



CURRICULUM AND SYLLABI

(2021-2022)

B.Tech. Computer Science and Engg with Spec. in Bioinformatics

B.Tech (CSE) with Specialization in Bioinformatics

CURRICULUM AND SYLLABI

(2021-2022 Admitted Students)





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VISION STATEMENT OF VELLORE INSTITUTE OF TECHNOLOGY

> Transforming life through excellence in education and research.

MISSION STATEMENT OF VELLORE INSTITUTE OF TECHNOLOGY

- World class Education: Excellence in education, grounded in ethics and critical thinking, for improvement of life.
- Cutting edge Research: An innovation ecosystem to extend knowledge and solve critical problems.
- Impactful People: Happy, accountable, caring and effective workforce and students.
- Rewarding Co-creations: Active collaboration with national & international industries & universities for productivity and economic development.
- Service to Society: Service to the region and world through knowledge and compassion.



VISION STATEMENT OF THE SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

To be a world-renowned centre of education, research and service in computing and allied domains.

MISSION STATEMENT OF THE SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

- To offer computing education programs with the goal that the students become technically competent and develop lifelong learning skill.
- To undertake path-breaking research that creates new computing technologies and solutions for industry and society at large.
- To foster vibrant outreach programs for industry, research organizations, academia and society.



B.Tech – CSE with Specialization in Bioinformatics

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- 1. Graduates will be engineering practitioners and leaders, who would help solve industry's technological problems.
- 2. Graduates will be engineering professionals, innovators or entrepreneurs engaged in technology development, technology deployment, or engineering system implementation in industry.
- 3. Graduates will function in their profession with social awareness and responsibility.
- 4. Graduates will interact with their peers in other disciplines in industry and society and contribute to the economic growth of the country.
- 5. Graduates will be successful in pursuing higher studies in engineering or management.
- 6. Graduates will pursue career paths in teaching or research.



B.Tech – CSE with Specialization in Bioinformatics

PROGRAMME OUTCOMES (POs)

- > **PO_01:** Having an ability to apply mathematics and science in engineering applications.
- PO_02: Having a clear understanding of the subject related concepts and of contemporary issues and apply them to identify, formulate and analyse complex engineering problems.
- PO_03: Having an ability to design a component or a product applying all the relevant standards and with realistic constraints, including public health, safety, culture, society and environment
- PO_04: Having an ability to design and conduct experiments, as well as to analyze and interpret data, and synthesis of information
- PO_05: Having an ability to use techniques, skills, resources and modern engineering and IT tools necessary for engineering practice
- PO_06: Having problem solving ability- to assess social issues (societal, health, safety, legal and cultural) and engineering problems
- PO_07: Having adaptive thinking and adaptability in relation to environmental context and sustainable development
- > PO_08: Having a clear understanding of professional and ethical responsibility
- > **PO_09:** Having cross cultural competency exhibited by working as a member or in teams
- PO_10: Having a good working knowledge of communicating in English communication with engineering community and society
- PO_11: Having a good cognitive load management skills related to project management and finance
- > **PO_12:** Having interest and recognize the need for independent and lifelong learning



B.Tech – CSE with Specialization in Bioinformatics

PROGRAMME SPECIFIC OUTCOMES (PSOs)

- 1. The ability to formulate mathematical models and problem-solving skills through programming techniques for addressing real-time problems using appropriate data structures and algorithms.
- 2. The ability to design hardware and software through system programming skills based on the knowledge acquired in the system software and hardware courses.
- 3. The ability to interpret relationships among living things and analyze the biological problems, from molecular to ecosystem level, solving them using basic biological concepts, algorithms, and tools available in computer science and to facilitate the biological database system.



B.Tech – CSE with Specialization in Bioinformatics

CREDIT STRUCTURE

Category Wise Credit Distribution

Category	Credits
Foundation Core	55
Discipline-linked Engineering Sciences	12
Discipline Core	44
Specialization Elective	21
Projects and Internship	9
Open Elective	9
Bridge Course	0
Non-graded Core Requirement	11
Total Credits	161

Foundation Core	Discipline- linked Engineering Sciences	Discipline Core	Specialization Elective	Projects and Internship	Elective	Course	Non-graded Core Requirement	Total Credits
55	12	44	21	9	9	0	11	161

		FOUND	DATION CORE						
S. No	Course Code	course Title	Course Type	Versi on	L	Т	Р	J	С
1.	BCHY101L	Engineering Chemistry	Theory Only	1.0	3	0	0	0	3.0
2.	BCHY101P	Engineering Chemistry Lab	Lab Only	1.0	0	0	2	0	1.0
3.	BCSE101E	Computer Frogramming.	Embedded Theory and Lab	1.0	1	0	4	0	3.0
4.	BCSE102L	Structured and Object-Oriented Programming	Theory Only	1.0	2	0	0	0	2.0
5.	BCSE102P	Structured and Object-Oriented Programming Lab	Lab Only	1.0	0	0	4	0	2.0
6.	BCSE103E	Computer Programming. Java	Embedded Theory and Lab	1.0	1	0	4	0	3.0
7.	BECE101L	Basic Electronics	Theory Only	1.0	2	0	0	0	2.0
8.	BECE101P	Basic Electronics Lab	Lab Only	1.0	0	0	2	0	1.0
9.	BEEE101L	Basic Electrical Engineering	Theory Only	1.0	2	0	0	0	2.0
10.	BEEE101P	Basic Electrical Engineering Lab	Lab Only	1.0	0	0	2	0	1.0
11.	BENG101L	Technical English Communication	Theory Only	1.0	2	0	0	0	2.0
12.	BENG101P	Technical English Communication Lab	Lab Only	1.0	0	0	2	0	1.0
13.	BENG102P	Technical Report Writing	Lab Only	1.0	0	0	2	0	1.0
14.	BMAT101L	Calculus	Theory Only	1.0	3	0	0	0	3.0
15.	BMAT101P	Calculus Lab	Lab Only	1.0	0	0	2	0	1.0
16.	BMAT102L	Differential Equations and Transforms	Theory Only	1.0	3	1	0	0	4.0

17.	BMAT201L	Complex Variables and Linear Algebra	Theory Only	1.0	3	1	0	0	4.0
18.	BMAT202L	Probability and Statistics	Theory Only	1.0	3	0	0	0	3.0
19.	BMAT202P	Probability and Statistics Lab	Lab Only	1.0	0	0	2	0	1.0
20.	BPHY101L	Engineering Physics	Theory Only	1.0	3	0	0	0	3.0
21.	BPHY101P	Engineering Physics Lab	Lab Only	1.0	0	0	2	0	1.0
22.	BSTS101P	Quantitative Skills Practice I	Soft Skill	1.0	0	0	3	0	1.5
23.	BSTS102P	Quantitative Skills Practice II	Soft Skill	1.0	0	0	3	0	1.5
24.	BSTS201P	Qualitative Skills Practice I	Soft Skill	1.0	0	0	3	0	1.5
25.	BSTS202P	Qualitative Skills Practice II	Soft Skill	1.0	0	0	3	0	1.5
26.	BFLE200L	B.Tech. Foreign Language - 2021	Basket	1.0	0	0	0	0	2.0
27.	BHSM200L	B.Tech. HSM Elective - 2021	Basket	1.0	0	0	0	0	3.0
B.T	ech. Foreign I	Language - 2021				1			
1.	BARB101L	Arabic							
2.	BCHI101L	Chinese I							
3.	BESP101L	Spanish I							
4.	BFRE101L	French I							
5.	BGER101L	German I							
6.	BGRE101L	Modern Greek							
7.	BITL101L	Italian							
8.	BJAP101L	Japanese I							
B.T	ech. HSM Ele	ctive - 2021							
1.	BCLE214L	Global Warming							
2.	BCLE215L	Waste Management							
3.	BCLE216L	Water Resource Management							
4.	BHUM102E	Indian Classical Music							
5.	BHUM103L	Micro Economics							
6.	BHUM104L	Macro Economics							
7.	BHUM105L	Public Policy and Administration	Dn						
8.	BHUM106L	Principles of Sociology							
9.	BHUM107L	Sustainability and Society							

10.	BHUM108L	Urban Community Developmen	t						
11.	BHUM109L	Social Work and Sustainability							
12.	BHUM110E	Cognitive Psychology							
13.	BMGT101L	Principles of Management							
14.	BMGT102L	Human Resource Management							
15.	BMGT103L	Organizational Behavior							
16.	BMGT104L	Marketing Management							
17.	BMGT105L	Consumer Behavior							
18.	BMGT106L	Digital Marketing							
<u>10.</u> 19.	BMGT100L	Business Analytics							
19.	DWIGITUTL	•							
		DISCIPLINE-LINKED	ENGINEERING	SCIE	NCES				
S. No	Course Code	Course Title	Course Type	Versi on	L	Т	Р	J	С
1.	BECE102L	Digital Systems Design	Theory Only	1.0	3	0	0	0	3.0
2.	BECE102P	Digital Systems Design Lab	Lab Only	1.0	0	0	2	0	1.0
3.	BECE204L	Microprocessors and Microcontrollers	Theory Only	1.0	3	0	0	0	3.0
4.	BECE204P	Microprocessors and Microcontrollers Lab	Lab Only	1.0	0	0	2	0	1.0
5.	BMAT205L	Discrete Mathematics and Graph Theory	Theory Only	1.0	3	1	0	0	4.0
	L		PLINE CORE			<u> </u>			
C	Course Code	Course Title	Course Type	Versi	L	Т	Р	J	С
No				on	1		1		
1.	BCSE202L	Data Structures and Algorithms	Theory Only	1.0	3	0	0	0	3.0
2.	BCSE202P	Data Structures and Algorithms Lab	Lab Only	1.0	0	0	2	0	1.0
3.	BCSE204L	Design and Analysis of Algorithms	Theory Only	1.0	3	0	0	0	3.0
4.	BCSE204P	Design and Analysis of Algorithms Lab	Lab Only	1.0	0	0	2	0	1.0
5.	BCSE205L	Computer Architecture and Organization	Theory Only	1.0	3	0	0	0	3.0
6.	BCSE301L	Software Engineering	Theory Only	1.0	3	0	0	0	3.0
7.	BCSE301P	Software Engineering Lab	Lab Only	1.0	0	0	2	0	1.0
8.	BCSE302L	Database Systems	Theory Only	1.0	3	0	0	0	3.0
9.	BCSE302P	Database Systems Lab	Lab Only	1.0	0	0	2	0	1.0
10.	BCSE303L	Operating Systems	Theory Only	1.0	3	0	0	0	3.0
11.	BCSE303P	Operating Systems Lab	Lab Only	1.0	0	0	2	0	1.0
12.	BCSE304L	Theory of Computation	Theory Only	1.0	3	0	0	0	3.0
13.	BCSE305L	Embedded Systems	Theory Only	1.0	3	0	0	0	3.0
								0	

14.	BCSE306L	Artificial Intelligence	Theory Only	1.0	3	0	0	0	3.0
15.	BCSE307L	Compiler Design	Theory Only	1.0	3	0	0	0	3.0
16.	BCSE307P	Compiler Design Lab	Lab Only	1.0	0	0	2	0	1.0
17.	BCSE308L	Computer Networks	Theory Only	1.0	3	0	0	0	3.0
18.	BCSE308P	Computer Networks Lab	Lab Only	1.0	0	0	2	0	1.0
19.	BCSE309L	Cryptography and Network Security	Theory Only	1.0	3	0	0	0	3.0
20.	BCSE309P	Cryptography and Network Security Lab	Lab Only	1.0	0	0	2	0	1.0
		SPECIALIZA	ATION ELECTIV	VE					
Ş.	Course Code	Course Title	Course Type	Versi	L	Т	Р	J	С
No				on	_	r	1		_
1.	BBIT207L	Molecular Biology	Theory Only	1.0	3	0	0	0	3.0
2.	BBIT207P	Molecular Biology Lab	Lab Only	1.0	0	0	2	0	1.0
3.	BBIT208L	Biochemistry	Theory Only	1.0	3	0	0	0	3.0
4.	BBIT324L	Cell Biology and Genetics	Theory Only	1.0	3	0	0	0	3.0
5.	BBIT327L	Data Analytics in Bioinformatics	Theory Only	1.0	3	0	0	0	3.0
6.	BBIT401L	Molecular Modelling and Drug Design	Theory Only	1.0	3	0	0	0	3.0
7.	BBIT417L	Analytical Bioinformatics	Theory Only	1.0	3	0	0	0	3.0
8.	BBIT417P	Analytical Bioinformatics Lab	Lab Only	1.0	0	0	2	0	1.0
9.	BBIT418L	Biological Databases	Theory Only	1.0	3	0	0	0	3.0
10.	BBIT418P	Biological Databases Lab	Lab Only	1.0	0	0	2	0	1.0
		PROJECTS	AND INTERNSH	IP					
Ş.	Course Code	Course Title	Course Type	Versi	L	Т	Р	J	С
No 1.	BCSE399J	Summer Industrial Internship	Project	on 1.0	0	0	0	0	1.0
2.	BCSE497J	Project - I	Project	1.0	0	0	0	0	3.0
3.	BCSE498J	Project - II / Internship	Project	1.0	0	0	0	0	5.0
4.	BCSE499J	One Semester Internship	Project	1.0	0	0	0	0	14.0
		1	ELECTIVE			-		-	
G			C T	•	Ŧ	T	D		0
S. No	Course Code	Course Title	Course Type	Versi on	L	Т	Р	J	С
1.	BCSE353E	Information Security Analysis and Audit	ETL	1.0	1	0	2	0	2.0
2.	BCSE354E	Information Security Management	ETL	1.0	1	0	2	0	2.0
3.	BCSE391J	Technical Answers to Real Problems Project	РЈТ	1.0	0	0	0	0	3.0
4.	BCSE392J	Design Project	РЈТ	1.0	0	0	0	0	3.0
5.	BCSE393J	Laboratory Project	РЈТ	1.0	0	0	0	0	3.0
								10	

6.	BCSE394J	Product Development Project	PJT	1.0	0	0	0	0	3.0
7.	BCSE395J	Reading Course	PJT	1.0	0	0	0	0	3.0
8.	BCSE396J	Special Project	PJT	1.0	0	0	0	0	3.0
9.	BCSE397J	Simulation Project	PJT	1.0	0	0	0	0	3.0
10.	BSTS301P	Advanced Competitive Coding -I	SS	1.0	0	0	3	0	1.5
11.	BSTS302P	Advanced Competitive Coding -II	SS	1.0	0	0	3	0	1.5
12.	CFOC102M	Introduction to Cognitive Psychology	Online Course	1.0	0	0	0	0	3.0
13.	CFOC103M	Introduction to Political Theory	Online Course	1.0	0	0	0	0	3.0
14.	CFOC104M	Six Sigma	Online Course	1.0	0	0	0	0	3.0
15.	CFOC105M	Emotional Intelligence	Online Course	1.0	0	0	0	0	2.0
16.	CFOC109M	Design Thinking - A Primer	Online Course	1.0	0	0	0	0	1.0
17.	CFOC118M	Practical Machine Learning with Tensorflow	Online Course	1.0	0	0	0	0	2.0
18.	CFOC122M	Educational Leadership	Online Course	1.0	0	0	0	0	2.0
19.	CFOC133M	E-Business	Online Course	1.0	0	0	0	0	3.0
20.	CFOC152M	Pattern Recognition and Application	Online Course	1.0	0	0	0	0	3.0
21.	CFOC165M	Software testing	Online Course	1.0	0	0	0	0	3.0
22.	CFOC188M	Ethical Hacking	Online Course	1.0	0	0	0	0	3.0
23.	CFOC190M	Positive Psychology	Online Course	1.0	0	0	0	0	2.0
24.	CFOC191M	Forests and their Management	Online Course	1.0	0	0	0	0	3.0
25.	CFOC193M	Bioengineering: An Interface with Biology and Medicine	Online Course	1.0	0	0	0	0	2.0
26.	CFOC197M	Bio-Informatics: Algorithms and Applications	Online Course	1.0	0	0	0	0	3.0
27.	CFOC203M	Natural Hazards	Online Course	1.0	0	0	0	0	2.0
28.	CFOC207M	Electronic Waste Management - Issues And Challenges	Online Course	1.0	0	0	0	0	1.0
29.	CFOC227M	GPU Architectures and Programming	Online Course	1.0	0	0	0	0	3.0
30.	CFOC232M	Consumer Behaviour	Online Course	1.0	0	0	0	0	2.0
31.	CFOC235M	Rocket Propulsion	Online Course	1.0	0	0	0	0	3.0
32.	CFOC236M	Aircraft Maintenance	Online Course	1.0	0	0	0	0	1.0
33.	CFOC253M	Plastic Waste Management	Online Course	1.0	0	0	0	0	2.0
34.	CFOC258M	Introduction to Geographic Information Systems	Online Course	1.0	0	0	0	0	1.0
35.	CFOC282M	Waste to Energy Conversion	Online Course	1.0	0	0	0	0	2.0
36.	CFOC329M	Design, Technology and Innovation	Online Course	1.0	0	0	0	0	2.0
37.	CFOC332M	Fundamentals of Automotive	Online Course	1.0	0	0	0	0	3.0

		Systems							
38.	CFOC356M	Analog Circuits	Online Course	1.0	0	0	0	0	3.0
39.	CFOC365M	Evolution of Air Interface towards 5G	Online Course	1.0	0	0	0	0	2.0
40.	CFOC384M	Entrepreneurship Essentials	Online Course	1.0	0	0	0	0	3.0
41.	CFOC388M	Energy Resources, Economics and Environment	Online Course	1.0	0	0	0	0	3.0
42.	CFOC391M	Effective Writing	Online Course	1.0	0	0	0	0	1.0
43.	CFOC395M	Speaking Effectively	Online Course	1.0	0	0	0	0	2.0
44.	CFOC397M	Intellectual Property	Online Course	1.0	0	0	0	0	3.0
45.	CFOC400M	Language and Mind	Online Course	1.0	0	0	0	0	2.0
46.	CFOC401M	The Nineteenth - Century English Novel	Online Course	1.0	0	0	0	0	3.0
47.	CFOC402M	Introduction to World Literature	Online Course	1.0	0	0	0	0	3.0
48.	CFOC405M	Economic Growth & Development	Online Course	1.0	0	0	0	0	2.0
49.	CFOC406M	Human Behaviour	Online Course	1.0	0	0	0	0	2.0
50.	CFOC407M	Introduction to Modern Indian Political Thought	Online Course	1.0	0	0	0	0	3.0
51.	CFOC408M	English Literature of the Romantic Period, 1798 – 1832	Online Course	1.0	0	0	0	0	2.0
52.	CFOC416M	Feminism: Concepts and Theories	Online Course	1.0	0	0	0	0	3.0
53.	CFOC419M	Basic Real Analysis	Online Course	1.0	0	0	0	0	3.0
54.	CFOC442M	Robotics and Control: Theory and Practice	Online Course	1.0	0	0	0	0	2.0
55.	CFOC475M	IC Engines and Gas Turbines	Online Course	1.0	0	0	0	0	3.0
56.	CFOC488M	Business Analytics For Management Decision	Online Course	1.0	0	0	0	0	3.0
57.	CFOC490M	Sales and Distribution Management	Online Course	1.0	0	0	0	0	2.0
58.	CFOC493M	Management of Inventory Systems	Online Course	1.0	0	0	0	0	3.0
59.	CFOC494M	Quality Design And Control	Online Course	1.0	0	0	0	0	3.0
60.	CFOC495M	Foundation Course in Managerial Economics	Online Course	1.0	0	0	0	0	2.0
61.	CFOC496M	Engineering Econometrics	Online Course	1.0	0	0	0	0	3.0
62.	CFOC497M	Financial Statement Analysis and Reporting	Online Course	1.0	0	0	0	0	3.0
63.	CFOC498M	Business Statistics	Online Course	1.0	0	0	0	0	3.0
64.	CFOC499M	Global Marketing Management	Online Course	1.0	0	0	0	0	2.0
65.	CFOC500M	Marketing Research and Analysis – II	Online Course	1.0	0	0	0	0	3.0

67.CFOC505MManagement of Commercial BankingOnline Course1.000003.068.CFOC508MEntrepreneurshipOnline Course1.000003.068.CFOC508MInternational BusinessOnline Course1.000003.070.CFOC570MPublic SpeakingOnline Course1.000003.071.CFOC570MPublic SpeakingOnline Course1.000003.072.CFOC578MWastewater Treatment and RecyclingOnline Course1.000003.073.CFOC578MReal-Time SystemsOnline Course1.000003.074.CFOC587MReal-Time SystemsOnline Course1.000003.075.CFOC591MPrinciples Of ManagementOnline Course1.000003.076.CFOC594MCustomer Relationship CommunicationOnline Course1.000003.076.CFOC594MBiologyTheory Only1.0310003.077.CFOC594MCourse TitleCourse TypeVersiLTPJ078.Course CodeCourse TitleCourse TypeVersiLTPJ078.BENG101N <th>7. CFOC505M Management of Commercial Banking Online Course 1.0 0 0 0 3.0 86. CFOC508M Entrepreneurship Online Course 1.0 0 0 0 0 3.0 69. CFOC543M International Business Online Course 1.0 0<</th> <th></th>	7. CFOC505M Management of Commercial Banking Online Course 1.0 0 0 0 3.0 86. CFOC508M Entrepreneurship Online Course 1.0 0 0 0 0 3.0 69. CFOC543M International Business Online Course 1.0 0<										
Banking Image: Constraint of the second	Banking Online Course 1.0 0	66.	CFOC503M	Marketing Analytics	Online Course	1.0	0	0	0	0	3.0
69. CFOC543M International Business Online Course 1.0 0 0 0 3.0 70. CFOC550M Numerical Analysis Online Course 1.0 0 0 0 0 4.0 71. CFOC570M Public Speaking Online Course 1.0 0 0 0 0 0 0 3.0 72. CFOC575M Wildlife Ecology Online Course 1.0 0 0 0 0 3.0 73. CFOC580M Real-Time Systems Online Course 1.0 0 0 0 0 3.0 74. CFOC580M Real-Time Systems Online Course 1.0 0 0 0 3.0 75. CFOC591M Principles Of Management Online Course 1.0 0 0 0 3.0 0 0 2.0 76. CFOC594M Customer Relationship Management Online Course 1.0 0 0 0 3.0 0 0 3.0 0 0 3.0 0 0 3.0 <td>69. CFOC543M International Business Online Course 1.0 0 0 0 3.0 70. CFOC550M Numerical Analysis Online Course 1.0 0 0 0 0 4.0 71. CFOC570M Public Speaking Online Course 1.0 <td< td=""><td>67.</td><td>CFOC505M</td><td>6</td><td>Online Course</td><td>1.0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>3.0</td></td<></td>	69. CFOC543M International Business Online Course 1.0 0 0 0 3.0 70. CFOC550M Numerical Analysis Online Course 1.0 0 0 0 0 4.0 71. CFOC570M Public Speaking Online Course 1.0 0 <td< td=""><td>67.</td><td>CFOC505M</td><td>6</td><td>Online Course</td><td>1.0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>3.0</td></td<>	67.	CFOC505M	6	Online Course	1.0	0	0	0	0	3.0
70. CFOC550M Numerical Analysis Online Course 1.0 0 0 0 4.0 71. CFOC570M Public Speaking Online Course 1.0 0 0 0 0 3.0 72. CFOC575M Wildlife Ecology Online Course 1.0 0 0 0 0 3.0 73. CFOC578M Wastewater Treatment and Recycling Online Course 1.0 0 0 0 0 3.0 74. CFOC580M Real-Time Systems Online Course 1.0 0 0 0 0 3.0 75. CFOC591M Principles Of Management Online Course 1.0 0 0 0 0 3.0 76. CFOC591M Principles Of Management Online Course 1.0 0 0 0 3.0 0 0 3.0 77. CFOC594M Customer Relationship Management Doline Course 1.0 0 0 4.0 2.0 8 BBIT100N Biology Theory Only 1.0 3	70. CPOC550M Numerical Analysis Online Course 1.0 0 </td <td>68.</td> <td>CFOC508M</td> <td>Entrepreneurship</td> <td>Online Course</td> <td>1.0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>3.0</td>	68.	CFOC508M	Entrepreneurship	Online Course	1.0	0	0	0	0	3.0
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5. ACXC105N Astronomy - Beyond the Universe		3. No 1. 2. 3. 4. 5. 6. Ex 1. 2. 3.	BMAT100N Course Code BCHY102N BCSE101N BHUM101N BSSC101N BSSC102N BEXC100N Ctracurricular ACXC101N ACXC102N ACXC103N	Communication Mathematics NON-GRADED Course Title Environmental Sciences Introduction to Engineering Ethics and Values Essence of Traditional Knowledge Indian Constitution Extracurricular Activities / Co-Curricular Activities / Co-Curricular Activities / B.Tech. Programmes Activities / Co-Curricular Act Art of Advertising and Marketin ABC of Cells IOS Platform	Theory Only CORE REQUIRE Course Type Online Course Project Online Course Online Course Online Course Basket ivities - B.Tech. Prong	1.0 Version 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	3 F 0 0 0 0 0 0 0	1 7 0 0 0 0 0 0	0 P 0 0 0 0 0 0	0 J 0 0 0 0 0	4.0 C 2.0 1.0 2.0 2.0 2.0
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10.	ACXC110N	Innovation and Creativity in New Product and Technology
11.	ACXC111N	
12.	ACXC112N	Premier Technology and Gadgets
13.	ACXC113N	Finance and Trading
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21.	ACXC121N	Creativity Through Multimedia
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(2021-2022)

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BCHY101L	Engineering Chemistry	3	0	0	3
Pre-requisite	NIL	Sy	llabı	ıs ver	sion
		1.)		
Course Objectives	\$				
 To enable stud disciplines of of 2. To provide ave To empower sta addressing soc To integrate ar individuals cor To offer opport higher learning Course Outcomes Understand the chemistry. Analyze the pri Apply chemical Apply chemical Appreciate the Design new material Module:1 Chem aws of thermodyperiod	ents to have fundamental understanding of the basic chemistry. nues for learning advanced concepts from school to uni- tudents with emerging concepts in applied chemistry t ietal needs adytical and computational ability with experimental sl npetent in basic science and its by-product of its applic tunities to create pathways for self-reliant in terms of k	versity o be to kills tr ation. nowle sical, es. applic coatin aneity ctivat	and ations dge a and and ations of a ion e	l in ate nd analy s. hniqu hniqu a cher nergy	tica es.
Module:2 Meta	l complexes and organometallics		6	hours	
Inorganic comple stability, structur	xes - structure, bonding and application; Organometa e and applications of metal carbonyls, ferrocene a (haemoglobin, chlorophyll- structure and property).				
	nic intermediates and reaction transformations			hours	
Aromatics (aroma cansformations for	liates - stability and structure of carbocations, carbiticity) and heterocycles (3, 4, 5, 6 membered and fused r making useful drugs for specific disease targets (two ion, substitution and cross coupling reactions).	lsyste	ems);	Orgai	nic
Module:4 Ener	gy devices		6]	hours	
Electrochemical an electrode-electroly ells: H2-On and s	nd electrolytic cells — electrode materials with example te interface- chemistry of Li ion secondary batteries, su solid oxide fuel cell (SOFC); Solar cells - photovoltai cal cells and dye-sensitized cells.	uperca	pacit	ors; F	uel
Module:5 Func	tional materials		71	hours	

1 D /	AKELITE); Conducting polymers- polyace	atulana and	offoot of	doning ohor	nistry of display
	evices specific to OLEDs; Nano materials				
	wn and bottom-up approaches for synthes				
Μ	lodule:6 Spectroscopic, diffraction and	d microsco	oic techni	iques	5 hours
	ndamental concepts in spectroscopic and				
of U	UV-Visible and XRD techniques (numerica	lls); Overvie	w of vario	ous techniques s	such as AAS, IR,
NM	AR, SEM and TEM.				
Μ	Iodule:7 Industrial applications				7 hours
Wa	ater purification methods - zeolites, ion	i-exchange	resins an	d reverse osn	nosis; Fuels and
	nbustion -LCV, HCV, Bomb calorimet				
	atings for corrosion control: cathodic a				=
	sors for environmental monitoring - gas		erview of	computationa	l methodologies:
ene	ergy minimization and conformational ar	nalysis.			
	Iodule:8 Contemporary topics				2 hours
Gue	est lectures from Industry and, Research a	and Develop	ment Org	anizations	
т	otal Lecture hours:			45 hou	Inc
	otal Lecture nours.			45 1100	115
1.	Theodore E. Brown, H Eugene, LeMa Woodward, Matthew E. Stoltzfus, Che Pearson Publishers, 2017. UK				
					7, 14th Califon,
Re	ference Books				
Re 1.		Chemistry:		and Function,	
	ference Books Peter Vollhardt, Neil Schore, Organic O WH Freeman, London Atkins' Physical Chemistry: Internation	-	Structure		2018, 8th ed.
1.	ference Books Peter Vollhardt, Neil Schore, Organic C WH Freeman, London Atkins' Physical Chemistry: Internation Press; UK Colin Banwell, Elaine McCash, Fundar	nal, 2018, E	Structure leventh ec	dition, Oxford	2018, 8th ed. University
1. 2.	ference Books Peter Vollhardt, Neil Schore, Organic C WH Freeman, London Atkins' Physical Chemistry: Internation Press; UK	nal, 2018, E	Structure leventh ec Molecula	dition, Oxford r Spectroscopy	2018, 8th ed. University y, 4th Edition,
1. 2. 3.	ference Books Peter Vollhardt, Neil Schore, Organic G WH Freeman, London Atkins' Physical Chemistry: Internation Press; UK Colin Banwell, Elaine McCash, Fundar McGraw Hill, US Solid State Chemistry and its Applicati	nal, 2018, E mentals for ons, Antho Vilfried van	Structure leventh eo Molecula ny R. Wes Sark, Ale	dition, Oxford r Spectroscopy st. 2014, 2nd e exandre Freund	2018, 8th ed. University y, 4th Edition, dition, Wiley, dlich,
1. 2. 3. 4.	ference BooksPeter Vollhardt, Neil Schore, Organic OWH Freeman, LondonAtkins' Physical Chemistry: InternationPress; UKColin Banwell, Elaine McCash, FundarMcGraw Hill, USSolid State Chemistry and its ApplicatiUK.AngA"Ie Reinders, Pierre Verlinden, W	al, 2018, E mentals for ons, Antho Vilfried van mentals to A	Structure leventh ea Molecula ny R. Wes Sark, Ala Applicatio	dition, Oxford r Spectroscopy st. 2014, 2nd e exandre Freund ons, 2017, Wile	2018, 8th ed. University y, 4th Edition, dition, Wiley, dlich, ey publishers,
1. 2. 3. 4. 5. 6.	ference Books Peter Vollhardt, Neil Schore, Organic G WH Freeman, London Atkins' Physical Chemistry: Internation Press; UK Colin Banwell, Elaine McCash, Fundar McGraw Hill, US Solid State Chemistry and its Applicati UK. AngA"Ie Reinders, Pierre Verlinden, W Photovoltaic solar energy: From fundar Lawrence S. Brown and Thomas Holm edition — Open access version	al, 2018, E mentals for ons, Antho Vilfried van mentals to A e, Chemisti	Structure leventh eo Molecula ny R. Wes Sark, Ale Applicatio	dition, Oxford r Spectroscopy st. 2014, 2nd e exandre Freund ons, 2017, Wile	2018, 8th ed. University y, 4th Edition, dition, Wiley, dlich, ey publishers,
1. 2. 3. 4. 5. 6.	ference Books Peter Vollhardt, Neil Schore, Organic G WH Freeman, London Atkins' Physical Chemistry: Internation Press; UK Colin Banwell, Elaine McCash, Fundar McGraw Hill, US Solid State Chemistry and its Applicati UK. AngA"Ie Reinders, Pierre Verlinden, W Photovoltaic solar energy: From fundar Lawrence S. Brown and Thomas Holm	al, 2018, E mentals for ons, Antho Vilfried van mentals to A e, Chemisti	Structure leventh ec Molecula ny R. Wes Sark, Ale Applicatio ry for eng	dition, Oxford r Spectroscopy st. 2014, 2nd e exandre Freund ons, 2017, Wile	2018, 8th ed. University y, 4th Edition, dition, Wiley, dlich, ey publishers,

Cour	se Code	Co	ourse Title			L	Т	P	С
BCHY	7101P	Engineeri	ng Chemist	ry Lab		0	0	2	1
Pre-re	quisite		0			Sy	llabus	vers	ion
	1.0								
Course	Objectives								
To appl	y theoretic	al knowledge gained in	the theory co	ourse and	d get hands	s-on e	xperie	nce of	f th
topics.									
~	O								
	Outcomes	.1 . 1 . 111	11 /						
		burse the student will be		ion oo on	analysis a	fmat	liona	hrim	
	of experime	the importance and han	ds-on experi	lence on	analysis o	i meta	al ions	by m	ean
	-	al experience on synthes	is and chara	cterizati	on of the o	roania	r mole	rules	anc
		als in the laboratory.		- WIIZully		- Suin	11010	-4103	and
		knowledge in thermody	namic funct	tions, kir	netics and r	nolec	ular ge	omet	ries
		experiments.		,			- 0-		
		-							
Indicati	ve Experin	nents							
1. Th	ermodynar	nics functions from EM	F measurem	ents: Zir	nc – Coppe	r syst	em		
	· · ··	C (1	1 1 1	· · · · · · · · · · · · · · · · · · ·	.1 1	1 1	1 .		
2. De	termination	n of reaction rate, order	and molecul	arity of	ethylacetat	e nyd	rolysis		
3. Co	lorimetric	estimation of Ni ²⁺ using	convention	al and sr	nart phone	digita	al-imag	ging	
me	thods								
	•	cale preparation of impor	rtant drug in	termedia	ate - para a	minop	phenol	for th	ne
•		acetaminophen							
5. Ma	agnesium-s	ea water activated cell -	Effect of sa	lt concer	ntration on	volta	ge gen	eratio	n
6 Ar	alysis of ir	on in an alloy sample by	y potentiome	etry					
7 D		<u> </u>	<u></u>	-	• .•				
/ Pre	eparation of	f tin oxide by sol- gel m	ethod and it	s charact	terization				
8 Siz	e depender	nt colour variation of Cu	12O nanopar	ticles by	spectroph	otome	eter		
9 De	termination	n of hardness of water sa	mple by co	mplayor	natria titrat	ion h	afora a	nd of	or
	i-exchange		ample by co	mpiexon	neure utral	1011 00	erore a	nu all	er
	e	al Optimization of molec	rular geome	try using	Avogadro	softy	vare		
	mputation	a optimization of molec	0						
	-				aboratory		s:	30 h	ou
		nt: Continuous assessn			l examinat	tion			
	•	Board of Studies	28-06-202	-					
	ad by A ag	demic Council	No. 63	Date	23-09-2	2021			

Course Code	Course Title	L	Т	P	С
BCSE101E	Computer Programming: Python	1	0	4	3
Pre-requisite	NIL	S	yllabu	is vei	
•		1.0			
Course Objectives	S				
2. To inculcate th	posure to basic problem-solving techniques using com ne art of logical thinking abilities and propose novel s ough programming language constructs	•	ns for	real	wor
Course Outcomes	1				
and demonst 2. Choose appr	ious algorithmic approaches, categorize the appropria trate various control constructs ropriate programming paradigms, interpret and hand ution through reusable modules; idealize the impor	dle dat	a usii	ng fil	les
Madula 1 Intra	duction to Duchlom Colving		1 h		
	Definition and Steps, Problem Analysis Chart, Deve udocode	eloping		lgori	thm
Introduction to Py	on Programming Fundamentals thon – Interactive and Script mode -Indentation - Co – Data Types – Operators and their Precedence – I		s - 1		oles
Introduction to Py Reserved Words - Functions – Impor Module:3 Cont	thon – Interactive and Script mode -Indentation - Co – Data Types – Operators and their Precedence – I ting from Packages trol Structures	Expres	ts - V sions 2 h	/arial – Bu	oles uilt-
Introduction to Py Reserved Words - Functions – Import Module:3 Cont Decision Making	thon – Interactive and Script mode -Indentation - Co – Data Types – Operators and their Precedence – I ting from Packages	Express	ts - V sions 2 h ents -	/arial – Bu ours Loop	oles uilt-
Introduction to Py Reserved Words - Functions – Import Module:3 Cont Decision Making	thon – Interactive and Script mode -Indentation - Co – Data Types – Operators and their Precedence – I ting from Packages trol Structures and Branching: if-else, nested if, multi-way if-elif s p – else clauses in loops, nested loops – break, continu	Express	sions 2 h ents - pass s	/arial – Bu ours Loop	oles uilt- oing nent
Introduction to Pyr Reserved Words – Functions – Import Module:3 Cont Decision Making while loop, for loop Module:4 Colle Lists: Create, Acce Create, Indexing a values, Operations	thon – Interactive and Script mode -Indentation - Co – Data Types – Operators and their Precedence – I ting from Packages trol Structures and Branching: if-else, nested if, multi-way if-elif s p – else clauses in loops, nested loops – break, continu ections ess, Slicing, Negative Indices, List methods, List comp and Slicing, Operations on tuples – Dictionary: Cre on dictionaries – Sets: Creation and operations	Express stateme ue and p prehen	sions 2 h ents - pass s 3 h sions dd an	/arial – Bu nours Loop tatem – Tu d rep	ples ping ples place
Introduction to Pyr Reserved Words - Functions – Import Module:3 Cont Decision Making while loop, for loop Module:4 Colle Lists: Create, Acce Create, Indexing a values, Operations Module:5 Strin	thon – Interactive and Script mode -Indentation - Co – Data Types – Operators and their Precedence – I ting from Packages trol Structures and Branching: if-else, nested if, multi-way if-elif s p – else clauses in loops, nested loops – break, continu ections ess, Slicing, Negative Indices, List methods, List comp and Slicing, Operations on tuples – Dictionary: Creation and operations on dictionaries – Sets: Creation and operations mgs and Regular Expressions	Express stateme ue and p prehen- eate, ad	sions 2 h ents - pass s 3 h sions 1d an 2 h	/arial – Bu ours Loop tatem ours d rep	ples ping pent ples
Introduction to Pyr Reserved Words - Functions – Import Module:3 Cont Decision Making while loop, for loop Module:4 Colle Lists: Create, Acce Create, Indexing a values, Operations Module:5 Strin	thon – Interactive and Script mode -Indentation - Co – Data Types – Operators and their Precedence – I ting from Packages trol Structures and Branching: if-else, nested if, multi-way if-elif s p – else clauses in loops, nested loops – break, continu ections ess, Slicing, Negative Indices, List methods, List comp and Slicing, Operations on tuples – Dictionary: Cre on dictionaries – Sets: Creation and operations mgs and Regular Expressions on, Formatting, Slicing, Splitting, Stripping – Regular F	Express stateme ue and p prehen- eate, ad	sions 2 h ents - pass s 3 h sions 1d an 2 h	/arial – Bu ours Loop tatem ours d rep	ples ping pent ples
Introduction to Pyr Reserved Words - Functions - ImportModule:3ContDecision Making while loop, for loopModule:4ColleLists: Create, Acce Create, Indexing a values, OperationsModule:5StrinStrings: Compariso	thon – Interactive and Script mode -Indentation - Co – Data Types – Operators and their Precedence – I ting from Packages trol Structures and Branching: if-else, nested if, multi-way if-elif s p – else clauses in loops, nested loops – break, continu ections ess, Slicing, Negative Indices, List methods, List comp and Slicing, Operations on tuples – Dictionary: Cre on dictionaries – Sets: Creation and operations ngs and Regular Expressions on, Formatting, Slicing, Splitting, Stripping – Regular Hee, Patterns	Express stateme ue and p prehen- eate, ad	sions 2 h ents - pass s 3 h sions 1d an 2 h sions:	/arial – Bu ours Loop tatem ours d rep	ples ping ples plac
Introduction to Pyr Reserved Words - Functions – Import Module:3 Cont Decision Making while loop, for loop Module:4 Colle Lists: Create, Acce Create, Indexing a values, Operations Module:5 Strin Strings: Compariso Search and Replac Module:6 Func Functions – Param with default values	thon – Interactive and Script mode -Indentation - Co – Data Types – Operators and their Precedence – I ting from Packages trol Structures and Branching: if-else, nested if, multi-way if-elif s p – else clauses in loops, nested loops – break, continu ections ess, Slicing, Negative Indices, List methods, List comp and Slicing, Operations on tuples – Dictionary: Creater on dictionaries – Sets: Creation and operations ngs and Regular Expressions on, Formatting, Slicing, Splitting, Stripping – Regular Here, Patterns eters and Arguments: Positional arguments, Keyword s - Local and Global scope of variables – Functions withons – Lambda Function. Files: Create, Open, Read, W	Express stateme ue and p prehent eate, ad Express argume th Arbi	$\begin{array}{r} \hline s & - \\ \hline sions \\ \hline 2 \\ \hline h \\ \hline ents & - \\ \hline pass \\ s \\ \hline 3 \\ \hline h \\ \hline sions \\ \hline d \\ an \\ \hline 2 \\ \hline h \\ \hline sions \\ \hline 3 \\ \hline h \\ \hline ents, \\ \hline itrary \\ \end{array}$	/arial – Bu ours Loop tatem ours – Tu d rep ours Mato	ples ping pent ples ples blac chin nete men
Introduction to Pyr Reserved Words – Functions – Import Module:3 Cont Decision Making while loop, for loop Module:4 Colle Lists: Create, Acce Create, Indexing a values, Operations Module:5 Strin Strings: Compariso Search and Replac Search and Replac Module:6 Funct Functions – Param with default values – Recursive Functi – tell and seek met	thon – Interactive and Script mode -Indentation - Co – Data Types – Operators and their Precedence – I ting from Packages trol Structures and Branching: if-else, nested if, multi-way if-elif s p – else clauses in loops, nested loops – break, continu ections ess, Slicing, Negative Indices, List methods, List comp and Slicing, Operations on tuples – Dictionary: Create on dictionaries – Sets: Creation and operations figs and Regular Expressions on, Formatting, Slicing, Splitting, Stripping – Regular Here, Patterns ettors and Files eters and Arguments: Positional arguments, Keyword s - Local and Global scope of variables – Functions withons figs and Files : Create, Open, Read, We thods	Express stateme ue and p prehent eate, ad Express argume th Arbi	$\begin{array}{r} \hline s & - & V \\ sions \\ \hline 2 & h \\ ents & - \\ pass & s \\ \hline 3 & h \\ sions \\ d & an \\ \hline 2 & h \\ sions: \\ \hline 3 & h \\ ents, I \\$	/arial – Bu ours Loop tatem ours – Tu d rep ours Mato	ples nilt- ping nent ples blac chin nete men Clo
Introduction to Pyr Reserved Words - Functions – ImportModule:3ContDecision Making while loop, for loopModule:4ColleLists: Create, AcceCreate, Indexing a values, OperationsModule:5StringStrings: ComparisoSearch and ReplacModule:6FunctFunctions – Param with default values– Recursive Functi– tell and seek metModule:7Module:7	thon – Interactive and Script mode -Indentation - Co – Data Types – Operators and their Precedence – I ting from Packages trol Structures and Branching: if-else, nested if, multi-way if-elif s p – else clauses in loops, nested loops – break, continu ections ess, Slicing, Negative Indices, List methods, List comp and Slicing, Operations on tuples – Dictionary: Creater on dictionaries – Sets: Creation and operations ngs and Regular Expressions on, Formatting, Slicing, Splitting, Stripping – Regular Here, Patterns eters and Arguments: Positional arguments, Keyword s - Local and Global scope of variables – Functions withons – Lambda Function. Files: Create, Open, Read, W	Express stateme le and p prehen- eate, ad Express argume th Arbi rite, Ap		/arial – Bu ours Loop tatem ours – Tu d rep d rep Mato Paran argun and	ples nilt- ping nent ples blac chin nete men Clo

Text Book(s)
1. Eric Matthes, Python Crash Course: A Hands-on, Project-Based Introduction to
Programming, 2 nd Edition, No starch press, 2019
Reference Books
 Martic C Brown, Python: The Complete Reference, 4th Edition, McGraw Hill Publishers, 2018
2. John V. Guttag, Introduction to computation and programming using Python: with applications to understanding data, 2 nd Edition, MIT Press, 2016
Mode of Evaluation: No separate evaluation for theory component
Indicative Experiments
1 Problem Analysis Chart, Flowchart and Pseudocode Practices
2 Sequential Constructs using Python Operators, Expressions
3 Branching (if, if-else, nested if, multi-way if-elif statements) and looping (for, while, nested looping, break, continue, else in loops)
4 Lists, Tuples, Dictionaries & Sets
5 Strings, Regular Expressions
6 Functions, Lambda, Recursive Functions and Files
7 Modules and Packages (NumPy and Pandas)
Total Laboratory Hours 60 hours
Text Book(s)
1 Mariano Anaya, Clean Code in Python: Develop maintainable and efficient code, 2 nd Edition, Packt Publishing Limited, 2021
Reference Book(s)
1 Harsh Bhasin, Python for beginners, 1 st Edition, New Age International (P) Ltd., 2019
Mode of assessment: Continuous Assessments and FAT
Recommended by Board of Studies 03-07-2021
Approved by Academic CouncilNo. 63Date23-09-2021

	Course Title	L	Т	P	С
BCSE102L	Structured and Object-Oriented Programming	2	0	0	2
Pre-requisite	NIL	Sy	llabu	s vei	sio
			1	.0	
Course Objectives					
	basic constructs in structured programming and object-or	riente	ed pro	gram	miı
paradigms.			1	, •	
2. To inculcate th world problem	e insights and benefits in accessing memory locations b	y imj	pleme	nting	g re
1	g real world problems through appropriate programming	o nar	adiom	s	
	g rear world problems unough appropriate programming	5 pare			
Course Outcomes					
	ourse, students should be able to:				
1. Understand	l different programming language constructs ar	nd d	lecisio	on-m	aki
statements;	manipulate data as a group.				
•	the application of modular programming approach; cre	ate u	ser de	finec	l da
	dealize the role of pointers				
	nd various elements of object-oriented programming	-	-	-	-
	rough inheritance and polymorphism; identify the approximately the approximately and the second	-			icti
for the give	en problem and devise solution using generic programm	ing te	echnic	lues.	
			1		
	ogramming Fundamentals		2 h	ours	
Variables Deserv					
	red words - Data Types – Operators – Operator Precede		Expr	ressic	ns
Type Conversions	ed words - Data Types – Operators – Operator Precede – I/O statements – Branching and Looping: if-else, nest	ted if	Expr	essic se lac	ons lde
Type Conversions switch statement,	red words - Data Types – Operators – Operator Precede	ted if	Expr	essic se lac	ons lde
Type Conversions switch statement, statements	ed words - Data Types – Operators – Operator Precede – I/O statements – Branching and Looping: if-else, nest goto statement - Loops: for, while and dowhile –	ted if	Expr , if-els , and	essic se lac cont	ons lde inu
Type Conversions switch statement, statements Module:2 Arra	ved words - Data Types – Operators – Operator Precede – I/O statements – Branching and Looping: if-else, nest goto statement - Loops: for, while and dowhile – ys and Functions	ted if	Expr , if-els c and 4 h	essic se lac cont ours	ons lde inu
Type Conversions switch statement, statements Module:2 Arra Arrays: One Dime	ed words - Data Types – Operators – Operator Precede – I/O statements – Branching and Looping: if-else, nest goto statement - Loops: for, while and dowhile –	ted if breal its op	Expr , if-els , and 4 h	essic se lac cont ours	ons lde inu Use
Type Conversions switch statement, statements Module:2 Arra Arrays: One Dime defined Functions:	red words - Data Types – Operators – Operator Precede – I/O statements – Branching and Looping: if-else, nest goto statement - Loops: for, while and dowhile – ys and Functions ensional array – Two-Dimensional array – Strings and	ted if breal its op	Expr , if-els c and 4 h peratione –	essic se lac cont ours ons.	ons Ide inu Uso
Type Conversions switch statement, statements <u>Module:2 Arra</u> Arrays: One Dime defined Functions: Functions – Recurs	red words - Data Types – Operators – Operator Precede – I/O statements – Branching and Looping: if-else, nest goto statement - Loops: for, while and dowhile – ys and Functions ensional array – Two-Dimensional array – Strings and Declaration – Definition – call by value and call by n sive functions – Storage classes – Scope, Visibility and	ted if breal its op	Expr , if-els c and 4 h perationence – ime of	essic se lac cont ours ons. - Typ f vari	ons Ide inu Uso es abl
Type Conversions switch statement, statements Module:2 Arra Arrays: One Dime defined Functions: Functions – Recurs Module:3 Point	red words - Data Types – Operators – Operator Precede – I/O statements – Branching and Looping: if-else, nest goto statement - Loops: for, while and dowhile – ys and Functions ensional array – Two-Dimensional array – Strings and Declaration – Definition – call by value and call by r sive functions – Storage classes – Scope, Visibility and ters	ted if breal its op refere Lifeti	Expr , if-els c and 4 h perationence – ime of 4 h	essic se lac cont ours ons. Typ f vari ours	ons Ide inu Uso oes abl
Type Conversions switch statement, statements Module:2 Arra Arrays: One Dime defined Functions: Functions – Recurs Module:3 Point Declaration and	red words - Data Types – Operators – Operator Precede – I/O statements – Branching and Looping: if-else, nest goto statement - Loops: for, while and dowhile – ys and Functions ensional array – Two-Dimensional array – Strings and Declaration – Definition – call by value and call by n sive functions – Storage classes – Scope, Visibility and	ted if breal its op refere Lifeti	Expr , if-els c and 4 h perationence – ime of 4 h	essic se lac cont ours ons. Typ f vari ours	ons Ide inu Uso oes abl
Type Conversions switch statement, statements Module:2 Arra Arrays: One Dime defined Functions: Functions – Recurs Module:3 Point Declaration and Allocation – Pointe	red words - Data Types – Operators – Operator Precede – I/O statements – Branching and Looping: if-else, nest goto statement - Loops: for, while and dowhile – ys and Functions ensional array – Two-Dimensional array – Strings and Declaration – Definition – call by value and call by r sive functions – Storage classes – Scope, Visibility and ters Access of Pointer Variables, Pointer Arithmetic – ers and Arrays – Pointers and Functions.	ted if breal its op refere Lifeti	Expr , if-els c and 4 h peration ence – ime of 4 h amic	essic se lac cont ours ons. - Typ f vari ours Men	ons Ide inu Us oes ab
Type Conversions switch statement, statements <u>Module:2</u> Arra Arrays: One Dime defined Functions: Functions – Recurs <u>Module:3</u> Point Declaration and Allocation – Pointe <u>Module:4</u> Struc	red words - Data Types – Operators – Operator Precede – I/O statements – Branching and Looping: if-else, nest goto statement - Loops: for, while and dowhile – ys and Functions misional array – Two-Dimensional array – Strings and Declaration – Definition – call by value and call by r sive functions – Storage classes – Scope, Visibility and ters Access of Pointer Variables, Pointer Arithmetic – ers and Arrays – Pointers and Functions.	its of refere Lifet	Expr , if-els c and 4 h peratic ence – ime of 4 h amic 2 h	essic se lac cont ours ons. - Typ f vari ours Men	ons Ide inu Uso es abl
Type Conversionsswitch statement,switch statementsModule:2ArraArrays: One Dimedefined Functions:Functions – RecursModule:3PointDeclaration andAllocation – PointeModule:4StrucDeclaration, Initial	red words - Data Types – Operators – Operator Precede – I/O statements – Branching and Looping: if-else, nest goto statement - Loops: for, while and dowhile – ys and Functions ensional array – Two-Dimensional array – Strings and Declaration – Definition – call by value and call by r sive functions – Storage classes – Scope, Visibility and ters Access of Pointer Variables, Pointer Arithmetic – ers and Arrays – Pointers and Functions.	its oprefere Lifeti	Expr , if-els c and 4 h peration ence – ime of 4 h amic 2 h – Arr	essic se lac cont ons. Typ f vari ours Men ours ays v	ons Ide inu Uso es abl
Type Conversions switch statement, statements <u>Module:2</u> Arra Arrays: One Dime defined Functions: Functions – Recurs <u>Module:3</u> Point Declaration and Allocation – Pointe <u>Module:4</u> Struc Declaration, Initial Structure – Structu	red words - Data Types – Operators – Operator Precede – I/O statements – Branching and Looping: if-else, nest goto statement - Loops: for, while and dowhile – ys and Functions ensional array – Two-Dimensional array – Strings and Declaration – Definition – call by value and call by r sive functions – Storage classes – Scope, Visibility and ters Access of Pointer Variables, Pointer Arithmetic – ers and Arrays – Pointers and Functions. cture and Union ization, Access of Structure Variables – Arrays of Struc- re within Structures - Structures and Functions – Pointer	its oprefere Lifeti	Expr , if-els c and 4 h peratic ence – ime of 4 h amic 2 h – Arra	essic se lac cont ours ons. - Typ f vari ours Men ours ays v ture	ons Ide inu Uso abl nor
Type Conversionsswitch statement,switch statement,statementsModule:2ArraArrays: One Dimedefined Functions:Functions – RecursModule:3PointDeclaration andAllocation – PointeModule:4StructorDeclaration, InitialStructure – StructuModule:5Over	red words - Data Types – Operators – Operator Precede – I/O statements – Branching and Looping: if-else, nest goto statement - Loops: for, while and dowhile – <u>ys and Functions</u> ensional array – Two-Dimensional array – Strings and Declaration – Definition – call by value and call by r sive functions – Storage classes – Scope, Visibility and ters Access of Pointer Variables, Pointer Arithmetic – ers and Arrays – Pointers and Functions. <u>eture and Union</u> ization, Access of Structure Variables – Arrays of Struc- re within Structures - Structures and Functions – Pointer view of Object-Oriented Programming	its of refere Lifett Dyn	Expr , if-els c and 4 h peration ence – ime of 4 h amic 2 h – Arra Struct 5 h	essic se lac cont ours ons. Typ f vari ours ays v ture ours	ons Ide inu Uso oes abl
Type Conversionsswitch statement,statementsModule:2ArraArrays: One Dimedefined Functions:Functions – RecursModule:3PointDeclaration andAllocation – PointeModule:4StrucDeclaration, InitialStructure – StructuModule:5OverFeatures of OOP –	red words - Data Types – Operators – Operator Precede – I/O statements – Branching and Looping: if-else, nest goto statement - Loops: for, while and dowhile – ys and Functions ensional array – Two-Dimensional array – Strings and Declaration – Definition – call by value and call by r sive functions – Storage classes – Scope, Visibility and ters Access of Pointer Variables, Pointer Arithmetic – ers and Arrays – Pointers and Functions. cture and Union ization, Access of Structure Variables – Arrays of Struc- re within Structures - Structures and Functions – Pointer view of Object-Oriented Programming Classes and Objects – "this" pointer – Constructors and	ted if breal its op refere Lifeti Dyn cture ers to	Expr , if-els c and 4 h peration ence – ime of 4 h amic 2 h - Arr Structo	essic se lac cont ours ons. Typ f vari ours Men ours ays v ture ours	ons Ide inu Uso oes abl nor vith
Type Conversionsswitch statement,statementsModule:2ArrayArrays: One Dimedefined Functions:Functions – RecursModule:3PointDeclaration andAllocation – PointeModule:4StructorDeclaration, InitialStructure – StructuModule:5OverFeatures of OOP –Data Members, Sta	red words - Data Types – Operators – Operator Precede – I/O statements – Branching and Looping: if-else, nest goto statement - Loops: for, while and dowhile – ys and Functions ensional array – Two-Dimensional array – Strings and a Declaration – Definition – call by value and call by re- sive functions – Storage classes – Scope, Visibility and ters Access of Pointer Variables, Pointer Arithmetic – ers and Arrays – Pointers and Functions. <u>eture and Union</u> ization, Access of Structure Variables – Arrays of Struc- re within Structures - Structures and Functions – Pointer view of Object-Oriented Programming Classes and Objects – "this" pointer – Constructors and atic Member Functions and Objects – Inline Functions -	ted if break its op refere Lifet Dyn cture ers to 1 Des – Cal	Expr , if-els c and 4 h peration ence – ime of 4 h amic 2 h - Arra Structo 1 by ro	essic se lac cont ours ons. Typ f vari ours ays v ture ours rs – sefere	ons Ide inu Use abl nor vith Sta
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Type Conversionsswitch statement,statementsModule:2ArrayArrays: One Dimedefined Functions:Functions – RecursModule:3PointDeclaration andAllocation – PointeModule:4StructorDeclaration, InitialStructure – StructuModule:5OverFeatures of OOP –Data Members, Sta	red words - Data Types – Operators – Operator Precede – I/O statements – Branching and Looping: if-else, nest goto statement - Loops: for, while and dowhile – ys and Functions ensional array – Two-Dimensional array – Strings and a Declaration – Definition – call by value and call by re- sive functions – Storage classes – Scope, Visibility and ters Access of Pointer Variables, Pointer Arithmetic – ers and Arrays – Pointers and Functions. cture and Union ization, Access of Structure Variables – Arrays of Struc- re within Structures - Structures and Functions – Pointer view of Object-Oriented Programming Classes and Objects – "this" pointer – Constructors and atic Member Functions and Objects – Inline Functions – fault arguments – Functions with Objects as Argument	ted if break its op refere Lifet Dyn cture ers to 1 Des – Cal	Expr , if-els c and 4 h peratic ence – ime of 4 h amic 2 h c Arra Structo 1 by reriend	essic se lac cont ours ons. Typ f vari ours ays v ture ours rs – S efere	ons Ide inu Usc oes abl nor vith Sta nce

ш	neritance, Hierarchical Inheritance – Mu	ltipath Inheritance –	Inheritance and Constructors
N	Iodule:7 Polymorphism		4 hours
Fu	nction Overloading – Operator Overload	ding – Dynamic Poly	morphism – Virtual Functions
Pu	re Virtual Functions - Abstract Classes		
N	Iodule:8 Generic Programming		4 hours
Fu	nction Templates and Class Templates, S	Standard Template Li	ibrary
		Total Lecture	hours: 30 hour
То	xt Book(s)		
10			
1.	Herbert Schildt, C: The Complete Ref	erence, 4 th Edition, N	Mc Graw Hill Education, 2017
2.	Herbert Schildt, C++: The Complete R	Reference, 4 th Edition	n, Mc Graw Hill Education, 201
Re	ference Books		
	Yashavant Kanetkar, Let us C: 17th Ed	lition, BPB Publicati	ions, 2020
1.			
1. 2.	Stanley Lippman and Josee Lajoie, C-	++ Primer, 5 th Editio	on, Addison-Wesley Publishers
1. 2.	Stanley Lippman and Josee Lajoie, C- 2012	++ Primer, 5 th Editio	on, Addison-Wesley Publishers
	2012		on, Addison-Wesley Publishers
N	2012 Mode of Evaluation: CAT, Quiz, Assig	nment and FAT	on, Addison-Wesley Publishers
N	2012		on, Addison-Wesley Publishers

D	Course Code		Cours	se Title			L	Т	P	0	
B	CSE102P	Structured		t-Oriented	Program	ming	0	0	4	2	
Pr	e-requisite	NIL					Sy	llabus	vers	ion	
						1.0					
	irse Objectives										
	To impart the b	asic constructs	in structure	d programn	ning and o	bject-o	riente	ed prog	gramr	nin	
-	paradigms To inculcate the	e insights and h	enefits in a	ressing me	mory loca	tions h	v imr	lemen	ting 1	real	
	world problems	•		cessing me	mory loca		y ոոբ		iting i	l Ca	
	To solve real w		hrough appr	opriate prog	ramming	paradig	ms				
		1	0 11	<u> </u>		<u> </u>					
Cou	irse Outcomes										
	the end of the c	,									
1.	Understand diff		ning langua	ge construc	ts and dec	ision-n	nakin	g state	ment	s;	
-	manipulate da	0 1									
2.	Recognize the		1 4	gramming a	pproach; c	create u	ser-d	efined	data		
2	• 1	lize the role of	-								
3.	Comprehend va		•		-		-	-		t10	
	-	tance and poly	-	-				ure for	the		
	given problem	and devise sol	ution using	generic prog	gramming	technie	ques				
Indi											
	icative Experim										
1.	_	nents ng basic contro	structures,	branching a	nd loopin	g					
	Programs usi			0	-	0					
2.	Programs usin Experiment th	ng basic contro ne use of 1-D, 2	-D arrays a	0	-	0					
2.	Programs usin Experiment th	ng basic contro	-D arrays a	0	-	0					
2. 3.	Programs usin Experiment th Demonstrate	ng basic contro ne use of 1-D, 2	D arrays an of pointers	0	-	0					
2. 3. 4.	Programs usin Experiment th Demonstrate Experiment st	ng basic control ne use of 1-D, 2 the application tructures and u	-D arrays an of pointers nions	0	-	0					
2. 3. 4. 5.	Programs usin Experiment th Demonstrate Experiment st Bacterial Gen	ng basic control ne use of 1-D, 2 the application tructures and un omic DNA isol	D arrays an of pointers nions ation	nd strings a	nd functio	0					
2. 3. 4. 5.	Programs usin Experiment th Demonstrate Experiment st Bacterial Gen	ng basic control ne use of 1-D, 2 the application tructures and u	D arrays an of pointers nions ation	nd strings a	nd functio	0					
2. 3. 4. 5. 6	Programs usin Experiment th Demonstrate Experiment st Bacterial Gen Programs on	ng basic control ne use of 1-D, 2 the application tructures and un omic DNA isol	-D arrays an of pointers nions ation ented progra	nd strings an	nd functio	0					
2. 3. 4. 5. 6 7	Programs usin Experiment th Demonstrate Experiment st Bacterial Gen Programs on Demonstrate	ng basic control ne use of 1-D, 2 the application tructures and un omic DNA isol basic object-ori	D arrays an of pointers nions ation ented progra	amming cor	nd functio	0					
2. 3. 4. 5. 6 7 8	Programs usin Experiment th Demonstrate Experiment st Bacterial Gen Programs on Demonstrate Program to ap	ng basic control ne use of 1-D, 2 the application tructures and un omic DNA isol basic object-ori various categor oply kinds of po	-D arrays an of pointers nions ation ented progra ies of inheri olymorphisn	amming cor tance	nd functio	0					
2. 3. 4. 5. 6 7 8	Programs usin Experiment th Demonstrate Experiment st Bacterial Gen Programs on Demonstrate Program to ap	ng basic control ne use of 1-D, 2 the application tructures and un omic DNA isol basic object-ori various categor	-D arrays an of pointers nions ation ented progra ies of inheri olymorphisn	amming cor tance	ad functio	ns					
1. 2. 3. 4. 5. 6 7 8 9	Programs usin Experiment th Demonstrate Experiment st Bacterial Gen Programs on Demonstrate Program to ap	ng basic control ne use of 1-D, 2 the application tructures and un omic DNA isol basic object-ori various categor oply kinds of po	-D arrays an of pointers nions ation ented progra ies of inheri olymorphisn	amming cor tance	nd functio	ns	hours		60 h		
2. 3. 4. 5. 6 7 8 9	Programs usin Experiment th Demonstrate Experiment st Bacterial Gen Programs on Demonstrate Program to ap	ng basic control ne use of 1-D, 2 the application tructures and un omic DNA isol basic object-ori various categor oply kinds of po	-D arrays an of pointers nions ation ented progra ies of inheri olymorphisn	amming cor tance	ad functio	ns	hours		60 h		

Reference Book: Vardan Grigoryan and Shunguang Wu, Expert C++: Become a proficient programmer by learning coding best practices with C++17 and C++20's latest features, 1st

Edition, Packt Publishing Limited, 2020					
Mode of assessment: Continuous assess	sment, FAT	and Ora	examination		
Recommended by Board of Studies	03-07-2021				
Approved by Academic Council	No. 63	Date	23-09-2021		

	Course Title	\mathbf{L}	Т	Р	С
BCSE103E	Computer Programming: Java	1	0	4	3
Pre-requisite	NIL	S	yllabu	is vei	rsioi
				1.0	
Course Objective					
	e the core language features of Java and understand need programming in Java	the f	fundai	nenta	als c
v	he ability of using Java to solve real world problems				
Course Outcomes					
At the end of this of	course, students should be able to:				
Programmi reusability 2. Realize the	I basic programming constructs; realize the fundamentaing in Java; apply inheritance and interface concepts e exception handling mechanisms; process data within n the collection framework for solving real world probl	for files a	enhan	cing	coc
Module:1 Java	Basics		2 h	ours	
-	Features of Java Language - JVM – Bytecode – Java	-			
Basic programmin	g constructs – data types - variables – Java naming cor	iventi	ons -	opera	ator
	ning Constructs and Arrays			ours	
	ng constructs – Arrays - one dimensional and multi-dir - Wrapper classes	nensi	onal –	- enha	ance
Module:3 Class	ses and Objects		2 h	ours	
	IIS – Access and non-access specifiers – declaring of ariables – array of objects – constructors and destructor ords	-		-	
36 3 3 4 7 3	ritance and Polymorphism			ours	
Inheritance – type	es – use of "super" – final keyword – Polymorphism act class - Interfaces	- 0	verloa	ding	
Inheritance – type Overriding – abstr	es – use of "super" – final keyword – Polymorphism	- 0		ding	an
Inheritance – type Overriding – abstr Module:5 Pack Packages: Creating Exception Handlir	es – use of "super" – final keyword – Polymorphism act class - Interfaces		2 h	ours	and
Inheritance – type Overriding – abstr Module:5 Pack Packages: Creating Exception Handlir	es – use of "super" – final keyword – Polymorphism act class - Interfaces ages and Exception Handling g and Accessing Sub-packages ng – Types of Exception – Control Flow in Exception ows in Exception Handling – User defined exceptions		2 h se of	ours	and
Inheritance – type Overriding – abstr Module:5 Pack Packages: Creating Exception Handlir Finally, throw, thro Module:6 IO S Java I/O Streams DataInputStream	es – use of "super" – final keyword – Polymorphism act class - Interfaces ages and Exception Handling g and Accessing Sub-packages ng – Types of Exception – Control Flow in Exception ows in Exception Handling – User defined exceptions	s – U	2 h se of 2 h & Fil	try, o ours eWri	and
Inheritance – type Overriding – abstr Module:5 Pack Packages: Creating Exception Handlir Finally, throw, thro Module:6 IO S Java I/O Streams DataInputStream PrintOutputStream	es – use of "super" – final keyword – Polymorphism act class - Interfaces ages and Exception Handling g and Accessing Sub-packages ag – Types of Exception – Control Flow in Exception ows in Exception Handling – User defined exceptions treams and Files a – FileInputStream & FileOutputStream – FileRea & DataOutputStream – BufferedInputStream & Buf	s – U	2 h se of 2 h & Fil Outpu	try, o ours eWri	and catc ter am

	Total Lecture hours: 15 hour
Геу	xt Book(s)
1.	Y. Daniel Liang, "Introduction to Java Programming" - comprehensive version - 11th
	Edition, Pearson publisher, 2017
Ref	ference Books
1.	Herbert Schildt, The Complete Reference – Java, Tata McGraw-Hill publisher, 10 th Edition, 2017
2.	Cay Horstmann, "Big Java", 4 th Edition, John Wiley & Sons publisher, 5 th Edition, 2015
3.	E. Balagurusamy, "Programming with Java", Tata McGraw-Hill publishers, 6 th Edition 2019
N	Iode of Evaluation: CAT, Quiz, Assignment and FAT
Iı	adicative Experiments
1	Programs using sequential and branching structures
1	Tograms using sequential and oranening structures
2	Experiment the use of looping, arrays and strings
3	Demonstrate basic Object-Oriented programming elements
4	Experiment the use of inheritance, polymorphism and abstract classes
5	Designing packages and demonstrate exception handling
6	Demonstrate the use of IO streams, file handling and serialization
7	Program to discover application of collections
	Total Laboratory Hours 60 hours
Τ	ext Book(s)
1	Marc Loy, Patrick Niemeyer and Daniel Leuck, Learning Java, O'Reilly Media, Inc. 5 th Edition, 2020
R	eference Book(s)
1	Dhruti Shah, 100+ Solutions in Java: A Hands-On Introduction to Programming in
-	Java, BPB Publications, 1 st Edition, 2020
	Iode of assessment: Continuous Assessments and FAT ecommended by Board of Studies 03-07-2021
	ρ_{0}

Pre-requisite Nil 2 0 0 0 2 Pre-requisite Nil Syllabus version Course Objectives 1.0 1. To introduce the students to the basic concepts of electronic components, sources, measurements, and instrumentation. 2. To apply the inculcated knowledge for developing simple circuits using various electronic components and devices 3. To familiarize the students with the basic concepts of number systems and digital logic. 4. To analyse the concepts associated with multiple sensors and their sensing mechanisms. Course Outcome Students will be able to 1. 1. Understand the basic electronic components, sources, and measuring equipment 2. Comprehend the characteristics of diodes, transistors and their applications 3. Design and analyse the amplifiers and oscillators 3 hours Comprehend the basic concept of various sensors and their sensing mechanisms. Module:1 Electronics on Industry and Society - Familiarization of Resistors, Capacitors, Inductors - Colour Coding - types and specifications, - Electrore mechanical components - Relay and Contactors - Regulated Power supply, Function Generator - Multimeter - CRO Module:2 Junction Diodes 4 hours Intrinsic and extrinsic semiconductors - doping - PN Junctions, Formation of Junction, Physical operation, of diode, Barrier Potential, I - V Characteristics, Rectifiers, Zener diode as Voltage regulator. Module:2 Junction Diodes 5 hours	BECE101L	Basic Electronics		L	Т	Ρ	С
Course Objectives 1.0 Course Objectives 1.0 I. To introduce the students to the basic concepts of electronic components, sources, measurements, and instrumentation. 2. To apply the inculcated knowledge for developing simple circuits using various electronic components and devices 3. To familiarize the students with the basic concepts of number systems and digital logic. 4. To analyse the concepts associated with multiple sensors and their sensing mechanisms. Course Outcome Students will be able to 1. 1. Understand the basic electronic components, sources, and measuring equipment 2. Ocmprehend the characteristics of diodes, transistors and their applications 3. Design and analyse the amplifiers and oscillators 3. hoalyse the performance metrics of the measurement systems. 6. Comprehend the basic concept or various sensors and their sensing mechanisms. Module:1 Electronic Components, Sources, and Measuring Equipment 3 hours Evolution of Electronics – Impact of Electronics in Industry and Society – Familiarization of Resistors, Capacitors, Inductors – Colour Coding – types and specifications, – Electromechanical components – Relay and Contactors – Regulated Power supply, Function Generator – Multimeter – CRO 4 hours Intrinsic and extrinsic semiconductors – doping - PN Junctions, Formation of Junction, Physical operation of diode. Barrier Potential, I - V Characteristics, Rectifiers, Zener diode – I-V Characteristics, Zener diode – I-V Characteristics, Zener diode a Voltage regulator. ModUe:3<				2	0	0	2
Course Objectives 1. To introduce the students to the basic concepts of electronic components, sources, measurements, and instrumentation. 2. To apply the inculcated knowledge for developing simple circuits using various electronic components and devices 3. To familiarize the students with the basic concepts of number systems and digital logic. 4. To analyse the concepts associated with multiple sensors and their sensing mechanisms. Course Outcome Students will be able to 1. Understand the basic electronic components, sources, and measuring equipment 2. Comprehend the characteristics of diodes, transistors and their applications 3. Design and analyse the amplifiers and oscillators 4. Design and implement simple digital circuits 5. Analyse the performance metrics of the measurement systems, 6. Comprehend the characteristics of electronics in Industry and Society – Famillarization of Resistors, Capacitors, Inductors – Colour Coding – types and specifications, – Electromechanical components – Relay and Contactors – Regulated Power supply, Function mechanical components – Relay and Contactors – Regulated Power supply, Function Physical operation of diode, Barrier Potential, I - V Characteristics, Rectifiers, Zener diode – I-V Characteristics, Zener diode as Voltage regulator. Module:2 Junction Transistor (BJT) - Device structure and physical operation, Concept of CB, CE and CC Configuration, Transistors as a Switch, - Metal-Oxide Field Effect Transistor (MOSFET) – Device Structure, mode of operation and Characteristics, MOSFET configura	Pre-requisite	Nil	Syll	abu	is ve	ersi	on
1. To introduce the students to the basic concepts of electronic components, sources, measurements, and instrumentation. 2. To apply the inculcated knowledge for developing simple circuits using various electronic components and devices 3. To familiarize the students with the basic concepts of number systems and digital logic, 4. To analyse the concepts associated with multiple sensors and their sensing mechanisms. Course Outcome Students will be able to 1. Understand the basic electronic components, sources, and measuring equipment 2. Comprehend the characteristics of diodes, transistors and their applications 3. Design and analyse the amplifiers and oscillators 4. Design and implement simple digital circuits 5. Analyse the performance metrics of the measurement systems. 6. Comprehend the basic concept of various sensors and their sensing mechanisms. Module:1 Electronic Components, Sources, and Measuring Equipment 3 hours Evolution of Electronics – Impact of Electronics in Industry and Society – Famillarization of Resistors, Capacitors, Inductors – Colour Coding – types and specifications, – Electronic Generator – Multimeter – CRO Module:2 Junction Diodes 4 hours Intrinsic and extrinsic semiconductors – doping - PN Junctions, Formation of Junction, Physical Operation of diode, Barrier Potential, I - V Characteristics, Rectifiers, Zener diode – I-V Characteristics, Zener diode a Voltage regulator. M					1.0		
measurements. and instrumentation. 2. To apply the inculcated knowledge for developing simple circuits using various electronic components and devices 3. To familiarize the students with the basic concepts of number systems and digital logic. 4. To analyse the concepts associated with multiple sensors and their sensing mechanisms. Course Outcome Students will be able to 1. Understand the basic electronic components, sources, and measuring equipment 2. Comprehend the characteristics of diodes, transistors and their applications 3. Design and analyse the amplifiers and oscillators 4. Design and analyse the amplifiers and oscillators 5. Analyse the performance metrics of the measurement systems. 6. Comprehend the basic concept of various sensors and their sensing mechanisms. Module:1 Electronic Components, Sources, and Measuring Equipment 3 hours Evolution of Electronics – Impact of Electronics in Industry and Society – Familiarization of Resistors, Capacitors, Inductors – Colour Coding – types and specifications, – Electron Generator – Multimeter – CRO Module:2 Junction Diodes 1 thours Intrinsic and extrinsic semiconductors – doping - PN Junctions, Formation of Junction, Physical operation of diode, Barrier Potential, I - V Characteristics, Rectifiers, Zener diode – 1-V Characteristics, Zener diode as Voltage regulator. Module:3 Transistor BUT) - Device structure and physical operation, Concept of CB, CE and CC configuration, Transistor as a Switch, - Metal-Oxide Field Effect Transistor Module:4 Amplifiers and Oscillators - Barkhaunsen's criteria for sustained oscillation, RC Phase Shift Oscillator, LO Oscillators - Barkhaunsen's criteria for sustained oscillation, RC Phase Shift Oscillator, LC Oscillators - Barkhaunsen's criteria for sustained oscillation, RC Phase Shift Oscillator, LC Oscillators - Barkhaunsen's criteria for sustained oscillation, RC Phase Shift Oscillator, LC Oscillators - Barkhaunsen's criteria for sustained oscillation, RC Phase Shift Oscillator, LC Oscillators - Barkhaunsen's criteria for s							
2. To apply the inculcated knowledge for developing simple circuits using various electronic components and devices 3. To familiarize the students with the basic concepts of number systems and digital logic. 4. To analyse the concepts associated with multiple sensors and their sensing mechanisms. Course Outcome Students will be able to 1. Understand the basic electronic components, sources, and measuring equipment 2. Comprehend the characteristics of diodes, transistors and their applications 3. Design and analyse the amplifiers and oscillators 4. Design and implement simple digital circuits 5. Analyse the performance metrics of the measurement systems. 6. Comprehend the basic concept of various sensors and their sensing mechanisms. Module:1 Electronic Components, Sources, and Measuring Equipment 3 hours Evolution of Electronics – Impact of Electronics in Industry and Society – Familiarization of Resistors, Capacitors, Inductors – Colour Coding – types and specifications, – Electro- mechanical components – Relay and Contactors – Regulated Power supply, Function Generator – Multimeter – CRO Module:2 Junction Diodes 4 hours Intrinsic and extrinsic semiconductors – doping - PN Junctions, Formation of Junction, Physical operation of diode, Barrier Potential, I - V Characteristics, Rectifiers, Zener diode – IV Characteristics, Zener diode as Voltage regulator. Module:3 Transistors Sipolar Junction Transistor (BJT) - Device structure and physical operation, Concept of CB, CE and CC Configuration, Transistor as a Switch, - Metal-Oxide Field Effect Transistor (MOSFET) - Device Structure, mode of operation and Characteristics, MOSFET configurations (CS, CD, CG). Module:4 Amplifiers and Oscillators 4 hours Number systems, conversion of bases, Boolean algebra, Logic Gates, Concept of universal gate, Simplification and implementation of Boolean functions. Module:5 Digital Logics 4 hours Sumas explications and Classification of Instruments, Types of measurement system and Instruments, Applications and Classification of Inst			npon	ents	, so	ourc	es,
components and devices 3. To familiarize the students with the basic concepts of number systems and digital logic. 4. To analyse the concepts associated with multiple sensors and their sensing mechanisms. Course Outcome Students will be able to 1. Understand the basic electronic components, sources, and measuring equipment 2. Comprehend the characteristics of diodes, transistors and their applications 3. Design and analyse the amplifiers and oscillators 4. Design and implement simple digital circuits 5. Analyse the performance metrics of the measurement systems. 6. Comprehend the basic concept of various sensors and their sensing mechanisms. Module:1 Electronic Components, Sources, and Measuring Equipment 3 hours Evolution of Electronics – Impact of Electronics in Industry and Society – Familiarization of Generator – Multimeter – CRO 4 hours Intrinsic and extrinsic semiconductors – doping – PN Junctions, Formation of Junction, Physical operation of diode, Barrier Potential, I - V Characteristics, Rectifiers, Zener diode – I-V Characteristics, Recretistics, Zener diode as Voltage regulator. 5 hours Bipolar Junction Transistor (BJT) - Device structure and physical operation, Concept of CB, CE and CC, Configuration, Transistor as a Switch, - Metal-Oxide Field Effect Transistor (MOSFET) - Device Structure, mode of operation and Characteristics, MOSFET Softa Socillators. 4 hours <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>							
3. To familiarize the students with the basic concepts of number systems and digital logic. 4. To analyse the concepts associated with multiple sensors and their sensing mechanisms. Course Outcome Students will be able to 1. Understand the basic electronic components, sources, and measuring equipment 2. Comprehend the characteristics of diodes, transistors and their applications 3. Design and analyse the amplifiers and oscillators 4. Design and implement simple digital circuits 5. Analyse the performance metrics of the measurement systems. 6. Comprehend the basic concept of various sensors and their sensing mechanisms. Module:1 Electronic Components, Sources, and Measuring Equipment 2. Sourport of Electronics – Impact of Electronics in Industry and Society – Familiarization of Resistors, Capacitors, Inductors – Colour Coding – types and specifications, – Electro- mechanical components – Relay and Contactors – Regulated Power supply, Function Generator – Multimeter – CRO Module:2 Junction Diodes 4 hours Intrinsic and extrinsic semiconductors – doping - PN Junctions, Formation of Junction, Physical operation of diode, Barrie Potential, I - V Characteristics, Rectifiers, Zener diode – I-V Characteristics, Zener diode as Voltage regulator. Module:3 Transistor (B)T) – Device structure and physical operation, Concept of CB, CE and CC Configuration, Transistor as a Switch, - Metal-Oxide Field Effect Transistor BJT as an amplifier (CE configuration), MOSFET as an amplifier (CS configuration), Feedback concept, Oscillators - Barkhaunsen's criteria for sustained oscillation, RC Phase Shift Oscillator, LC Oscillator. Module:5 Principles of Measurement and Analysis Units and standards, Errors, Functional Elements of a Measurement System and Instruments, Applications and Classification of Instruments, Types of measured Quantities, Measures of Dispersion, Sample deviation and sample mean, Calibration and standard. Module:7 Sensors and Transducers Sensor fundamentals and characteristics - General			g var	ious	ele	ctro	nic
4. To analyse the concepts associated with multiple sensors and their sensing mechanisms. Course Outcome Students will be able to 1. Understand the basic electronic components, sources, and measuring equipment 2. Comprehend the characteristics of diodes, transistors and their applications 3. Design and analyse the amplifiers and oscillators 4. Denotement the basic concept of various sensors and their sensing mechanisms. Module:1 Electronic Components, Sources, and Measuring Equipment 3 hours Evolution of Electronics – Impact of Electronics in Industry and Society – Familiarization of Resistors, Capacitors, Inductors – Colour Coding – types and specifications, – Electromechanical components – Relay and Contactors – Regulated Power supply, Function Generator – Multimeter – CRO 4 hours Module:2 Junction Diodes 4 hours Intrinsic and extrinsic semiconductors – doping - PN Junctions, Formation – d Junction, Physical operation of diode, Barrier Potential, I - V Characteristics, Rectifiers, Zener diode – I-V Characteristics, Zener diode as Voltage regulator. 5 hours Bipolar Junction Transistor (BJT) - Device structure and physical operation, Concept of CB, CE and CC Configuration, Transistor as a Switch, - Metal-Oxide Field Effect Transistor 9 hours BJT as an amplifier (CE configuration), MOSFET as an amplifier (CS configuration), Feedback concept, Oscillators. 4 hours Number systems, conversion of bases, Boolean algebra, Logic Gates, Co	•				-11-		
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Feedback concept, Oscillators - Barkhaunsen's criteria for sustained oscillation, RC Phase Shift Oscillator, LC Oscillator. Module:5 Digital Logics Number systems, conversion of bases, Boolean algebra, Logic Gates, Concept of universal gate, Simplification and implementation of Boolean functions. Module:6 Principles of Measurement and Analysis Units and standards, Errors, Functional Elements of a Measurement System and Instruments, Applications and Classification of Instruments, Types of measured Quantities, Measures of Dispersion, Sample deviation and sample mean, Calibration and standard. Module:7 Sensors and Transducers Sensor fundamentals and characteristics - General concepts and terminology of measurement systems, Sensors and transducers - Classification of sensors, Static and dynamic characteristics. Principle of Resistive Sensors, Capacitive Sensors, Inductive Sensors, Magnetic sensors, Optical sensor, Self-generating Sensors Module:8 Contemporary issues Quantices from Industry and, Research and Development Organisations			CS	con			
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Module:5Digital Logics4 hoursNumber systems, conversion of bases, Boolean algebra, Logic Gates, Concept of universal gate, Simplification and implementation of Boolean functions.3 hoursModule:6Principles of Measurement and Analysis3 hoursUnits and standards, Errors, Functional Elements of a Measurement System and Instruments, Applications and Classification of Instruments, Types of measured Quantities, Measures of Dispersion, Sample deviation and sample mean, Calibration and standard.5 hoursModule:7Sensors and Transducers5 hoursSensor fundamentals and characteristics - General concepts and terminology of measurement systems, Sensors and transducers - Classification of sensors, Static and dynamic characteristics. Principle of Resistive Sensors, Capacitive Sensors, Inductive Sensors, Magnetic sensors, Optical sensor, Self-generating Sensors2 hoursGuest lectures from Industry and, Research and Development Organisations2 hours				. ,			
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gate, Simplification and implementation of Boolean functions.Module:6Principles of Measurement and Analysis3 hoursUnits and standards, Errors, Functional Elements of a Measurement System and Instruments, Applications and Classification of Instruments, Types of measured Quantities, Measures of Dispersion, Sample deviation and sample mean, Calibration and standard.Module:7Sensors and Transducers5 hoursSensor fundamentals and characteristics - General concepts and terminology of measurement systems, Sensors and transducers - Classification of sensors, Static and dynamic characteristics. Principle of Resistive Sensors, Capacitive Sensors, Inductive Sensors, Magnetic sensors, Optical sensor, Self-generating Sensors2 hoursGuest lectures from Industry and, Research and Development Organisations			ncep	t of	univ	ersa	a
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Instruments, Applications and Classification of Instruments, Types of measured Quantities, Measures of Dispersion, Sample deviation and sample mean, Calibration and standard. Module:7 Sensors and Transducers Sensor fundamentals and characteristics - General concepts and terminology of measurement systems, Sensors and transducers - Classification of sensors, Static and dynamic characteristics. Principle of Resistive Sensors, Capacitive Sensors, Inductive Sensors, Magnetic sensors, Optical sensor, Self-generating Sensors Module:8 Contemporary issues Quantity and, Research and Development Organisations	Module:6 Princ	ciples of Measurement and Analysis			3	hou	ırs
Measures of Dispersion, Sample deviation and sample mean, Calibration and standard. Module:7 Sensors and Transducers 5 hours Sensor fundamentals and characteristics - General concepts and terminology of measurement systems, Sensors and transducers - Classification of sensors, Static and dynamic characteristics. Principle of Resistive Sensors, Capacitive Sensors, Inductive Sensors, Magnetic sensors, Optical sensor, Self-generating Sensors 2 hours Guest lectures from Industry and, Research and Development Organisations	Units and stand	dards, Errors, Functional Elements of a Measuren	nent	Sy	ster	n a	ind
Module:7Sensors and Transducers5 hoursSensor fundamentals and characteristics - General concepts and terminology of measurement systems, Sensors and transducers - Classification of sensors, Static and dynamic characteristics. Principle of Resistive Sensors, Capacitive Sensors, Inductive Sensors, Magnetic sensors, Optical sensor, Self-generating Sensors5 hoursModule:8Contemporary issues2 hoursGuest lectures from Industry and, Research and Development Organisations1							es,
Sensor fundamentals and characteristics - General concepts and terminology of measurement systems, Sensors and transducers - Classification of sensors, Static and dynamic characteristics. Principle of Resistive Sensors, Capacitive Sensors, Inductive Sensors, Magnetic sensors, Optical sensor, Self-generating Sensors Module:8 Contemporary issues 2 hours Guest lectures from Industry and, Research and Development Organisations 2			and	stan			
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dynamic characteristics. Principle of Resistive Sensors, Capacitive Sensors, Inductive Sensors, Magnetic sensors, Optical sensor, Self-generating Sensors Inductive Sensors, Inductive Sensors, Inductive Sensors Module:8 Contemporary issues 2 hours Guest lectures from Industry and, Research and Development Organisations 2							
Sensors, Magnetic sensors, Optical sensor, Self-generating Sensors Module:8 Contemporary issues 2 hours Guest lectures from Industry and, Research and Development Organisations							
Module:8 Contemporary issues 2 hours Guest lectures from Industry and, Research and Development Organisations 2	•		Sens	ors,	Inc	duct	ive
Guest lectures from Industry and, Research and Development Organisations					_		
		· · ·			2	nou	ırs
Total Lecture hours: 30 hours	Guest lectures fro	orn industry and, Research and Development Organisation	กร				
Total Lecture nours: 30 hours		Total Lacture has	IFC :		20	hai	
			ai 5.		30	not	112

Tex	Text Book(s)							
1.	A. P. Malvino, D. J. Bates, Electronic Principles, 2017, 7/e, Tata McGraw-Hill.							
2	Albert D. Helfrick and William D. Cooper, "Modern Electronic Instrumentation and							
	Measurement Techniques", 2016, First Edition, Pearson Education, Noida, India.							
Re	ference Books							
1.	David A Bell, Electronic Devices and Circuits, Oxford Press, 5 th Edition, 2008							
2	Robert L. Bolysted and Louis Nashelsky, Electronic Devices and Circuit Theory,							
	Prentice Hall of India, 11th Edition, 2017							
3	D. Patranabis – Sensor and Transducers (2e) Prentice Hall, New Delhi, 2003							
4	A.K. Sawhney, Puneet Sawhney, A Course In Electrical and Electronic Measurements,							
	and Instrumentation, Dhanpat Rai & Co., 2015							
Mo	Mode of Evaluation: Internal Assessment (CAT, Quizzes, Digital Assignments) & FAT							
Re	commended by Board of Studies 08.07.2021							
App	Approved by Academic Council No. 63 Date 23.09.2021							

BECE101P	B	asic Electroni	cs Lab	L T P C			
Pre-requisite	Nil			Syllabus version			
Course Objec	lives			1.0			
	various characteristics	of diodes and	transistors				
	nd the concept of digita			uth tables			
	performance metrics o						
sensors							
Course Outco Students will b							
	various characteristics	and applicatio	ns of diodes and t	ransistors			
	circuits using logic gat						
3. Measure the	physical parameters u						
4		icative Experi					
group of a				ponent from the given nt devices (Multimeter,			
2 V-I Chara	cteristics of PN Junctic	on diodes and Z	ener diodes				
3 Half Wave	e and Full Wave Rectif	ier circuits					
4 Zener Dic	de as a voltage regula	tor					
5 Characte	istics of BJT in Commo	on Emitter Con	figuration				
6 Characte	istics of MOSFET in C	ommon Source	e Configuration				
7 Frequenc	y response of BJT sing	le stage amplif	ier				
8 Study of t	he signa l generation us	sing RC Phase	Shift Oscillator				
9 Study of I	ogic gates and implem	entation of Boo	lean Functions				
10 Strain gau	ige sensors for measu	rement of norm	al strain.				
11 Displace	nent measurement usi	ing LVDT and L	.DR.				
12 Temperat	ure measurement usin	g RTD, Thermi	stor and Thermoc	ouple.			
			Total Laboratory	Hours 30 hours			
Text Book(s)	ing D. I. Datas. Flast		0047 7/a Tata N				
	ino, D. J. Bates, Electi Helfrick and William						
	Albert D. Helfrick and William D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", 2016, First Edition, Pearson Education, Noida, India.						
Reference Bo	oks						
Prentice I	Robert L. Bolysted and Louis Nashelsky, Electronic Devices and Circuit Theory, Prentice Hall of India, 11th Edition, 2017						
	D. Patranabis – Sensor and Transducers (2e) Prentice Hall, New Delhi, 2003						
	sment: Continuous ass	-	/ Oral examinatio	n and others			
	by Board of Studies	08.07.2021	Data 22.00.2	0.021			
Approved by A	cademic Counci l	No. 63	Date 23.09.2	.021			

BEEE101L	Basic Electrical Engineering	L	Т	Ρ	С
D		2	0	0	2
Pre-requisite	NIL S	yllabı		ersi	on
Course Objectiv			1.0		
Course Objective					
	sights into relevant concepts and principles in electrical en understand and comprehend laws, rules and theore			mn	uto
	s of electric circuits	1115 1		mp	ute
•	mprehend and analyze the concepts of electrical machine	s and	mea	sur	ina
instrument		e ana			
Course Outcome					
	this course, the students will be able to				
	DC and AC circuit parameters using various laws and theo				
	e parameters of magnetically coupled circuits and compare	e vario	ous t	ype	S
	al machines				
	nd the measurement techniques of electrical parameters				
	d the concept of electric supply system and comprehend e	essent	al		
	afety requirements		6	hou	
	ments and sources; Ohms law, Kirchhoff's laws; Sei				
	uit elements; Source transformation; Node voltage analys				
	n power transfer theorem	13, 1010	5511 0	Jun	Cin
	ircuits		6	hou	urs
	es and currents, RMS, average, form factor, peak factor;	Single			
	and parallel circuits; Power and power factor; Baland				
systems				•	
Module:3 Magr	netic Circuits		4	hou	urs
	Induction: Self and mutual; Magnetically coupled circ	uits; S	Serie	s a	and
	circuits; Dot convention				
	rical Machines			hou	
	tion, construction and applications of DC machines, transf		s, ind	duct	ion
	ous generators, stepper motor, Brushless DC (BLDC) mot	or	-	h	
	rical Measurements			hou	
	ction and operation of moving coil and moving iron instrur ient in single phase and three phase systems	ients;	Pow	era	ina
	trical Supply Systems & Safety		3	hou	ire
	strical power generation, transmission and distribution	sveton			
	Earthing; Protective devices	systen	13,		ng,
	temporary Issues		2	hou	urs
	m Industry and, Research and Development Organization	s			
					-
	Total Lecture hour	s:	30	hou	urs
Text Book(s)					
	bley, Electrical Engineering: Principles & Applications, 20	19, 7 th	edit	ion,	
Pearson Edu					
Reference Books					
	I J Nagrath, Basic Electric Engineering, 2019, 4 th edition	i, McG	iraw	Hill	
Education	lastrical Circuit Theory and Technology 2012 5th adia		مالات	dae	
2. John Bird, E Publications	lectrical Circuit Theory and Technology, 2013, 5 th editi	on, Ro	Jutle	uge)
	n, R Rengaraj, G R Venkatakrishnan, Basic Electrical, E	Actro	nice	and	
	t Engineering, 2018, McGraw Hill Education	COUDI	105	anu	I
Megeliremen	Endineering ZUIA MCGRAW AM EQUCATION				

	2011, Reem Publications							
5.	V K Mehta and Rohit Mehta, Principles of Power System, 2005, S. Chand							
Мо	de of Evaluation: CAT, Written A	ssignment, Quiz	, FAT					
Recommended by Board of Studies 03.07.2021								
Ap	proved by Academic Council	No. 63	Date	23.09.2021				

BEEE101P Basic Electrical Engineering Lab							LT	P	С	
							2	1		
Pre-requisite NIL							Syllabus version			
							1.0			
Cou	rse Objectiv	es								
1		iding the concepts		enginee	ering for	deve	elopme	ent	and	
		tation of electrical system								
		wledge and skill in wir								
3		comprehend and ide	ntify appropria	ate meas	uring devi	ces	for an	elec	ctric	
	circuit									
	rse Outcome									
		this course, the studer								
		id, analyze and validat								
		d develop electrical sy						ons		
		kills for interpretation o								
		s to use modern engin	eering tools to	or electrica	al system l	ayou	t planr	ing		
	cative Exper		_							
1		of Kirchhoff's voltage								
2		of Kirchhoff's current la								
3		of maximum power tra								
4		teady state response of								
5		t for a single lamp and		Julator						
6		t for Godown with two								
7		single phase transform								
8		nt of power in a single								
9		nt of power and energy				e AC	load			
10		thing and measureme		resistance	•					
11		tion of residential elect			P <i>c</i>			<i>c</i> ,		
12	Electrical lay	out for a residential/co								
T			To	tal Labor	atory Hou	Irs	3	0 ho	urs	
	t Book(s)				1. c		→th			
1		nbley, Electrical Engine	eering: Princip	les & App	lications, 2	2019	, / ed	ition	,	
M	Pearson Edu									
Mode of assessment: CAT, FAT, Oral examination										
		y Board of Studies	03.07.2021	Deta	00.00.000	24				
Аррі	roved by Aca	demic Council	No. 63	Date	23.09.202	21				

BE	NG101L	Technical English Communication	L	Τ	Ρ	C
			2	0	0	2
Pre	-requisite	NIL	Syllabı		ersi	on
~	01.1	()		1.0		
Co	urse Objec					
		elop LSRW skills for effective communication in professional ance knowledge of grammar and vocabulary for meaningful			tion	
		erstand information from diverse texts for effective technical				
	o. To und		comme	ince		
Со	urse Outco	omes:				
	1. Use gra	ammar and vocabulary appropriately while writing and speak	ing			
		he concepts of communication skills in formal and informal si				
		strate effective reading and listening skills to synthesize and	l draw i	ntel	liger	nt
	inferen					
		learly and significantly in academic and general contexts				
Мо	dule:1 In	troduction to Communication		4 ho	ours	5
		ocess - Types of communication: Intra-personal, Interpersona				
		communication / Cross-cultural Communication - Communi		Barr	iers	
		of good communication - Principles of Effective Communication				
		rammatical Aspects		4 h	ours	5
		ern - Modal Verbs - Concord (SVA) - Conditionals - Error det				
		/ritten Correspondence		4 h	ours	5
		Letters - Resume Writing - Statement of Purpose				
		usiness Correspondence		4 h		5
		rs: Calling for Quotation, Complaint & Sales Letter – Memo	Minute	es of		
		cribing products and processes		4.1		
		rofessional Writing		4 h		5
	commendat	& Summarizing - Executive Summary - Structure and Types	of Prop	osai	-	
		eam Building & Leadership Skills		4 ho	r	
		eadership - Team Leadership Model - Negotiation Skills - Co		4 11	Juis	>
	nagement	eadership - Team Leadership Moder - Negotiation Skills - Co	mici			
		esearch Writing		4 ho	ours	5
		d Analysing a research article - Approaches to Review Pape				-
		research article - Referencing		5		
		uest Lecture from Industry and R&D organizations		2 h	ours	5
Cor	ntemporary	ssues				
		Total Lecture hou		30 h	0.UP	6
T	+ D = = -(=)		.	50 11	oui	3
	t Book(s)	eenakshi & Sangeeta Sharma. (2015). Technical Communic	otion	Drin	ainle	
1.		ce, (3 rd Edition). India: Oxford University Press.	auon. I	Phili	cipie	28
Ref	ference Bo					
1.		irley & Chandra .V. (2010). Communication for Business A P	ractical	An	proa	ocł
		India: Pearson Longman.	aonoai	141	0,00	
2.	Kumar, Sanjay & Pushpalatha. (2018). English Language and Communication Skills for Engineers. India: Oxford University Press.					
3.		una. (2020). English Language Skills for Engineers. India: M	cGraw	Hill		
4.	Rizvi, M. A	shraf. (2018). <i>Effective Technical Communication</i> 2 nd Editior ill Education.	. Chen	nai:		
5.	Mishra, Su	in Education. Initha & Muralikrishna, C. (2014). Communication Skills for Education.	ngineer	s. Ir	ndia:	

10.1	Natkins, P. (2018). Teaching and Developing Reading Skills: Cambridge Handbooks for
	Language teachers. India: Cambridge University Press.

Mode of Evaluation : CAT / Assignment / Quiz / FAT / Group Discussion						
Recommended by Board of Studies	Recommended by Board of Studies 28.06.2021					
Approved by Academic Council	No. 63 Date 23.09.2021					

BENG	G101P	Technical English Communication Lab		L 1	- P	C		
				0 0				
Pre-r	equisite	NIL	Syl	labus	vers	sion		
				1.	0			
Cour	se Objecti	ves:						
		priate grammatical structures in professional communica	tion					
		nglish communication skills for better employability						
		eaningful communication skills in writing and public spea	aking					
	se Outcon							
		rofessional rhetoric and articulate ideas effectively						
		rial on technology and deliver eloquent presentations						
		e and productive skills in real life situations and develop	o worl	kplace				
	nunication	<u> </u>						
	ative Expe							
1.		& Vocabulary						
	Error Dete							
_		Worksheets						
2.		to Narratives						
		of eminent personalities & Ted Talks						
2	Video Res	istening Comprehension / Summarising						
3.								
	SWOT Analysis & digital resume techniques Activity: Preparing a digital résumé for mock interview							
4.								
4.	Product & Process Description Describing and Sequencing							
	Activity: Demonstration of product and process							
5.	Mock Meetings							
J.		neetings and meeting etiquette						
		Conduct of meetings and drafting minutes of the mee	etina					
6.		esearch article						
	•	and Technical articles						
	Activity: Writing Literature review							
7.	Analytica							
	Case Studies on Communication, Team Building and Leadership							
	Activity: (Group Discussion						
8.	Presentat	ions						
		Conference/Seminar paper						
		ndividual/ Group presentations						
9.	Intensive							
	Scientific documentaries							
	Activity: Note taking and Summarising							
10.	Interview Skills							
	Interview questions and techniques							
	Activity:	Aock Interviews						
		sment: Continuous Assessment / FAT / Written Assignm	nents	/ Quiz/	Ora	1		
		d Group Activity.						
		by Board of Studies 28.06.2021	~ ~					
Appro	oved by Ac	ademic Council No. 63 Date 23.09.20	21					

BEN	IG102P	Tec	hnical Report Writ	ing	L	Т	Ρ	С
					0	0	2	1
Pre-	requisite	Technical English C	ommunication		Syllabu		ersi	on
0.000						1.0		
	rse Objectiv		nun aving to chaical	roporto				
	-	pecific writing skills for		•				
		ally, evaluate, analyse			rmation			
3. 10	o acquire pro	oficiency in writing and	presenting reports					
	0.1							
	rse Outcom			a a a build an a an al a	. t . d. a			
		e sentences using app		•	style			
	•	formation and concept						
3. D	emonstrate t	he ability to write and	present reports on c	liverse topics				
		•						
	cative Expe							
1.		Grammar, Vocabula		raan va Taahr		hu	l	
		Tenses - Adjectives ns - Mechanics of Edit				cabu	lary	
	Activity: W		ing. Functuation an		y			
2.		and Analyses						_
			m Newspapers - M	agazines - Artic	les and	e-co	nter	nt
	Synchronise Technical Details from Newspapers - Magazines - Articles and e-content Activity : Writing introduction and literature review							
3.	Systematisation of Information							
	Techniques to Converge Objective-Oriented data in Diverse Technical Reports							
	Activity: Preparing Questionnaire							
4.	Data Visualisation							
	Interpreting Data - Graphs - Tables – Charts - Imagery - Infographics							
_	Activity: T							
5.		on to Reports	Characteristics and	Types of Bong	rto			
	Meaning - Definition - Purpose - Characteristics and Types of Reports Activity: Worksheets on Types of reports							
6.	-	•						
v.	Structure of Reports Title – Preface – Acknowledgement - Abstract/Summary – Introduction - Materials and							
	Methods – Results – Discussion - Conclusion - Suggestions/Recommendations							
		lentifying the structure						
7.	Report Wr	iting						
	Data Collection - Draft an Outline and Organize Information							
	Activity: Drafting reports							
8.	Supplementary Texts							
	Appendix – Index – Glossary – References – Bibliography - Notes							
0	Activity: Organizing supplementary texts							
9.	Review of Final Reports Structure – Content – Style - Layout and Referencing							
	Activity: Examining clarity and coherence in final reports							
10.	Presentation							
		Technical Reports						
		lanning, creating and o	ligital presentation c	of reports				
		0,	<u> </u>	boratory Hour	5	30	hou	Irs
Mod	le of assess	ment: Continuous As						
	examination							
Reco	ommended b	by Board of Studies	28.06.2021					
Ann	roved by Aca	ademic Council	No. 63 Date	23.09.202	1			

BMAT101L	Calculus	L		Ρ	С
		3	-	0	3
Pre-requisite	Nil	Syllab		ersi	on
0			1.0		
Course Objectiv		م ما الم م	-		
	e requisite and relevant background necessary to understar eering mathematics courses offered for Engineers and Scie			el.	
	mportant topics of applied mathematics, namely Single and			hle	
	ctor Calculus etc.	ivian	vanc		
	se technology to model the physical situations into mathematic	atical	prob	lems	5.
	rpret results, and verify conclusions.		P		,
Course Outcom					
At the end of the	course the student should be able to:				
1. Apply single v	ariable differentiation and integration to solve applied probl	ems i	n		
engineering and	find the maxima and minima of functions				
	al derivatives, limits, total differentials, Jacobians, Taylor se		and		
	plems involving several variables with or without constraints				
	ple integrals in Cartesian, Polar, Cylindrical and Spherical	coord	inate	s.	
	inctions to evaluate various types of integrals.			~	
	radient, directional derivatives, divergence, curl, Green's, S	tokes	and	Gau	SS
Divergence theo	le Variable Calculus			3 hoi	IFO
	Extrema on an Interval Rolle's Theorem and the Mear				
	lecreasing functionsFirst derivative test-Second derivative				
	ty. Integration-Average function value - Area between cur				
solids of revolution					. 01
	tivariable Calculus		5	i hoi	ırs
	variables-limits and continuity-partial derivatives -total dif	ferent			
and its properties	•				
	lication of Multivariable Calculus		5	5 hoi	ırs
Taylor's expansi	on for two variables–maxima and minima–constrained max	ima a	nd m	ninim	a-
Lagrange's multi					
	tiple integrals			3 hoi	
	uble integrals-change of order of integration-change of var				
	plar co-ordinates - evaluation of triple integrals-change of v	ariabl	es be	etwee	en
	/lindrical and spherical co-ordinates.				
	cial Functions			b hou	
	na functions-interrelation between beta and gamma function				
complementary	s using gamma and beta functions. Dirichlet's integral	-		ncut	115
	tor Differentiation		5	i hoi	ire
	ctor valued functions – gradient, tangent plane-direc	tional			
	curl-scalar and vector potentials. Statement of vector				
problems.				•	0.0
	tor Integration		6	i hoi	ırs
	d volume integrals - Statement of Green's, Stoke's and Gau	uss di	verge	ence	
	ation and evaluation of vector integrals using them.		0		
	temporary Topics		2	2 hoi	ırs
Guest lectures fr	om Industry and, Research and Development Organization				
	Total Lecture hours	:	45	5 hoi	ırs
Text Book					
	homas, D.Weir and J. Hass, Thomas Calculus, 2014,	131	n ed	tion	
Pearson		,			

Reference Books

1.	Erwin Kreyszig, Advanced Engineering Mathematics, 2015, 10th Edition, Wiley India								
2.	B.S. Grewal, Higher Engineering Mathematics, 2020, 44th Edition, Khanna Publishers								
3.	John Bird, Higher Engineering Mathematics, 2017, 6th Edition, Elsevier Limited.								
4.	. James Stewart, Calculus: Early Transcendental, 2017, 8th edition, Cengage Learning.								
5.	K.A.Stroud and Dexter J. Booth, Er	ngineering M	lathemati	ics, 2013, 7th Edition, Palgrave					
	Macmillan.								
Mo	Mode of Evaluation: CAT, Assignment, Quiz and FAT								
Re	Recommended by Board of Studies 24.06.2021								
App	Approved by Academic Council No. 63 Date 23.09.2021								

BM/	AT101P		Calculus L	ab			L	Τ	Ρ	С
							0	0	2	1
Pre-	requisite	NIL				Syl	abı	is v	ersi	on
	-							1.0		
Cou	rse Objectiv	es								
1. To	o familiarize v	vith the basic syntax	, semantics and	d library f	unctions of I	ΜΑΤΙ	_AB	whi	ch	
serv	es as a tool n	ot only in calculus b	ut also many co	ourses in	engineering	and	scie	ence	es	
2. To	o visualize ma	athematical function:	s and its related	d properti	es.					
3. To	o evaluate sir	ngle and multiple inte	egrals and unde	erstand it	graphically.					
Cou	rse Outcom	es								
At th	ne end of the	course the student s	hould be able t	0:						
1. D	emonstrate N	ATLAB code for cha	allenging prob l e	ems in en	gineering					
		plays, interpret and i	llustrate eleme	ntary ma	thematical fu	Inctic	ons a	and		
	edures.									
	cative Exper									
1.	Introduction	to MATLAB through	matrices and g	general S	Syntax					
2.	Plotting and	visualizing curves a	nd surfaces in	MATLAB	- Symbolic	com	puta	ition	s	
	using MATL	AB								
3.	Evaluating E	Extremum of a single	variable functi	on						
4.		ing integration as Are								
5.		of Volume by Integra								
6.		naxima and minima			bles					
7.	Applying La	grange multiplier opt	timization meth	od						
8.	Evaluating \	/olume under surfac	es							
9.	Evaluating t	riple integrals								
10.	Evaluating g	radient, curl and div	ergence							
11.	Evaluating li	ine integrals in vecto	ors							
12.	Applying Gr	een's theorem to rea	al world problen	าร						
			Т	otal Labo	oratory Hours	s 3 0) ho	ours		
Text	t Book									
1.	Brian H. Ha	hn, Danie l T. Valenti	ne, Essential N	IATLAB f	or Engineers	s and				
	Scientists, A	cademic Press, 7th	edition, 2019.		_					
Refe	erence Book	s								
1.	Amos Gilat,	MATLAB: An Introd	uction with App	lications,	Wiley, 6/e, 2	2016	-			
2	Maritn Broka	ate, Pammy Mancha	anda, Abul Has	an Siddio	qi, Calculus f	for So	cien	tists	and	ł
		Springer, 2019								
Mod		ent: DA and FAT								
		y Board of Studies	24.06.2021							
		demic Council	No. 63	Date	23.09.202	1				

BMAT102L	Differential Equations and Transforms	L	Τ	Ρ	С
		3	1	0	4
Pre-requisite	BMAT101L, BMAT101P	Syllab		/ers	ion
<u> </u>			1.0		
Course Objectiv					
	the knowledge of Laplace transform, an important trans	storm teo	nnic	lues	fo
	s which requires knowledge of integration. g the elementary notions of Fourier series, this is vital i	o prootio	alba	rma	nic
analysis.	g the elementary notions of Fourier series, this is vital in	i practic			лпс
	the skills in solving initial and boundary value problems.				
	e knowledge and application of difference equations an		rans	forn	n ir
	systems that are inherent in natural and physical process				
	,				
Course Outcom	es				
At the end of the	course the student should be able to:				
1. Find solu	ition for second and higher order differential equation	ons, for	mati	on a	anc
solving p	artial differential equations.				
	nd basic concepts of Laplace Transforms and solve pro	ob l ems w	/ith p	peric	did
	step functions, impulse functions and convolution.				
	ne tools of Fourier series and Fourier transforms.				
	e techniques of solving differential equations and	partia	diff	eren	itia
equations					
	e Z-transform and its application in population dynamic	s and d	igita	sig	na
processir	g.				
Module:1 Ordi	nary Differential Equations (ODE)		6	6 ho	iire
	on- homogenous differential equations with constant coe	fficients-			
	variable coefficients- method of undetermined coefficients-				
	rameters-Solving Damped forced oscillations and				
prob l ems.	- ·				
Module:2 Part	ial Differential Equations (PDE)		5	5 ho	urs
	tial differential equations - Singular integrals - Solution				
	ial differential equations – Lagrange's linear equation-N	lethod o	f sep	barat	tior
of variab l es					
Module:3 Lap				' ho	
	rties of Laplace transform-Laplace transform of standard				
	eriodic functions-Unit step function-Impulse function	i. Invers	se l	apla	ace
transform-Partial	fractions method and by Convolution theorem.			7 10 0	
	Ition to ODE and PDE by Laplace transform s – Non-homogeneous terms involving Heaviside function			ho	
Module:4 Solu					
Module:4 Solution of ODE		- Firet or		FDL	D
Module:4 Solution of ODE' Solution of ODE' - Solving Non-ho	mogeneous system using Laplace transform - solution to	o First or	uer		
Module:4 Solution of ODE ² Solution of ODE ² Solving Non-ho Laplace transfor	mogeneous system using Laplace transform - solution to n.	o First or		s ho	IIrc
Module:4 Solution of ODE' Solution of ODE' - Solving Non-ho Laplace transfor Module:5 Fou	mogeneous system using Laplace transform - solution to n. rier Series		e	6 ho f rai	
Module:4 Solution of ODE' Solution of ODE' - Solving Non-ho Laplace transfor Module:5 Fou Fourier series -	mogeneous system using Laplace transform - solution to n. rier Series Euler's formulae- Dirichlet's conditions - Change of in		e		
Module:4 Solu Solution of ODE Solving Non-ho Laplace transford Module:5 Fou Fourier series - series – RMS va	mogeneous system using Laplace transform - solution to n. rier Series Euler's formulae- Dirichlet's conditions - Change of in ue – Parseval's identity.		e Ha l	f rai	nge
Module:4 Solution of ODE' Solution of ODE' Solving Non-ho Solving Non-ho Solving Non-ho Laplace transform Module:5 Fou Module:5 Fou Fou Solving Non-ho Solving Non-ho Solving Non-ho Laplace transform Fou Solving Non-ho Solving Non-ho Solving Non-ho Solving Non-ho Solving Non-ho Solving Non-ho Solving Non-ho Solving Non-ho Solving Non-ho Solving Non-ho Module:5 Fou Solving Non-ho Module:6 Fou Solving Non-ho	mogeneous system using Laplace transform - solution to n. rier Series Euler's formulae- Dirichlet's conditions - Change of in lue – Parseval's identity. rier Transform	nterval -	e Ha l	fran 5 ho	nge urs
Module:4Solution of ODE'Solution of ODE'Solving Non-hoLaplace transformModule:5FouFourier series -series -RMS vaModule:6FouComplex Fourier	mogeneous system using Laplace transform - solution to n. rier Series Euler's formulae- Dirichlet's conditions - Change of in lue – Parseval's identity. rier Transform transform - properties - Relation between Fourier and L	nterval -	e Ha l E	f rai 5 ho sforr	nge urs ms
Module:4 Solution of ODE' Solution of ODE' Solution of ODE' Solution of ODE Solution of ODE' Solution of ODE' Solution of ODE' Solution of ODE Non-hot Laplace transform Module:5 Fourier series - Series - series - RMS va Module:6 Fou Complex Fourier Fourier	mogeneous system using Laplace transform - solution to n. rier Series Euler's formulae- Dirichlet's conditions - Change of in ue – Parseval's identity. rier Transform transform - properties - Relation between Fourier and L cosine transforms – Parseval's identity- Convolution T	nterval -	e Ha l E	f rai 5 ho sforr	nge urs ms
Module:4Solution of ODE'Solution of ODE'Solving Non-hoLaplace transformModule:5FouFourier series -series -RMS vaModule:6FouComplex Fourier	mogeneous system using Laplace transform - solution to n. rier Series Euler's formulae- Dirichlet's conditions - Change of in lue – Parseval's identity. rier Transform transform - properties - Relation between Fourier and L cosine transforms – Parseval's identity- Convolution T olve PDE.	nterval -	e Ha l fran and	f rai 5 ho sforr	nge urs ms nple

Module:8	Contemporary Issues			2 hours
		Total Lecture Total Tutorial		45 hours 15 hours
Text Book	/			
Indi 2. B.S	n Kreyszig, Advanced Engineerii a. Grewal, Higher Engineering lishers.			
Reference				
	nael D. Greenberg, Advanced rson Education, Indian edition.	Engineering Mathe	ematics, 20	006, 2nd Edition
	irst Course in Differential Equa	tions with Modellin	ig Applicat	ions. Dennis Zill
	3, 11th Edition, Cengage Publish			
201	•	ers.		
201 Mode of Ev	3, 11th Edition, Cengage Publish	ers.		

	Complex Variables and Linear Algebra	L	Т	P	C
		3	1	0	4
Pre-requisite	BMAT102L	Sylla			ion
			1.0		
Course Objectiv		at of one	of #		
	ent comprehensive, compact, and integrated treatmer t branches of applied mathematics namely Comp				
	s and the scientists.		nies	ιο	uie
	ent comprehensive, compact, and integrated treatm	ent of a	nothe	er m	nost
	t branches of applied mathematics namely Linear Alg				
	scientists.			Ŭ	
To provid	le students with a framework of the concepts that will	help ther	n to	ana	yse
deep l y at	bout many complex problems.				
Course Outcom					
At the end of the	course the student should be able to				
1 0	the second distance and distance in the state of the distance in the second distance in the				
	t analytic functions and find complex potential of fluid fl				
	image of straight lines by elementary transforma unctions in power series.	tions and	1 10	expr	ess
	real integrals using techniques of contour integration.				
	power of inner product and norm for analysis.				
	ices and transformations for solving engineering proble	ems.			
Module:1 Ana	vtic Functions				
				7ho	
Complex variable	e - Analytic functions and Cauchy - Riemann equation			qua	tior
Comp l ex variabl and Harmonic	e - Analytic functions and Cauchy – Riemann equation functions; Construction of Harmonic conjugate an	d ana l yti		qua	tior
Complex variables and Harmonic Applications of a	 e - Analytic functions and Cauchy – Riemann equatic functions; Construction of Harmonic conjugate an inalytic functions to fluid-flow and electric field problems 	d ana l yti	c fu	equa nctic	tior
Complex variables and Harmonic Applications of a Module:2 Con	e - Analytic functions and Cauchy – Riemann equation functions; Construction of Harmonic conjugate an analytic functions to fluid-flow and electric field problems formal and Bilinear transformations	d analyti s.	c fu	equa nctic 7 ho	tior
Complex variables and Harmonic Applications of a Module:2 Con Conformal mapp	e - Analytic functions and Cauchy – Riemann equatic functions; Construction of Harmonic conjugate an analytic functions to fluid-flow and electric field problems formal and Bilinear transformations bing - Elementary transformations; Translation, Magnif	d ana l yti s. fication, R	c fu otati	equa nctic 7 ho on,	tior ons urs
Complex variables and Harmonic Applications of a Module:2 Con Conformal mapp Inversion; Expor	e - Analytic functions and Cauchy – Riemann equatic functions; Construction of Harmonic conjugate an inalytic functions to fluid-flow and electric field problems formal and Bilinear transformations ing - Elementary transformations; Translation, Magnif mential and Square transformations (w = e ^z , z ²); Bi	d analyti s. fication, R ilinear tra	c fu otation	equa nctic 7 ho on, rmat	tior ons urs
Complex variable and Harmonic Applications of a Module:2 Con Conformal mapp Inversion; Expor Cross-ratio-Imag	e - Analytic functions and Cauchy – Riemann equation functions; Construction of Harmonic conjugate an analytic functions to fluid-flow and electric field problems formal and Bilinear transformations bing - Elementary transformations; Translation, Magnifi mential and Square transformations (w = e ^z , z ²); Biggs of the regions bounded by straight lines	d analyti s. fication, R ilinear tra	c fu otation	equa nctic 7 ho on, rmat	tior ons urs
Complex variables and Harmonic Applications of a Module:2 Con Conformal mapp Inversion; Expor Cross-ratio-Imag transformations;	e - Analytic functions and Cauchy – Riemann equation functions; Construction of Harmonic conjugate an analytic functions to fluid-flow and electric field problems formal and Bilinear transformations formal and Bilinear transformations; Translation, Magnif mential and Square transformations (w = e ^z , z ²); Bilinear transfor	d analyti s. fication, R ilinear tra	c fu otation nsfor the	equa nctic 7 ho on, rmat	tion ons; urs ion; ove
Complex variable and Harmonic Applications of a Module:2 Con Conformal mapp Inversion; Expor Cross-ratio-Imag transformations; Module:3 Con	e - Analytic functions and Cauchy – Riemann equation functions; Construction of Harmonic conjugate an analytic functions to fluid-flow and electric field problems formal and Bilinear transformations bing - Elementary transformations; Translation, Magnifi mential and Square transformations (w = e ^z , z ²); Biggs of the regions bounded by straight lines	d analyti s. fication, R ilinear tra under	c fu otation nsfor the	equa nctic 7 ho on, mati ab	tion ons urs ion ove
Complex variable and Harmonic Applications of a Module:2 Con Conformal mapp Inversion; Expor Cross-ratio-Imag transformations; Module:3 Con Functions given Residues; Integr	e - Analytic functions and Cauchy – Riemann equatic functions; Construction of Harmonic conjugate an analytic functions to fluid-flow and electric field problems formal and Bilinear transformations bing - Elementary transformations; Translation, Magnif mential and Square transformations (w = e ^z , z ²); Bi ges of the regions bounded by straight lines nplex Integration by Power Series - Taylor and Laurent series-Sin ration of a complex function along a contour; Statemer	d analyti s. fication, R ilinear tra under ngularities nts of Cau	c fu otationsfor the s - for chy-	equa nctic 7 ho on, mati ab 7 ho 7 ho Gou	tion ons ion ove urs s -
Complex variable and Harmonic Applications of a Module:2 Con Conformal mapp Inversion; Expor Cross-ratio-Imag transformations; Module:3 Con Functions given Residues; Integre theorem- Cauch	e - Analytic functions and Cauchy – Riemann equatic functions; Construction of Harmonic conjugate an inalytic functions to fluid-flow and electric field problems formal and Bilinear transformations ing - Elementary transformations; Translation, Magnif mential and Square transformations (w = e ^z , z ²); Biges of the regions bounded by straight lines in plex Integration by Power Series - Taylor and Laurent series-Sin ration of a complex function along a contour; Statemer by's integral formula-Cauchy's residue theorem-Evalua	d analyti s. fication, R ilinear tra under ngularities nts of Cau	c fu otationsfor the s - for chy-	equa nctic 7 ho on, mati ab 7 ho 7 ho Gou	tior ons urs ion ove urs s -
Complex variable and Harmonic Applications of a Module:2 Con Conformal mapp Inversion; Expor Cross-ratio-Imag transformations; Module:3 Con Functions given Residues; Integre theorem- Cauch Indented contour	e - Analytic functions and Cauchy – Riemann equation functions; Construction of Harmonic conjugate an analytic functions to fluid-flow and electric field problems formal and Bilinear transformations of the regions formations; Translation, Magnific mential and Square transformations (w = e ^z , z ²); Biges of the regions bounded by straight lines and the regions bounded by straight lines analytic function along a contour; Statemer by's integral formula-Cauchy's residue theorem-Evalua r integral.	d analyti s. fication, R ilinear tra under ngularities nts of Cau	c fu otationsfor the chy- eal in	equa nctic 7 ho on, mat ab 7 ho 7 ho 6 out 5 oles Gout	tior ons urs ion ove urs s - rsa als
Complex variable and Harmonic Applications of a Module:2 Con Conformal mapp Inversion; Expor Cross-ratio-Imag transformations; Module:3 Con Functions given Residues; Integre theorem- Cauch Indented contour Module:4 Vect	e - Analytic functions and Cauchy – Riemann equation functions; Construction of Harmonic conjugate an analytic functions to fluid-flow and electric field problems formal and Bilinear transformations formal and Bilinear transformations; Translation, Magnifi- mential and Square transformations (w = e ^z , z ²); Biges of the regions bounded by straight lines analytic function along a contour; Statement by Power Series - Taylor and Laurent series-Sin fraction of a complex function along a contour; Statement y's integral formula-Cauchy's residue theorem-Evaluation rintegral.	d analyti s. fication, R ilinear tra under ngularities nts of Cau ation of re	c fu otation nsfor the chy-i eal in	equa nctic on, mati ab 7 ho Poles Gou tegr 6 ho	tior ons urs ion ove urs s - rsa als urs
Complex variable and Harmonic Applications of a Module:2 Con Conformal mapp Inversion; Expor Cross-ratio-Imag transformations; Module:3 Con Functions given Residues; Integre theorem- Cauch Indented contour Module:4 Vector Vector space –	e - Analytic functions and Cauchy – Riemann equatic functions; Construction of Harmonic conjugate an analytic functions to fluid-flow and electric field problems formal and Bilinear transformations bing - Elementary transformations; Translation, Magnif mential and Square transformations (w = e ^z , z ²); Bi ges of the regions bounded by straight lines nplex Integration by Power Series - Taylor and Laurent series-Sin ration of a complex function along a contour; Statemen by's integral formula-Cauchy's residue theorem-Evalua r integral. tor Spaces subspace; linear combination - span - linearly dependent	d analyti s. fication, R ilinear tra under ngularities nts of Cau ation of re dent – Inc	c fu otationsfor the chy eal in depe	equa nctic 7 ho on, "mati ab 7 ho 7 ole: Goul tegr 6 ho nder	tior ons urs ion ove urs s - rsa als urs urs
Complex variable and Harmonic Applications of a Module:2 Con Conformal mapp Inversion; Expor Cross-ratio-Imag transformations; Module:3 Con Functions given Residues; Integre theorem- Cauch Indented contour Module:4 Vector Vector space – bases; Dimensic	e - Analytic functions and Cauchy – Riemann equation functions; Construction of Harmonic conjugate an analytic functions to fluid-flow and electric field problems formal and Bilinear transformations formal and Bilinear transformations; Translation, Magnifi- mential and Square transformations (w = e ^z , z ²); Biges of the regions bounded by straight lines analytic function along a contour; Statement by Power Series - Taylor and Laurent series-Sin fraction of a complex function along a contour; Statement y's integral formula-Cauchy's residue theorem-Evaluation rintegral.	d analyti s. fication, R ilinear tra under ngularities nts of Cau ation of re dent – Inc	c fu otationsfor the chy eal in depe	equa nctic 7 ho on, "mati ab 7 ho 7 ole: Goul tegr 6 ho nder	tior ons urs ion ove urs s - rsa als urs urs
Complex variable and Harmonic Applications of a Module:2 Con Conformal mapp Inversion; Expor Cross-ratio-Imag transformations; Module:3 Con Functions given Residues; Integre theorem- Cauch Indented contour Module:4 Vector Vector space – bases; Dimension nullity.	e - Analytic functions and Cauchy – Riemann equatic functions; Construction of Harmonic conjugate an analytic functions to fluid-flow and electric field problems formal and Bilinear transformations bing - Elementary transformations; Translation, Magnif mential and Square transformations (w = e ^z , z ²); Bi ges of the regions bounded by straight lines nplex Integration by Power Series - Taylor and Laurent series-Sin ration of a complex function along a contour; Statemen by's integral formula-Cauchy's residue theorem-Evaluar r integral. tor Spaces subspace; linear combination - span - linearly dependences; Finite dimensional vector space. Row and colum	d analyti s. fication, R ilinear tra under ngularities nts of Cau ation of re dent – Inc	c fu otationsfor the chy eal in (depe	equa nctic 7 ho on, mati ab 7 ho Pole: Goule tegr 6 ho nder ank	tior ons urs ion ove urs s - rsa als rsa als urs ant - and
Complex variable and Harmonic Applications of a Module:2 Con Conformal mapp Inversion; Expor Cross-ratio-Imag transformations; Module:3 Con Functions given Residues; Integre theorem- Cauch Indented contour Module:4 Vector Vector space – bases; Dimension nullity. Module:5 Line	e - Analytic functions and Cauchy – Riemann equatic functions; Construction of Harmonic conjugate an inalytic functions to fluid-flow and electric field problems formal and Bilinear transformations ing - Elementary transformations; Translation, Magnif mential and Square transformations (w = e ^z , z ²); Biges of the regions bounded by straight lines inplex Integration to by Power Series - Taylor and Laurent series-Sin ration of a complex function along a contour; Statemer by's integral formula-Cauchy's residue theorem-Evalua r integral. tor Spaces subspace; linear combination - span - linearly dependences; Finite dimensional vector space. Row and colum ear Transformations	d analyti s. fication, R ilinear tra under ngularities nts of Cau ation of re dent – Inc nn spaces	c fu otationsfor the s - I cchy chy (depe s; Ra	equa nctic 7 ho on, rmati ab 7 ho Poles Goul tegr 6 ho ank a 6 ho	tior ons ion ove urs s - rsa als urs als urs als urs aurs
Complex variable and Harmonic Applications of a Module:2 Con Conformal mapp Inversion; Expor Cross-ratio-Imag transformations; Module:3 Con Functions given Residues; Integr theorem- Cauch Indented contour Module:4 Vector Vector space – bases; Dimension nullity. Module:5 Line Linear transform	e - Analytic functions and Cauchy – Riemann equatic functions; Construction of Harmonic conjugate an inalytic functions to fluid-flow and electric field problems formal and Bilinear transformations ong - Elementary transformations; Translation, Magnif mential and Square transformations (w = e ^z , z ²); Biges of the regions bounded by straight lines inplex Integration to by Power Series - Taylor and Laurent series-Sin ration of a complex function along a contour; Statemer by's integral formula-Cauchy's residue theorem-Evalua r integral. tor Spaces subspace; linear combination - span - linearly dependences; Finite dimensional vector space. Row and colum ear Transformations mations – Basic properties; Invertible linear transformations	d analyti s. fication, R ilinear tra under ngularities nts of Cau ation of re dent – Ind nn spaces	c fu otationsfoo the chy chy cal in (depe depe s; Ra	equa nctic 7 ho on, rmati ab 7 ho Poles Goul tegr 6 ho ank a 6 ho	tior ons ion ove urs s - rsa als urs als urs als urs aurs
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Complex variable and Harmonic Applications of a Module:2 Con Conformal mapp Inversion; Expor Cross-ratio-Imag transformations; Module:3 Con Functions given Residues; Integre theorem- Cauch Indented contour Module:4 Vector vector space – bases; Dimension nullity. Module:5 Line Linear transform transformations; Module:6 Inne	e - Analytic functions and Cauchy – Riemann equatic functions; Construction of Harmonic conjugate an inalytic functions to fluid-flow and electric field problems formal and Bilinear transformations ong - Elementary transformations; Translation, Magnif mential and Square transformations (w = e ^z , z ²); Biges of the regions bounded by straight lines inplex Integration by Power Series - Taylor and Laurent series-Sin ration of a complex function along a contour; Statemer y's integral formula-Cauchy's residue theorem-Evalua r integral. tor Spaces subspace; linear combination - span - linearly dependences; Finite dimensional vector space. Row and column ear Transformations mations – Basic properties; Invertible linear transformat Vector space of linear transformations; Change of bas er Product Spaces	d analyti s. fication, R ilinear tra under ngularities nts of Cau ation of re dent – Ind nn spaces ion; Matri es; Simila	c fu otationsfor the chy chy cal in (depe s; Ra	equa nctic 7 ho on, mat ab 7 ho 7 ho 9 ole: Gou tegr. 6 ho of lin 5 ho	tion; urs ion; ove urs s - rsat als- urs and urs iear urs
Complex variable and Harmonic Applications of a Module:2 Con Conformal mapp Inversion; Expor Cross-ratio-Imag transformations; Module:3 Con Functions given Residues; Integre theorem- Cauch Indented contour Module:4 Vector Vector space – bases; Dimension nullity. Module:5 Line Linear transform transformations; Module:6 Inne Dot products and	e - Analytic functions and Cauchy – Riemann equatic functions; Construction of Harmonic conjugate an inalytic functions to fluid-flow and electric field problems formal and Bilinear transformations ong - Elementary transformations; Translation, Magnif mential and Square transformations (w = e ^z , z ²); Biges of the regions bounded by straight lines inplex Integration by Power Series - Taylor and Laurent series-Sin ration of a complex function along a contour; Statemer by's integral formula-Cauchy's residue theorem-Evaluar rintegral. tor Spaces subspace; linear combination - span - linearly dependent ons; Finite dimensional vector space. Row and column for space of linear transformations; Change of bas for the regions and angles of vectors; Matri	d analyti s. fication, R ilinear tra under ngularities nts of Cau ation of re dent – Ind nn spaces ion; Matri es; Simila	c fu otationsfor the chy chy cal in (depe s; Ra	equa nctic 7 ho on, mat ab 7 ho 7 ho 9 ole: Gou tegr. 6 ho of lin 5 ho	tion; urs ion; ove urs s - rsat als- urs and urs iear urs
Complex variable and Harmonic Applications of a Module:2 Con Conformal mapp Inversion; Expor Cross-ratio-Imag transformations; Module:3 Con Functions given Residues; Integre theorem- Cauch Indented contour Module:4 Vector Vector space – bases; Dimension nullity. Module:5 Line Linear transform transformations; Module:6 Inne Dot products and inner products; Con	e - Analytic functions and Cauchy – Riemann equatic functions; Construction of Harmonic conjugate an inalytic functions to fluid-flow and electric field problems formal and Bilinear transformations ing - Elementary transformations; Translation, Magnif mential and Square transformations (w = e ^z , z ²); Bi ges of the regions bounded by straight lines inplex Integration by Power Series - Taylor and Laurent series-Sin ration of a complex function along a contour; Statemer by's integral formula-Cauchy's residue theorem-Evalua r integral. tor Spaces subspace; linear combination - span - linearly depend ons; Finite dimensional vector space. Row and colum ear Transformations hations – Basic properties; Invertible linear transformat Vector space of linear transformations; Change of bas er Product Spaces d inner products; Lengths and angles of vectors; Matr Gram - Schmidt – Orthogonalization.	d analyti s. fication, R ilinear tra under ngularities nts of Cau ation of re dent – Ind nn spaces ion; Matri es; Simila	c fu otatii nsfoi the eal in depe s; Ra (cces (rrity.	equa nctic 7 ho on, mati ab 7 ho Pole: Goule: Goule: Goule: Goule: 6 ho of lin 5 ho ons	tion; urs ion; ove urs s - rsat als- urs and urs iear urs of
Complex variable and Harmonic Applications of a Module:2 Con Conformal mapp Inversion; Expor Cross-ratio-Imag transformations; Module:3 Con Functions given Residues; Integret theorem- Cauch Indented contour Module:4 Vector Vector space – bases; Dimension nullity. Module:5 Line Linear transform transformations; Module:6 Inne Dot products and inner products; C Module:7 Mate	e - Analytic functions and Cauchy – Riemann equatic functions; Construction of Harmonic conjugate an inalytic functions to fluid-flow and electric field problems formal and Bilinear transformations ing - Elementary transformations; Translation, Magnif mential and Square transformations (w = e ^z , z ²); Bi ges of the regions bounded by straight lines nplex Integration in by Power Series - Taylor and Laurent series-Sin ration of a complex function along a contour; Statemer ry's integral formula-Cauchy's residue theorem-Evalua r integral. tor Spaces subspace; linear combination - span - linearly dependences; Finite dimensional vector space. Row and colum ear Transformations mations – Basic properties; Invertible linear transformat Vector space of linear transformations; Change of bas er Product Spaces d inner products; Lengths and angles of vectors; Matri Gram - Schmidt – Orthogonalization. rices and System of Equations	d analyti s. fication, R ilinear tra under ngularities its of Cau ation of re dent – Ind nn spaces ion; Matri es; Simila ix represe	c fu otatii nsfoi the chy- ces (ces (rrity.	radia ra	tion; urs ion; ove urs s - rsat als- urs and urs ean urs of urs
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	Total Lectur Total Tutoria	••		45 hours 15 hours
Text E	Book(s)		-	
	G. Dennis Zill, Patrick D. Shanahan, applications, 2013, 3rd Edition, Jones and Jin Ho Kwak, Sungpyo Hong, Linear Alge	d Bartlett	Publis	shers Series in Mathematics.
Refer	ence Books			
	Erwin Kreyszig, Advanced Engineering Wiley & Sons (Wiley student Edition).			
2.	Michael, D. Greenberg, Advanced Eng Pearson Education.	gineering	Math	nematics, 2006, 2 nd Edition
3.	Bernard Kolman, David, R. Hill, Introduct 2011, 9th Edition Pearson Education.	ory Linea	r Alge	ebra - An app l ied first course
	Gilbert Strang, Introduction to Linear Alge B.S. Grewal, Higher Engineering Ma Publishers.		-	
Mode	of Evaluation: Digital Assignments(Solutior	ns by usir	ng sof	t skill), Quiz, Continuous
Asses	sments, Final Assessment Test.	-		
Recor	nmended by Board of Studies 24	-06-2021		
	ved by Academic Council No	0.64 D)ate	16-12-2021

Pre-requisite Course Objective	BMAT101L, BMAT101P	3	0	0	-
•		Culla		-	3
Course Objective		Sylla	1.0	ers	IOI
	S:		1.0		
 To provide descriptive To analyze To apply 	e students with a framework that will help them choo methods in various data analysis situations. distributions and relationship of real-time data. estimation and testing methods to make inferen for decision making.			•	
Course Outcome					
	ourse the student should be able to:				
techniques 2. Understand distribution 3. Apply sta interpreting 4. Make app experiment	d the basic concepts of random variables and fin for analyzing data specific to an experiment. tistical methods like correlation, regression analy gexperimental data. propriate decisions using statistical inference that tal research.	nd an /sis in is the	appi ana	opri alyzi	ate ng,
	ical methodology and tools in reliability engineering prol	olems.			
Module:1 Introd	luction to Statistics		6	i ho	urs
	ata analysis; Measures of central tendency; Meas ss-Kurtosis (Concepts only).	ure of	Disp	bersi	on,
Module:2 Rando	om variables		8	ho	urs
probabi l ity distribu	 Probability mass function, distribution and den- ition and Joint density functions; Marginal, Condition Mathematical expectation and its properties- Condition 	na l dist	ributi	on a	and
Module:3 Corre	lation and Regression		4	ho	urs
	Regression – Rank Correlation; Partial and Multiple of	orre l at			
Module:4 Proba	bility Distributions		7	' ho	urs
Binomial distribut	tion; Poisson distributions; Normal distribution; Gaution; Weibull distribution.	amma			
Module:5 Hypot	thesis Testing-I		4	ho	urs
Testing of hypothe	esis –Types of errors - Critical region, Procedure for testster z test for Single Proportion- Difference of Pro		hypo	othes	sis-
Module:6 Hypot	▼) ho	
-	s- Student's t-test, F-test- chi-square test- goodness o gn of Experiments - Analysis of variance – One way-T RD-RBD- LSD				
Module:7 Reliat	bility		5	ho	urs

Reliability - Maintainability-Preventive and repair maintenance- Availability.

Modu	le:8 Contemporary Issues			2 hours
		Total lecture ho	ours:	45 hours
Text E	Book:		I	
1.	R. E. Walpole, R. H. Myer engineers and scientists, 201	s, S. L. Mayers, 12, 9 th Edition, Pea	K. Ye, arson Edu	Probability and Statistics for cation.
Refere	ence Books			
1.	Douglas C. Montgomery, G Engineers, 2016, 6 th Edition,			Statistics and Probability for
2.	E. Balagurusamy, Reliability	Engineering, 2017	7, Tata Mo	cGraw Hill, Tenth reprint.
3.	J. L. Devore, Probability ar Learning.	nd Statistics, 201	2, 8 th Ed	ition, Brooks/Cole, Cengage
4.	R. A. Johnson, Miller Freun edition, Prentice Hall India.	id's, Probabi l ity a	nd Statis	tics for Engineers, 2011, 8th
5.	Bilal M. Ayyub, Richard H Engineers and Scientists, 20			Statistics and Reliability for
Mode	of Evaluation: Digital Assig	gnments, Continu	ious Ass	essment Tests, Quiz, Final
Asses	sment Test.	- '		
Recon	nmended by Board of Studies	24-06-2021		
	ved by Academic Council	No. 64	Date	16-12-2021

BM	AT202P	Proba	bility and Stati	stics Lab)	L	Т	Ρ	С
						0	0	2	1
Pre	-requisite	BMAT101L, BMA	T101P			Sylla			ion
_							1.0		
	urse Objectiv								
	statistics 2. To study	e the students for using R programmin the relationship of	g.		-			-	
		using R. students capable to ng problems.	o do experimen	tal resea	rch using s	tatistic	s in	vari	ous
Cοι	Irse Outcom	es:							
At th	he end of the	course the student s	hould be able to	D:					
		ate R programming appropriate analysis			ough exper	imenta	l tec	hniq	ues
Indi	cative Expe	riments							
1.	Introduction	: Understanding Dat	a types: importi	 na/exnorti	na data				
2.		Summary Statistics				a			
		and Graphical Repre			,	٦			
3.		orrelation and simple		ession m	odel to rea	al			
•		nputing and interpre				To	ta		
4.	Applying m	ultiple linear regress	ion model to re	al datase			oora urs:		
5.		orobability distribution							
6.	Normal dist	ribution, Poisson dis	tribution						
7.	Testing of t time proble	nypothesis for one s ms	amp l e mean an	d proport	ion from rea	al			
8.	time proble		•			al			
9.		e t-test for independe	I						
10.	Applying Cl to real data	ni-square test for goo set	odness of fit test	and Con	tingency tes	st			
11.		ANOVA for real adomized Block desi			randomize	d			
Тех	t Book		· ·						
		analysis with R by	/ Joseph Schm	uller, Joh	n wiley an	d			
		New Jersey 2017.							-
	erence Books		. .	• -			• •	_	
	William P	of R: A First cours ollock, 2016. a Science, by Hadle	U U	•	•				
Mor		· nent: Continuous ass	essment FAT /	Oral eva	mination an	d othe	rs		
111100					initiation an				
	ommended h	y Board of Studies	24-06-2021						

	Course Title		_	Т	Ρ	С
BPHY101L	Engineering Physics		-	0	0	3
Pre-requisite	NIL	Syl			vers	ior
				1.0		
Course Objecti						
	he dual nature of radiation and matter.					
	chrödinger's equation to solve finite and infinite potential	probl	ems	an	id ap	opi
	eas at the nanoscale. and the Maxwell's equations for electromagnetic wa		and	an	nly	the
	semiconductors for engineering applications.	aves d	anu	ap	piy	ure
Course Outcon	ne					
At the end of the	e course the student will be able to					
	nd the phenomenon of waves and electromagnetic waves	S.				
	I the principles of quantum mechanics.					
	tum mechanical ideas to subatomic domain.					
	the fundamental principles of a laser and its types.					
5. Design a ty	pical optical fiber communication system using optoelect	tronic	devi	ces	5.	
Module:1 Intr	oduction to waves			-	7 ho	ur
	ng - Wave equation on a string (derivation) - Harmonic v		- rof			
	f waves at a boundary (Qualitative) - Standing					
eigenfrequencie		mar	00	an	u .	
	ctromagnetic waves					
				-	7 ho	urs
Physics of diver		f surfa	ce a		7 ho volu	
	gence - gradient and curl - Qualitative understanding of			and	volu	Ime
integral - Maxw	gence - gradient and curl - Qualitative understanding of ell Equations (Qualitative) - Displacement current - E	lectror	nagi	and net	volu ic w	Ime
integral - Maxw equation in free Module:3 Ele	gence - gradient and curl - Qualitative understanding of ell Equations (Qualitative) - Displacement current - E space - Plane electromagnetic waves in free space - He ments of quantum mechanics	lectror ertz's e	nagi expe	and neti rim	volu ic w ent. 6 ho	ave ave
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Textbook(s)

- 1. H. D. Young and R. A. Freedman, University Physics with Modern Physics, 2020, 15th Edition, Pearson, USA.
- 2. D. K. Mynbaev and Lowell L. Scheiner, Fiber Optic Communication Technology, 2011, 1st Edition, Pearson, USA

Reference Books

- 1. H. J. Pain, The Physics of vibrations and waves, 2013, 6th Edition, Wiley Publications, India.
- 2. R. A. Serway, J. W. Jewett, Jr, Physics for Scientists and Engineers with Modern Physics, 2019, 10th Edition, Cengage Learning, USA.
- 3. K. Krane, Modern Physics, 2020, 4th Edition, Wiley Edition, India.
- 4. M.N.O. Sadiku, Principles of Electromagnetics, 2015, 6th Edition, Oxford University Press, India.
- 5. W. Silfvast, Laser Fundamentals, 2012, 2nd Edition, Cambridge University Press, India.

Mode of Evaluation: Written assignment, Quiz, CAT and FAT

Recommended by Board of Studies	26-06-2021		
Approved by Academic Council	No. 63	Date	23-09-2021

BPH	IY101P	Engir	neering Phys	ics Lab			L	т	Ρ	С
							0	0	2	1
Pre-	-requisite	12 th or equivalent	ent Sy					Syllabus version		
								1.0		
Cou	rse Objectiv	es			I					
		al knowledge gained i	n the theory o	ourse an	d get hand	s-on	exp	erie	ence	of
the t	topics.		-		-					
Cou	rse Outcome	9								
At th	ne end of the	course the student will	be able to							
	•	end the dual nature of i				•				
2		s-on experience on	the topics of	of quanti	um mecha	nica	id	eas	in	the
	aboratory									
		power lasers in optics	and optical fi	ber re l ate	ed experime	ents.				
	cative Exper									
1.		e the dependence of fu		equency	with the ler	ngth	and	ten	sion	of
-		string using sonometer								
2.		e the characteristics of								
3.		e the wavelength of la	•	e-Ne lase	er and diode	e las	ers	of d	iffer	ent
4		s) using diffraction grat		diffuention	the second second			b a a		
4.		rate the wave nature o					te s	nee	et 👘	
5.		e the Planck's constant	~ ~				tion			
6.		ally demonstrate the dis								4 \
7.		equation (e.g., particle e the refractive index o								
1.	given)		a pristri usii	ly specifi		yie o	i pi	5111	will i	Je
8.		e the efficiency of a so	lar cell							
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10.		rate the phase velocity			oratory Hou	Irs	30 1	nou	rs	
Mod	e of assessm	ent: Continuous asses					551	.00		
		y Board of Studies	26.06.2021							
		demic Council	No. 63	Date	23.09.202	21				
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BSTS101P	Quantitative Skills Practice	LTP	C
		0 0 3	1.5
Pre-requisite	Nil	Syllabus ver	sion
Course Obiecti		1.0	
Course Objectiv	ce the logical reasoning skills of the students and help the	om improvo	
	solving abilities	an inprove	
	e skills required to solve quantitative aptitude problems		
	the verbal ability of the students for academic and profes	sional purpos	es
Course Outcom	es:		
	ound knowledge to solve problems of Quantitative Aptitud	е	
	rate ability to solve problems of Logical Reasoning		
	ne ability to tackle questions of Verbal Ability		
Module:1 Logi		5 N	ours
	egorization questions s involving students grouping words into right group order:	s of logical so	200
Cryptarithmetic		s or logical ser	150
	arrangements and Blood relations	6 h	ours
	ent - Circular Arrangement - Multi-dimensional Arrangem		ours
Relations		ent blood	
Module:3 Rati	o and Proportion	6 h	ours
Ratio - Proportio	on - Variation - Simple equations - Problems on Ages - N	Nixtures and	
alligations			
	entages, Simple and Compound Interest		ours
	Fractions and Decimals - Percentage Increase / Decreas erest - Relation Between Simple and Compound Interest		erest
Module:5 Num			ours
Number system-	Power cycle - Remainder cycle - Factors, Multiples - H		
	ential grammar for Placement	7 h	ours
 Preposition 			
•	s and Adverbs		
Tense			
 Speech a 			
	nd Phrasal Verbs		
	ons, Gerunds and Infinitives Ind Indefinite Articles		
	of Articles		
 Preposition 			
•	nd Prepositions and Prepositional Phrases		
 Interrogation 	• •		
	ding Comprehension for Placement	3 h	ours
	ns - Comprehension strategies - Practice exercises	ł	
Module:8 Voc	abulary for Placement		ours
	stions related to Synonyms – Antonyms – Analogy - Conf	using words -	
Spelling correctn			
	Total Lecture hou	urs: 45 h	ours
	18). Place Mentor 1 st (Ed.). Chennai: Oxford University P S. (2017). Quantitative Aptitude for Competitive Examina		

0		, ,	Ast (E L)	
3.	FACE. (2016). Aptipedia Aptitude Er	ncyclopedia	1° (Ed.).	New Delhi: Wiley
	Publications.			
4.	ETHNUS. (2016). Aptimithra, 1 st (Ed	.) Bangalor	e: McGrav	w-Hill Education Pvt. Ltd.
Ret	ference Books			
1.	Sharma Arun. (2016). Quantitative A	Aptitude, 7 th (Ed.). Noid	da: McGraw Hill Education Pvt.
	Ltd.			
Mo	de of evaluation: CAT, Assessments	and FAT (C	Computer	Based Test)
Re	commended by Board of Studies	28.06.2021	1	
Ар	proved by Academic Council	No. 63	Date	23.09.2021

Course Code	Course Title		L	Т	P	С
BSTS201P	Qualitative Skills Practic	e - I	0	0	3	1.
Pre-requisite	NIL	Sy	llabı	is v	ersi	ion
<u> </u>				1.0		
Course Objecti	ves:					
1. To enhar	ice the logical reasoning skills of stude	nts and improve	e prol	blen	n-	
solving a						
	then the ability of solving quantitative a					
3. To enrich	the verbal ability of the students for ac	cademic purpos	es			
Course Outcon	nes:					
1. Become	experts in solving problems of quantita	tive Aptitude				
	defend and critique concepts of logical					
3. Integrate	and display verbal ability effectively					
Module:1 Le	essons on excellence	[2 hc	
	n - Skill acquisition - consistent practic			-	2 110	Jur
Module:2 Th					6 hc	our
Problem	V					
Critical T						
 Lateral T 	hinking					
	and word-link builder questions	I				
	ogical Reasoning			(6 hc	bur
	nd Decoding					
Series						
AnalogyOdd Man	Out					
 Visual Re 						
Module:4 Su				4	3 ho	bur
	tory to moderate level sudoku puzzle	s to boost logi	cal tl			
comfort with nur	nbers				Ŭ	
	tention to detail				3 ho	bur
	d driven Qs to develop attention to deta	ail as a skill				
	uantitative Aptitude			14	4 hc	bur
Speed Maths	and Culture stiens of his sear sound and					
	and Subtraction of bigger numbers					
	nd square roots nd cube roots					
	ths techniques					
	tion Shortcuts					
 Multiplica 						
MultiplicaMultiplica	tion of 3 and higher digit numbers					
MultiplicaMultiplicaSimplifica	tion of 3 and higher digit numbers ations					
 Multiplica Multiplica Simplifica Comparir 	tion of 3 and higher digit numbers					

Module:7	Verbal Ability		6 hours
Grammar o			
A practice	paper with sentence base	ed and passage-ba	sed questions on grammar
discussed	- Nouns and Pronouns, \	/erbs, Subject-Verb	Agreement, Pronoun-
	nt Agreement, Punctuation	15	
Verbal reas			
Module:8	Recruitment Essentia	s	5 hours
Looking at	an engineering career t	hrough the prism	of an effective resume
 Impo 	rtance of a resume - the f	footprint of a persor	's career achievements
 Desi 	gning an effective resume)	
• An e	ffective resume vs. a pool	r resume	
 Skills 	s you must build starting to	oday the requisite?	
	does one build skills	5	
Impression	n Management		
Getting it rig	ght for the interview:		
Groo	ming, dressing		
 Body 	Language and other nor	-verbal signs	
	laying the right behaviour	0	
	Tota	Lecture hours:	45 hours
Text Book(s)		
1. SMART	. (2018). Place Mentor 1s	^t (Ed.). Chennai: O	xford University Press.
	D C (2017) Ouroptitat		
2. Aggarw	al R.S. (2017). Quanillal	ive Aptitude for Cor	npetitive Examinations 3 rd
00	ew Delhi: S. Chand Publi		npetitive Examinations 3 rd
(Ed.). N	ew Delhi: S. Chand Publi	shing.	
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Pre-requi	site	NIL					Sy	llabı	is v	ers	ion
									1.0		
Course Ol	ojectiv	ves:									
1. To a	pply c	ritical thinkin	g skills to	o related	l to their	subject i	natter				
		strate compe						ng ap	otitu	de	
		e good writte						• •			
Course Ou	utcom	es:									
		cal thinking s									er
		ate competer									
3. Disp	olay go	od written sk	tills for u	se in aca	ademic a	and profe	ssional	scer	nario	OS	
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		cal Reasoni	ng							5 hc	bur
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	ction S	Sense									
Cub											
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Module:2				and	Data					5 hc	bur
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Module:3 • Wor • Pip	Time k with es and	oblems and work– different effic cisterns: Mu	Advanc ciencies		ems					5 hc	our
Module:3 • Wor • Pip • Wo	Time k with es and rk equ	oblems and work– different effic cisterns: Mu ivalence	Advanc ciencies		ems					5 hc	bur
Module:3 • Wor • Pip • Wo • Div	Time k with es and rk equision c	oblems and work– different effic d cisterns: Mu ivalence f wages	Advanc ciencies ultiple pip	be proble			lating to				our
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Module:3 • Wor • Pip • Wo • Div • Adv Module:4 • Re • Ad • Ad • Ad • Ad • Ad • Ad	Time k with es and rk equision co vance Time lative vance vance vance vance vance nershi	oblems and work- different efficient ivalence f wages application speed d Problems b d Problems b d Problems b d Problems b t and loss, F ages - Advan	Advance ciencies ultiple pip problems Distance based on based on Partners	be proble s with co ce - Adv trains boats a races	omplexity anced		lating to	otal v	vork t	ς 5 hc	our
Module:3 • Wor • Pip • Wo • Div • Adv Module:4 • Ad • Ad • Ad • Ad • Ad • Ad • Ad	Time k with es and rk equ ision co /anceo /anceo vance vance vance vance vance rages	oblems and work- different efficient icisterns: Mu ivalence f wages application 5, Speed and 5, Speed and d Problems b d Problems b 1 and loss, F ages - Advar p	Advance ciencies ultiple pip problems Distance based on based on Partners	be proble s with co ce - Adv trains boats a races	omplexity anced		lating to	otal v	vork t	ς 5 hc	our
Module:3 • Wor • Pip • Wo • Div • Adv Module:4 • Re • Ad • Ad	Time k with es and rk equision co vance Time lative vance vance vance vance vance vance rages ghted	oblems and work- different efficient ivalence f wages application speed d Problems b d Problems b d Problems b t and loss, F ages - Advar p	Advanc ciencies ultiple pip problems ased on based on based on Partners nced	be proble s with co ce - Adv trains boats a races	omplexity anced		lating to	otal v	vork t	ς 5 hc	our
Module:3 • Wor • Pip • Wo • Div • Adv Module:4 • Re • Ad • Ad	Time k with es and rk equision co vance Time lative vance vance vance vance vance vance rages ghted	oblems and work- different efficient icisterns: Mu ivalence f wages application 5, Speed and 5, Speed and d Problems b d Problems b 1 and loss, F ages - Advar p	Advanc ciencies ultiple pip problems ased on based on based on Partners nced	be proble s with co ce - Adv trains boats a races	omplexity anced		lating to	otal v	vork t	ς 5 hc	our

	mainder and power cycles.	13hour
	entence Correction - Advanced	
	Subject-Verb Agreement	
	Modifiers	
	Parallelism	
	Pronoun-Antecedent Agreement	
	Verb Time Sequences	
	Comparisons	
	Prepositions	
~	• Determiners	
Qı	uick introduction to 8 types of errors followed by expo	osure to GMAT level questions
Se	entence Completion and Para-jumbles - Advance	d
20	Pro-active thinking	-
	 Reactive thinking (signpost words, root words, 	prefix suffix, sentence structure
	clues)	
	Fixed jumbles	
	Anchored jumbles	
Re Ex	actice on advanced GRE/ GMAT level questions eading Comprehension – Advanced posure to RCs of the level of GRE/ GMAT relating to	
Re Ex Mo	eading Comprehension – Advanced posure to RCs of the level of GRE/ GMAT relating to odule:8 Writing skills for Placement asay writing	
Re Ex Mo	eading Comprehension – Advanced sposure to RCs of the level of GRE/ GMAT relating to odule:8 Writing skills for Placement ssay writing • Idea generation for topics	
Re Ex Mo	 eading Comprehension – Advanced eposure to RCs of the level of GRE/ GMAT relating to odule:8 Writing skills for Placement esay writing e Idea generation for topics e Best practices 	
Re Ex Mo	eading Comprehension – Advanced sposure to RCs of the level of GRE/ GMAT relating to odule:8 Writing skills for Placement ssay writing • Idea generation for topics	
Re Ex Mo	 eading Comprehension – Advanced eposure to RCs of the level of GRE/ GMAT relating to odule:8 Writing skills for Placement esay writing e Idea generation for topics e Best practices 	3 hour
Re Ex Mc Es	eading Comprehension – Advanced sposure to RCs of the level of GRE/ GMAT relating to odule:8 Writing skills for Placement ssay writing Idea generation for topics Best practices Practice and feedback	3 hour
Re Ex Mc Es	 eading Comprehension – Advanced posure to RCs of the level of GRE/ GMAT relating to odule:8 Writing skills for Placement esay writing e Idea generation for topics e Best practices e Practice and feedback 	3 hour 45 hour
Re Ex Mc Es Te	eading Comprehension – Advanced sposure to RCs of the level of GRE/ GMAT relating to odule:8 Writing skills for Placement say writing Idea generation for topics Best practices Practice and feedback Total Lecture hours: ext Book(s)	3 hour 45 hour Oxford University Press.
Re Ex Mc Es Te 1.	eading Comprehension – Advanced sposure to RCs of the level of GRE/ GMAT relating to odule:8 Writing skills for Placement say writing • Idea generation for topics • Best practices • Practice and feedback Total Lecture hours: ext Book(s) SMART. (2018). Place Mentor 1 st (Ed.). Chennai:	3 hour 3 hour 45 hour Oxford University Press.
Re Ex Mc Es Te 1.	eading Comprehension – Advanced sposure to RCs of the level of GRE/ GMAT relating to odule:8 Writing skills for Placement say writing • Idea generation for topics • Best practices • Practice and feedback • Total Lecture hours: • SMART. (2018). Place Mentor 1 st (Ed.). Chennai: Aggarwal R.S. (2017). Quantitative Aptitude for C	3 hour 3 hour 45 hour Oxford University Press. Competitive Examinations 3 rd
Re Ex Mc Es Te 1.	eading Comprehension – Advanced sposure to RCs of the level of GRE/ GMAT relating to odule:8 Writing skills for Placement say writing • Idea generation for topics • Best practices • Practice and feedback Total Lecture hours: ext Book(s) SMART. (2018). Place Mentor 1 st (Ed.). Chennai: Aggarwal R.S. (2017). Quantitative Aptitude for C (Ed.). New Delhi: S. Chand Publishing.	3 hour 3 hour 45 hour Oxford University Press. Competitive Examinations 3 rd
Re Ex Mc Es Te 1. 2. 3.	eading Comprehension – Advanced sposure to RCs of the level of GRE/ GMAT relating to odule:8 Writing skills for Placement say writing Idea generation for topics Best practices Practice and feedback Total Lecture hours: ext Book(s) SMART. (2018). Place Mentor 1 st (Ed.). Chennai: Aggarwal R.S. (2017). Quantitative Aptitude for C (Ed.). New Delhi: S. Chand Publishing. FACE. (2016). Aptipedia Aptitude Encyclopedia 1 ^s Publications. ETHNUS. (2016). Aptimithra,1 st (Ed.) Bangalore	3 hour 45 hour Oxford University Press. Competitive Examinations 3rd st (Ed.). New Delhi: Wiley
Re Ex Mc Es Te 1. 2. 3. 4.	Eading Comprehension – Advanced sposure to RCs of the level of GRE/ GMAT relating to odule:8 Writing skills for Placement ssay writing Idea generation for topics • Idea generation for topics • Best practices • Practice and feedback Total Lecture hours: ext Book(s) SMART. (2018). Place Mentor 1 st (Ed.). Chennai: Aggarwal R.S. (2017). Quantitative Aptitude for C (Ed.). New Delhi: S. Chand Publishing. FACE. (2016). Aptipedia Aptitude Encyclopedia 1 st Publications. ETHNUS. (2016). Aptimithra,1 st (Ed.) Bangalore Ltd.	3 hour 3 hour 45 hour Oxford University Press. Competitive Examinations 3 rd
Re Ex Mc Es Te 1. 2. 3. 4.	eading Comprehension – Advanced sposure to RCs of the level of GRE/ GMAT relating to odule:8 Writing skills for Placement say writing Idea generation for topics Best practices Practice and feedback Total Lecture hours: ext Book(s) SMART. (2018). Place Mentor 1 st (Ed.). Chennai: Aggarwal R.S. (2017). Quantitative Aptitude for C (Ed.). New Delhi: S. Chand Publishing. FACE. (2016). Aptipedia Aptitude Encyclopedia 1 ^s Publications. ETHNUS. (2016). Aptimithra,1 st (Ed.) Bangalore	3 hour 45 hour Oxford University Press. Competitive Examinations 3 rd st (Ed.). New Delhi: Wiley :: McGraw-Hill Education Pvt.

Mode of evaluation: CAT, Assessme	ents and FA	T (Comp	outer Based Test)
Recommended by Board of Studies	28-06-202	1	
Approved by Academic Council	No. 68	Date	19-12-2022

FOUNDATION CORE

- B.Tech Foreign Languages Basket (2021-2022)

B.Tech. Computer Science and Engg with Spec. in Bioinformatics

BARB101L		Arabic		L	Т	Ρ	С
				2	0	0	2
Pre-requisite	NIL			Syll	abus		ion
					1.0		
Course Objective							
		sary background to					
		mmunicating in Ara					
		e and describe in	past, present, ar	nd fi	uture	time	by
	rabic grammar kno			•			
		f Arabic l iterature	e, culture, and	Ara	DIC te	ecnn	lica
terminologi	es.						
Course Outcome							
The student will be							
	Arabic Alphabets a	and Vowel signs.					
		ike days, months,	colors with simpl	e co	nvers	atior	n in
	al and corporate me						
Understand	the parts of sp	peech and conjug	ations (Past, Pre	esen	t, Fut	tures	s &
Imperative)							
		Ordina l numbers ar	nd different types of	of me	ember	rs of	the
family as w	ell as society.						
Medulari dan t						2 ho	
ل مجاء Module:1		Dhanatia aymhal af	Arabia Alababat)	Sha			
letters.	ne Pronunciation (Phonetic symbol of	Arabic Alphabel).	205	ipes o	n Ara	abio
ietters. ف ل£نة Module:2	A 17					3 ho	lire
The Vowel The V	owel Signs & the C	ases. The Sun lette	ors & Moon letters			5 110	uis
م للظن مة Module:3						4 ho	lire
		e Definite & the Inc	lefinite.			1110	are
ولعفة Module:4						5 ho	ours
		Adjective and Nour	n qualified.				
يض مائد Module:5						5 ho	ours
		trative Pronoun. Th	ne Re l ative Prono	un. 1	he Su	ubje	ct &
the Predicate. The	Demonstrative Phi	rase.				-	
والمر(Module:6	ل)ل مضي ول ض ارع	تصريف أفسعاز				5 ho	ours
Conjugations. Dail	y usage vocabulari	es.					
التقانية Module:7	ألعداد ولمصطىحات					4 ho	ours
		of the year. Seasor		nship	o. Tec	hnic	а
		hanical Engineering	g)				
بضرات Module:8	<u>م</u>					<u>2 ho</u>	
		Tota	Lecture hours:		3	0 ho	ours
Textbook(s)	Dahim Arabia Ca	uran for English C	nooking otudopto	<u>///al</u>	1 0	0 21	
2019, First Edi	ition, Goodword Bo	urse for Eng l ish S _l oks, New De l hi. ISI				α)	,
Reference Books		reach to the Aretic		.	lies		
1. Dr. W. A. Nadu Research	wi, A Practical Appr	roach to the Arabic	Language, Islamic	siuc	lies		
	v Delhi, Revised ed	lition-2016. ISBN: 9	708180202148				
		roach to the Arabic		nah E	Publics	ation	_
	18. ISBN: 978-93-8			girr		ation	-
	on: CAT. Digital as	sianment, Quiz, FA	Т				
	· •	signment, Quiz, FA 30-10-2021	Т				

BCHI101L	Chinese I	LTPC
		2 0 0 2
Pre-requisite	NIL	Syllabus version
		1.0
Course Objectiv		
-	s students the necessary background to:	
	basic Chinese and do simple conversation.	
	nese writing system and basic Chinese characters.	utting and davalage
	nd basic language texts relating to common daily se n ability (Chinese to English & vice-versa).	ettings and develop
แลกรูเลแบ	n ability (Oninese to English & vice-versa).	
Course Outcom	le	
The students wil	l be able to:	
1. Greeting	people in Chinese and use of personal pronouns and int	errogative
pronouns		
	family names and understand yes – no question and corr	rect use of
phonetics		ial quantiana
	xpressions related to nationality, place of origin and spec supations in Chinese, Adverbials of time and place and n	
	te expressions related to age, numbers, special question	
Module:1 Pho	netics语音 YuYin	3 hours
• P	honetics: Syllable initials:/ b/ / p/m /f ;;	
	yllable simple finals:/ a //o// e//i/u// ü;	
• P	honetics: Syllable initials:/ d//t/ /n/l;	
• S	yllable compound finals: an// ie //uo/	
	honetics: Syllable initials:/ g/k/ h/;	
	yllable compound finals::/ ai // ao//ei//en/	
	honetics: Syllable initials:/j//q//x/;	
	yllable compound finals: /ang //eng//ong//iang// iong/	
	honetics: Syllable initials:/z/c//s/;	
	honetics: Syllable initials:/zh//ch//sh//r;	
	ones: /1// 2 // 3/ /4/ .ing System书写系统 shuxiexitong	4 hours
	Characters	4 110013
 Chinese Radicals 	Characters	
 Stroke of 	rder	
	etings问候 wenhou	3 hours
	e basic ways to greet people, and tell one's own name an	d other's name
	onal pronouns"你,我,他/她,您,您们"	
•		
	with the interrogative pronoun"谁"	
	ily Names名姓 mingxing	4 hours
	ask and tell Family names, given names	
•	uestions with "什么"	
	native-Negative questions	
	onality国籍 guoji	4 hours
	ask and tell one's Nationality and origin)	
	" to express negation	
 Special q 	uestions with "哪儿"or "什么地方"	5 hours
	upation职业 zhiye	

• Lea	arn to ask and tell one's occupatio	n		
• Ad	verbials of time and place			
 No 	un/pronoun+"的"+noun			
Module:7	Numbers数字 shuzi			5 hours
• Ag	e (Learn to ask and tell one's age))		
• Th	e numerals			
• Th	e special questions with "几"			
• Tin	ne (Learn to tell time in native spea	akers' style	e)	
• Cu	rrency (Get idea about the usage	of notes ar	nd coins	in China)
• Th	e questions with "多少" and "怎么"			
Module:8	Contemporary Issues			2 hours
	Total Le	ecture hou	rs:	30 hours
Textbook	(S)			
1. Jiang	Liping (2014) 《HSK Standard	Course 2	1》Beiji	ng, Beijing Language and
Cultur	e University Press, ISBN7-5619-3	3709-9.	-	
Reference				
1. Kang	Yuhua & Lai Siping, (2005) 《	Conversatio	ona l Cł	ninese 301》 Book-1& 2,
i Nang	Beijing Language and Culture I	University I	Press, I	SBN 978-7-5619-1403-8/ H
Beijin				
Beijin 05014				
Beijin 05014		nt, Quiz, FA	T	
Beijin 05014 Mode of E		nt, Quiz, FA 30-10-202		

BESP101L	Spanish I	L	T	P	C
		2	0	0	2
Pre-requisite	NIL	Syllab			sion
<u> </u>			1.0		
Course Objectiv					
-	students the necessary background to:	. .			
	ate proficiency in reading, writing, and speaking in basic \$				
	abulary related to profession, education centers, day-to-c				
	ports and hobby, family set up, workplace, market, and cla				
	ate the ability to describe things in simple forms and from Spanish to English and vice versa.	their	uela	ans	and
เนื้อเราะเลเย	for spanish to English and vice versa.				
Course Outcom	Q				
The students will					
	er greetings, give personal details and identify genders	s hv u	nnia	CO	rect
articles	si greetings, give personal details and identity gendere	s by u	Sing	001	1001
	correct use of SER, ESTAR, and TENER verbs to desc	ribe pe	eople	e. pl	ace.
and thing				-, 1	,
	ime and weather conditions by knowing months, days	s, and	sea	ison	s in
Spanish.					
	pinion about people and places by using regular verbs a				
and creat	ing small paragraphs about the daily routine, hometowr	n, best	frie	end,	and
family.					
	edario; Saludos y Despedidas				ours
	aludos y Datos personales: Origen, Nacionalidad, Núme	eros Ca	ardin	ales	፡ (1-
100)					
	aticales: Vocales y Consonantes, Sílabas. Artículos defir	nidos e	ind	letin	idos
(Número y Géner	nicativos: Saludar y despedirse: Aprender a Presenta	rnoc		CORU	ntor
cosas en clase.	nicalivos. Saludai y despedilse. Aprendel a Presenta	1105,	a pi	egu	mai
	s personales; recursos para preguntar sobre las			4 ha	ours
pala					
	Números Cardinales (101-100 000), Profesión, Los días	de la :	sem	ana	
	ticales: Pronombres personales. Adjetivos. Los verbos S				
	(-AR, -ER, -IR) en el presente	-			
	nicativos: Escribe sobre mismo/a y los compañeros de la o	clase.			
	ribir lugares; Expresar existencia y ubicación			4 ho	ours
	niento del mundo Hispano. Vocabulario de Mi habitación,	Paíse	s y		
	es, Números Ordinales:				
	cimo (1 - 10). Descripción de lugares y cosas.		_		
	ticales: Adjetivos posesivos. El uso del verbo SER y EST,				
	AR. ¿qué, cuál / cuáles, cuántos / cuántas, dónde, cómo	, quier	ı, cu	land	0?
	icativos: Mi habitación, Mi Ciudad.			4 4 4	
	milia; Direcciones; Expresar la hora y los gustos			4 no	ours
	iones. Expresar la hora. ĭo. Expresar y preguntar sobre gustos e intereses.				
	ticales: Frases preposicionales. Uso del HAY.				
	re MUY y MUCHO. Uso del verbo GUSTAR, JUGAR,				
	icativos: Mi familia. Dar opiniones sobre tiempo.				
	lima; habilidades y aptitudes; Cualidades y defectos			4 h/	ours
	is personas			-+ 11(,ui 3
	el tiempo y las direcciones. Presentar y Describir a una p	herson	a v I	nua	r
	iticales: Los verbos irregulares (E-IE, O-UE, E-I) en el pre			-94	

_								
		omunicativos: Mi mejor amigo	o/a. Expres	ar feo	chas	s. Traducción li	nglés al es	paño
	spañol a					-		
		Describir el diario; Las a						hours
		diario. Las actividades cotidiar					ecesidad.	
		ramaticales:Los Verbos y pror						
		omunicativos:El horario. Tradu		és a e	espa	iñol y español a		
		La Gastronomía: Ir al Resta					4	hours
		mía: ¡A Comer! Dar opiniones		nento	s y l	bebidas.		
		ciudad y Ubicar los sitios en la						
		ramaticales: Los verbos irregu	lares. Esta	ar + ge	erun	ndio.		
	der + Infi		- ·					
		omunicativos:En l a cafetería, (Conversaci	on er	ו un	restaurante. M	I cludad na	atal.
	Universio	-						
Mo	dule:8	Contemporary Issues					21	hours
		Total L	ecture ho	urs:			30	hours
Тех	(tbook)		I				
1.	Jaime C	Čorpas, Eva Garcia, Agustin G	armendia,	AULA	N N	TERNAC I ONAI	1, Curso	de
	Españo	, 1 January 2016, GoyalPublis	shers and [Distrik	outo	rsPvt. Ltd, New	Delhi, Ind	ia
Ref	erence	Books						
1.	Shalu (Chopra, VIVA LATINO 1, Ja	anuary 20	19, 0	Soya	al Publishers a	and Distrib	outors
	Pvt.Ltd,	New Delhi, India	-					
2.	Ramón	Díez Galán, NuevoDELE A	1: Versiór	ו 202	20.	Preparación pa	ara e l exa	amen.
		s de examen						
3.		1 (Spanish Edition), Ju l y 14, 2						
		Cuadrad, Pilar Melero, Enriqu						
	ALUMN	O,1 January 2018, Goya l Publi	ishers and	Distri	buto	orsPvt. Ltd, Nev	w De l hi, In	dia
Ma	do of Evr	aluation: CAT, Digital Assignm	ont Quiz I					
IVIO		aluation. CAT, Digital Assignm	ent, Quiz, i	FAT				
Red	commen	ded by Board of Studies	30-10-202	21				
		/ Academic Council	No. 64	Date	•	16-12-2021		
· •P*P								

	French I L	Т 0	P 0	<u>С</u> 2
Pre-requisite		-	vers	
i ic-icquisite			.0	
Course Objective	les			
	students the necessary background to:			
	anguage competencies for effective communication in French			
	sights into the French culture and make them understand	the	nua	nce
	ommunication activities.			
	e students to communicate effectively in general and in a	a pro	ofess	iona
context.				
Course Outcome				
The students will				
	with the basics of the French Language.			
	end the various parts of speech and grammar concepts to	o fra	me t	basi
sentences	in French.			
	and acquire knowledge on a broad range of printed materia	als fo	r gen	era
	nd practical information.			
	nd explain the culture of French people through the language	e stuc	lied ir	ו th
class.				
	er et se presenter:		6 h	~~~~
	es Salutations, Les nombres (0-100000), L'heure, Les jours d			
	née, Les Pronoms personnels sujets, La conjugaison des ve	erbes	regu	lier
	irréguliers (avoir / être)			
Savoir-faire et sa				
	nter, Présenter quelqu'un, Donner des informations, Discuter	r de I	a cia	sse
l'université. Module:2 L'act	ivitéinteractiva		6 h	
	Pays, Les articles définis / indéfinis, Les prépositions de	الم		
La Mationalite du				
	e en français. La Couleur, La conjugaison des verbes - habit			
contracté, L'heure	e en français, La Cou l eur, La conjugaison des verbes - habit			
contracté, L'heure etc.				
contracté, L'heure etc. Savoir-faire et sa	avoir-agir :	ter / י	venir/	Alle
contracté, L'heure etc. Savoir-faire et sa Localiser des lieu: sur un hébergeme	avoir-agir : x dans une ville, Exprimer l'heure en français et Échanger de ent .	ter / י	venir/ orma	'Alle
contracté, L'heure etc. Savoir-faire et sa Localiser des lieu sur un hébergeme Module:3 Les a	avoir-agir : x dans une ville, Exprimer l'heure en français et Échanger de ent. activités quotidiennes:	ter / v	venir/ ormation 4 h é	Alle tion
contracté, L'heure etc. Savoir-faire et sa Localiser des lieu sur un hébergeme Module:3 Les a Les adjectifs pose	avoir-agir : x dans une ville, Exprimer l'heure en français et Échanger de ent. activités quotidiennes: sessifs, L'accord des adjectifs, Les pronoms toniques, La c	ter / v	ormation ormation ormation gaiso	′Alle tion our n d
contracté, L'heure etc. Savoir-faire et sa Localiser des lieu sur un hébergeme Module:3 Les a Les adjectifs poss verbe 'faire' avec	avoir-agir : x dans une ville, Exprimer l'heure en français et Échanger de ent. activités quotidiennes: sessifs, L'accord des adjectifs, Les pronoms toniques, La c e du, de la, de l', des. L'interrogation avec combien / comr	ter / v	venir/ orma 4 h gaiso / où	tion our n d etc
contracté, L'heure etc. Savoir-faire et sa Localiser des lieu sur un hébergeme Module:3 Les a Les adjectifs pose verbe 'faire' avec L'adjectif démons	avoir-agir : x dans une ville, Exprimer l'heure en français et Échanger de ent. activités quotidiennes: sessifs, L'accord des adjectifs, Les pronoms toniques, La c	ter / v	venir/ orma 4 h gaiso / où	tion our n d etc
contracté, L'heure etc. Savoir-faire et sa Localiser des lieu sur un hébergeme Module:3 Les a Les adjectifs poss verbe 'faire' avec L'adjectif démons français)	avoir-agir : x dans une ville, Exprimer l'heure en français et Échanger de ent. activités quotidiennes: sessifs, L'accord des adjectifs, Les pronoms toniques, La c e du, de la, de l', des. L'interrogation avec combien / com tratif, L'adjectif interrogatif, La traduction simple (français-a	ter / v	venir/ orma 4 h gaiso / où	tion our n d etc
contracté, L'heure etc. Savoir-faire et sa Localiser des lieu sur un hébergeme Module:3 Les a Les adjectifs poss verbe 'faire' avec L'adjectif démons français) Savoir-faire et sa	avoir-agir : x dans une ville, Exprimer l'heure en français et Échanger de ent. activités quotidiennes: sessifs, L'accord des adjectifs, Les pronoms toniques, La c e du, de la, de l', des. L'interrogation avec combien / com tratif, L'adjectif interrogatif, La traduction simple (français-a avoir-agir :	ter / v es inf conju ment ing l ai	venir/ orma <mark>4 h</mark> gaiso / où s/ang	tion our n d etc
contracté, L'heure etc. Savoir-faire et sa Localiser des lieu sur un hébergeme Module:3 Les a Les adjectifs poss verbe 'faire' avec L'adjectif démons français) Savoir-faire et sa Parler de la famille	avoir-agir : x dans une ville, Exprimer l'heure en français et Échanger de ent. activités quotidiennes: sessifs, L'accord des adjectifs, Les pronoms toniques, La c e du, de la, de l', des. L'interrogation avec combien / comr tratif, L'adjectif interrogatif, La traduction simple (français-a avoir-agir : e, Décrire une personne, parler de nos goûts, parler de nos a	ter / v es inf conju ment ing l ai	venir/ orma 4 h gaiso / où s/ang és.	Alle tion our our etc
contracté, L'heure etc. Savoir-faire et sa Localiser des lieu: sur un hébergeme Module:3 Les a Les adjectifs poss verbe 'faire' avec L'adjectif démons français) Savoir-faire et sa Parler de la famille Module:4 S'exp	avoir-agir : x dans une ville, Exprimer l'heure en français et Échanger de ent. activités quotidiennes: sessifs, L'accord des adjectifs, Les pronoms toniques, La c e du, de la, de l', des. L'interrogation avec combien / com stratif, L'adjectif interrogatif, La traduction simple (français-a avoir-agir : e, Décrire une personne, parler de nos goûts, parler de nos a primer:	ter / v es inf conju ment ing l ai	venir/ orma <mark>4 h</mark> gaiso / où s/ang	Alle tion our n d etc
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Мо	dule:6	L'activitédialogique:				2 hours
La	traduct	i on avancée (français-ang l ais/a	ang l ais-fran	çais)		
Sa	voir-fair	e et savoir-agir :				
		chats, Demander la direction, F	Réserver un	e chambi	re dans un hôte l , La	a
		sion écrite et orale.				
		L'activité de loisir				3 hours
		on / Dialogue:Décrire / parler d	•		erences/ une persor	nne / une
		cafeteria / la profession / l'unive		isirs.		
Module:8		Faciliter des échanges académiques				2 hours
				Tota	al Lecture hours:	30hours
				Tota	al Lecture hours:	30hours
	xtbook(,				
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BGER101L	German I	L T P C
Pre-requisite	NIL	Syllabus version
Course Obiosti		1.0
Course Objectiv	s students the necessary background to:	
	ate proficiency in reading, writing, and speaking in bas	sic German
	cate in German in everyday situations.	bio Comun.
	nd German culture and adapt in German speaking cou	untries or to work with
	peaking people.	
Course Outcom		
The students will		
	nd basic expressions, words, signs and simple convers	
	nd and translate short texts, simple descriptions, dire	ections and illustrated
	about daily activities. mmatically correct sentences, short paragraphs, inf	formal letters/e-mails
	s etc on matters of personal relevance and describe	
a simple l		
	nan in easy day-to-day conversations and demonstr	rate understanding o
German o		_
	ersteBegegnung	4 hours
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Mail-Adresse bud Nationalitäten sp Wortschatz: Beg Sprachen Grammatik: ,,\ Verbkonjugation Bestimmter Artiko	chstabieren; Zahlen bis 100 und mehr nennen; über L rechen. grüßungen, verabschieden, das Deutsche Alphabet, N ^{°°} Fragen, Aussagesätze, Personalpronomen (sein/kommen/wohnen/lernen/studieren/spre	änder, Sprachen und Zahlen, Länder und im Singular und
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Modulo:5 ZucommonmitExoundon	A bouro
Module:5 ZusammenmitFreunden	4 hours
Etwas gemeinsam planen; eine Speisekarte verstehe bezahlen; sich im Kaufhaus orientieren	en, im Restaurant bestellen und
Wortschatz: Glückwünsche, Redemittel, Stockwerke und	Waren im Kaufhaus
Grammatik: Imperativ mit du und ihr, Artikel im Da	ativ, Personalpronomen im Dativ,
Dativpräpositionen (mit, nach, ab, von), Modalverben (kör	nnen, sollen, wollen)
Schreiben: Inoffizielle Emails schreiben	
Module:6 MeineWohnung	4 hours
Wohnungsanzeigen verstehen, Wohnsituationen besch Positionen beschreiben, Gefallen und Missfallen ausdrüch	
Wortschatz: Wohnung, Zimmer und Räume, Möbel und G	eräte Farben
Grammatik: Adjektiv mit sein, zu/sehr+Adj, Wechselpräpo	
Schreiben: "Wohnung"	
Module:7 Eine Stadtrundfahrt	4 hours
Nach dem Weg fragen; Verkehrsmittel und Verkehrsschild	
Wortschatz: Plätze und Gebäude, Verkehrsmittel, Richtur Grammatik: Imperativ mit Sie, Modalverben (müssen/dürf	
Grammatik: Imperativ mit Sie, Modalverben (müssen/dürf später, Schreiben: "Meine Stadt"	en), Zeitadverbien: zuerst, dann,
Grammatik: Imperativ mit Sie, Modalverben (müssen/dürf später,	
Grammatik: Imperativ mit Sie, Modalverben (müssen/dürf später, Schreiben: "Meine Stadt"	en), Zeitadverbien: zuerst, dann, 2 hours
Grammatik: Imperativ mit Sie, Modalverben (müssen/dürf später, Schreiben: "Meine Stadt" Module:8 Training vom Sprechen	en), Zeitadverbien: zuerst, dann, 2 hours
Grammatik: Imperativ mit Sie, Modalverben (müssen/dürf später, Schreiben: ,,Meine Stadt" Module:8 Training vom Sprechen Total Lecture ho Textbook(s) 1. Stefanie Dengler, Paul Rusch, Helen Schmitz, Tan GmbH, Netzwerk A1, 2017, Stuttgart.	en), Zeitadverbien: zuerst, dann, 2 hours ours: 30hours
Grammatik: Imperativ mit Sie, Modalverben (müssen/dürf später, Schreiben: "Meine Stadt" Module:8 Training vom Sprechen Total Lecture ho Textbook(s) 1. Stefanie Dengler, Paul Rusch, Helen Schmitz, Tan GmbH, Netzwerk A1, 2017, Stuttgart. Reference Books	ien), Zeitadverbien: zuerst, dann, 2 hours 30hours ja Sieber, Ernst K l ett Sprachen
Grammatik: Imperativ mit Sie, Modalverben (müssen/dürf später, Schreiben: ,,Meine Stadt" Module:8 Training vom Sprechen Total Lecture ho Textbook(s) 1. Stefanie Dengler, Paul Rusch, Helen Schmitz, Tan GmbH, Netzwerk A1, 2017, Stuttgart.	ien), Zeitadverbien: zuerst, dann, 2 hours 30hours ja Sieber, Ernst Klett Sprachen ja Sieber, Ernst Klett Sprachen
Grammatik: Imperativ mit Sie, Modalverben (müssen/dürf später, Schreiben: ,,Meine Stadt" Module:8 Training vom Sprechen Total Lecture ho Textbook(s) 1. Stefanie Dengler, Paul Rusch, Helen Schmitz, Tan GmbH, Netzwerk A1, 2017, Stuttgart. Reference Books 1. Stefanie Dengler, Paul Rusch, Helen Schmitz, Tan GmbH, Netzwerk A1 Deutsch als Fremdsprache Inter	ien), Zeitadverbien: zuerst, dann, 2 hours 30hours ja Sieber, Ernst Klett Sprachen ja Sieber, Ernst Klett Sprachen nsivtrainer, 2019, Stuttgart
Grammatik: Imperativ mit Sie, Modalverben (müssen/dürf später, Schreiben: "Meine Stadt" Module:8 Training vom Sprechen Total Lecture ho Textbook(s) 1. Stefanie Dengler, Paul Rusch, Helen Schmitz, Tan GmbH, Netzwerk A1, 2017, Stuttgart. Reference Books 1. Stefanie Dengler, Paul Rusch, Helen Schmitz, Tan GmbH, Netzwerk A1 Deutsch als Fremdsprache Inte 2. Hartmut Aufderstrasse,JuttaMüller, Thomas Storz, La 3. Dallapiazza, Rosa-Maria; Jan, Eduard von; Schö	ien), Zeitadverbien: zuerst, dann, 2 hours 30hours ja Sieber, Ernst Klett Sprachen ja Sieber, Ernst Klett Sprachen nsivtrainer, 2019, Stuttgart agune, 2012.
Grammatik: Imperativ mit Sie, Modalverben (müssen/dürf später, Schreiben: ,,Meine Stadt" Module:8 Training vom Sprechen Total Lecture ho Textbook(s) 1. Stefanie Dengler, Paul Rusch, Helen Schmitz, Tan GmbH, Netzwerk A1, 2017, Stuttgart. Reference Books 1. Stefanie Dengler, Paul Rusch, Helen Schmitz, Tan GmbH, Netzwerk A1 Deutsch als Fremdsprache Inter 2. Hartmut Aufderstrasse,JuttaMüller, Thomas Storz, La	ien), Zeitadverbien: zuerst, dann, 2 hours 30hours ja Sieber, Ernst Klett Sprachen nsivtrainer, 2019, Stuttgart agune, 2012. onherr, Til, Hueber Verlag, 2008:
Grammatik: Imperativ mit Sie, Modalverben (müssen/dürf später, Schreiben: "Meine Stadt" Module:8 Training vom Sprechen Total Lecture ho Textbook(s) 1. Stefanie Dengler, Paul Rusch, Helen Schmitz, Tan GmbH, Netzwerk A1, 2017, Stuttgart. Reference Books 1. Stefanie Dengler, Paul Rusch, Helen Schmitz, Tan GmbH, Netzwerk A1 Deutsch als Fremdsprache Inte 2. Hartmut Aufderstrasse,JuttaMüller, Thomas Storz, La 3. Dallapiazza, Rosa-Maria; Jan, Eduard von; Schö Tangram aktuell.	ien), Zeitadverbien: zuerst, dann, 2 hours 30hours ja Sieber, Ernst Klett Sprachen nsivtrainer, 2019, Stuttgart agune, 2012. onherr, Til, Hueber Verlag, 2008:
Grammatik: Imperativ mit Sie, Modalverben (müssen/dürf später, Schreiben: "Meine Stadt" Module:8 Training vom Sprechen Total Lecture ho Textbook(s) 1. Stefanie Dengler, Paul Rusch, Helen Schmitz, Tan GmbH, Netzwerk A1, 2017, Stuttgart. Reference Books 1. Stefanie Dengler, Paul Rusch, Helen Schmitz, Tan GmbH, Netzwerk A1 Deutsch als Fremdsprache Inter 2. Hartmut Aufderstrasse,JuttaMüller, Thomas Storz, La 3. Dallapiazza, Rosa-Maria; Jan, Eduard von; Schö Tangram aktuell. 4. Hermann Funk, Christina Kuhn, Corneslen Verlag, Si Mode of Evaluation: CAT, Digital assignment, Quiz, FAT	ien), Zeitadverbien: zuerst, dann, 2 hours 30hours ja Sieber, Ernst Klett Sprachen nsivtrainer, 2019, Stuttgart agune, 2012. onherr, Til, Hueber Verlag, 2008:
Grammatik: Imperativ mit Sie, Modalverben (müssen/dürf später, Schreiben: "Meine Stadt" Module:8 Training vom Sprechen Total Lecture ho Textbook(s) 1. Stefanie Dengler, Paul Rusch, Helen Schmitz, Tan GmbH, Netzwerk A1, 2017, Stuttgart. Reference Books 1. Stefanie Dengler, Paul Rusch, Helen Schmitz, Tan GmbH, Netzwerk A1 Deutsch als Fremdsprache Inte 2. Hartmut Aufderstrasse,JuttaMüller, Thomas Storz, La 3. Dallapiazza, Rosa-Maria; Jan, Eduard von; Schö Tangram aktuell. 4. Hermann Funk, Christina Kuhn, Corneslen Verlag, St	ien), Zeitadverbien: zuerst, dann, 2 hours 30hours ja Sieber, Ernst Klett Sprachen nsivtrainer, 2019, Stuttgart agune, 2012. onherr, Til, Hueber Verlag, 2008: tudio d A1,2010, Berlin.

BGRE10)1L	Modern Greek		L	T	Ρ	0
Dro roquioi	ita	NIL	e di	2	0	0	2
Pre-requisi	te		Syll		<u>s ve</u> .0	ersi	or
Course Obj	iective	I					
		tudents the necessary background to:					
	0	<i>,</i> , ,					
1. Mast	ter the	Greek terminology widely used in their subjects of spe	cializa	tion			
		ate in Modern Greek in their day-to-day life.					
		, , ,					
Course Out	tcome						
The student	ts will b	e able to:					
1. Make	e use o	f the Modern Greek language in everyday conversation	n.				
2. Unde	erstand	contents from scientific texts that use Greek letters ar	nd woi	rds,	bec	omi	nç
fami	liar with	n fundamental linguistic aspects of the International So	cientifi	c Vo	ocal	bula	ry
		ning ab l e to formu l ate hypotheses about unknown	com	pou	nd	wor	d
deriv	ved from	n Greek.					
		critical socio-economic issues in contemporary Europ	pe, de	velo	opin	g th	ei
•		critical thinking.					
		ore aware of linguistic theory and phonetics and c		• •			
		rs and words, be more conscious and confident in	•			•	
		derived from Greek and compare Modern Greek with					
	•	lages through a deeper understanding of the Inte	ernatio	onal	Ph	one	eti
Alph	nabet.						
Madulaid	T - C \\				40	h	
		ηνικό αλφάβητο, ηφωνητικήκαιηπροφορά, οτονικόσύστημακαιτασημείαστίξης -			10	hοι	Ir
		uctiontotheGreekAlphabet, Phonetics,					
		tuation&Punctuation					
		d pronunciation of Greek letters; Greek symbols use					
		neering; Greek suffixes and prefixes used in Inte					
		national Phonetic Alphabet and phonetics of Mod					
and punctua		(usage of grave accent and diaeresis); word stress	rules;	cap	na	zau	0
		ισ. ή των Φράσεων και η Πρόταση: Γραμματική -			3	hοι	Ir
I	•	ureandgrammar			-		
	occulin	e, feminine, neuter), number (singular/plural) and	0000	(n	omi		
Gender (m						e a	n
Gender (m genitive, ac	cusativ	e and dative); adjectives: explaining agreement (cor	ncord)	; de			
Gender (m genitive, ac indefinite ar	cusativ ticles; p	e and dative); adjectives: explaining agreement (cor personal, interrogative, possessive, demonstrative, inde	ncord) efinite	; de	nou	ns.	
Gender (m genitive, ac indefinite ar Module:3	cusativ ticles; p Χαιρετ	e and dative); adjectives: explaining agreement (cor personal, interrogative, possessive, demonstrative, inde ισμοί: πληθυντικόςευγενείας -Formal and informal	ncord) efinite	; de	nou		IL
Gender (m genitive, ac indefinite an Module:3	cusativ ticles; p Χαιρετ greetir	e and dative); adjectives: explaining agreement (cor personal, interrogative, possessive, demonstrative, inde ισμοί: πληθυντικόςευγενείας -Formal and informal ngs	ncord) efinite	; de pro	nou 3	ns. hoı	
Gender (m. genitive, ac indefinite ar Module:3	cusativ ticles; p Χαιρετ greetir ative fur	e and dative); adjectives: explaining agreement (cor personal, interrogative, possessive, demonstrative, inde ισμοί: πληθυντικόςευγενείας -Formal and informal	ncord) efinite	; de pro	nou 3	ns. hoı	
Gender (ma genitive, ac indefinite ar Module:3 <u>Communica</u> affirmative for	cusativ ticles; p Χαιρετ greetir ative fur form.	e and dative); adjectives: explaining agreement (cor personal, interrogative, possessive, demonstrative, inde ισμοί: πληθυντικόςευγενείας -Formal and informal ngs	ncord) <u>efinite</u> I ucing	; de pro	nou 3 self	ns. hou usi	n
Gender (ma genitive, ac indefinite an Module:3 <u>Communica</u> affirmative for <u>Morphology</u> numerals fro	cusativ ticles; p Xαιρετ greetir ative fur form. γ and S om 1 to	e and dative); adjectives: explaining agreement (cor personal, interrogative, possessive, demonstrative, inde πσμοί: πληθυντικόςευγενείας -Formal and informal ngs nctions: using formal and informal greetings; introdu <u>yntax</u> : Auxiliary verb είμαι; personal pronouns (nomina 20.	ncord) <u>efinite</u> I ucing	; de pro	<u>nou</u> 3 self); ca	ns. hou usi ardii	n na
Gender (ma genitive, ac indefinite an Module:3 <u>Communica</u> affirmative for <u>Morphology</u> numerals fro Module:4	ccusativ ticles; p Xαιρετ greetin ative fun form. γ and S om 1 to Συστή	e and dative); adjectives: explaining agreement (cor personal, interrogative, possessive, demonstrative, inde παμοί: πληθυντικόςευγενείας -Formal and informal ngs nctions: using formal and informal greetings; introdu <u>yntax</u> : Auxiliary verb είμαι; personal pronouns (nomina 20. υω τον εαυτό μου- Introductions	ncord) efinite I ucing ative f	; de pro one	<u>nou</u> 3 self); ca 3	ns. hou usi ardii hou	ทยุ กอ
Gender (ma genitive, ac indefinite an Module:3 <u>Communica</u> affirmative for <u>Morphology</u> numerals from Module:4 <u>Communica</u>	ccusativ ticles; p Xαιρετ greetir ative fun form. γ and S om 1 to Συστή ative fun	e and dative); adjectives: explaining agreement (cor personal, interrogative, possessive, demonstrative, inde toμof: πληθυντικόςευγενείας -Formal and informal ngs nctions: using formal and informal greetings; introdu <u>yntax</u> : Auxiliary verb είμαι; personal pronouns (nomina 20. <u>υω τον εαυτό μου- Introductions</u> nctions: asking and providing information about bas	ncord) efinite I ucing ative f	; de pro one	<u>nou</u> 3 self); ca 3	ns. hou usi ardii hou	ทยุ กอ
Gender (ma genitive, ac indefinite ar Module:3 Communica affirmative fr Morphology numerals fro Module:4 Communica (name, age,	ccusativ ticles; p Xαιρετ greetin ative fun form. γ and S om 1 to Συστή ative fun , nation	e and dative); adjectives: explaining agreement (cor personal, interrogative, possessive, demonstrative, inde toμof: πληθυντικόςευγενείας -Formal and informal ngs inctions: using formal and informal greetings; introdu <u>yntax</u> : Auxiliary verb είμαι; personal pronouns (nomina 20. <u>νω τον εαυτό μου- Introductions</u> inctions: asking and providing information about bas ality, studies, profession).	ncord) efinite ucing ative f	; de pro one orm rsor	nou 3 self); ca 3 na l	ns. hou usi ardii hou deta	ne ne
Gender (m. genitive, ac indefinite ar Module:3 Communica affirmative for Morphology numerals fro Module:4 Communica (name, age, Morphology	ccusativ ticles; p Xαιρετ greetin ative fun form. y and S om 1 to Συστή ative fun , nation y and	e and dative); adjectives: explaining agreement (cor personal, interrogative, possessive, demonstrative, inde toμof: πληθυντικόςευγενείας -Formal and informal ngs nctions: using formal and informal greetings; introdu <u>yntax</u> : Auxiliary verb είμαι; personal pronouns (nomina 20. <u>υω τον εαυτό μου- Introductions</u> nctions: asking and providing information about bas	ncord) efinite ucing ative f sic pe	; de pro one one form rsor	nou 3 self); ca 3 na l (ns. hou usi ardii hou deta ens	n na ir ail

Мо	dule:5	Καταγωγήκαι οικογένε	ια - Nationality a	and Fa	amily	3 hours
		ative functions: asking and p				
		scribing the members of a nu			· · · · · · · · · · · · · · · · · · ·	a languagee
		<u>y and Syntax</u> :2 nd conjugati			υ, simp l e pre	sent tense);
		case (singular, parisyllat				
		adjectives of nationality				·
Мо	dule:6	Ηκαθημερινήρουτίνα -	Daily Routine ar	nd		3 hours
		Transportation				
Co	mmunic	ative functions: asking and p	providing information	on abou	ut habits and o	daily routine;
		asking the time; asking for ar				
		<u>γ and Syntax</u> :verbs πάω, τρ	ώω, λέω, ακούω; s	simp l e	present tense	and adverbs
		y; simple prepositions.				
Мо	dule:7			ζωήσ	την πόλη -	3 hours
	_	Weather, Seasonsand				
		<u>ative functions</u> : talking abou				g for prices;
		culations and perform a simp				
		<u>y and Syntax</u> :accusative cas				illion; ordinal
	,	ndefinite articles; accusative			ouns).	0.1
IVIO	dule:8	Διάλεξημε προσκεκλημέν			Σerc.	2 hours
		κοινωνίακαιπραγματικότι	ιτα της συγχρονη	ς Ελλά	οας –	
		contemporary Issues				
			Total Lecture h	ours:		30 hours
Tex	ktbook(s)				
1.	Georga	antziEvangelia, RaftopoulouE	Eleana, <i>Greek for y</i>	ou - El	ληνικάγιασας:	Textbook
	A1 Be	<i>ginners</i> ,March 2018, New Bi	lingual Edition (ISE	3N: 978	3-9607307682)), Neohe l ,
		s, Greece.				
2.		antziEvangelia, Raftopou l o				
		ook A1 Beginners, Marcl		lingual	Edition (ISE	3N: 978 -
_		07736), Neohel, Athens, Gre	ece.			
	ference		A 5/ (C		<u> </u>	5 / 00/0
1.		Gavala, Konstantinos Oikon		καλοκ	αιρι στην Ελλά	ioα!,2019,
2		tion, Omilo, Athens, Greece.		Tauth	AL AD Farts D	
2.		antziEvangelia, <i>Greek for you</i>			•	•
		o3, 2018, Bilingual Bundle Ed	ition (ISBN: 978-96	073076	568), Neohel, A	Athens,
	Greece	e.				
Мо	de of Ev	valuation: CAT, Digital Assigr	iment, Quiz, FAT.			
Re	commer	nded by Board of Studies	01-11-2021			
		y Academic Council	No. 64	Date	16-12-2021	

BITL101L	Italian	L T P C
Pre-requisite	NIL	2 0 0 2 Syllabus version
Fie-lequisite		1.0
Course Objectiv	/es	10
	s students the necessary background to:	
 Describe immediat Learn cru 	icate in Italian in their day-to-day life. in simple terms (both in written and oral form) aspects e environment and needs. ucial aspects of Italian culture and civilization, as we pnomy in the global market.	
Course Outcom	e	
The students will		
1. Use Italia	n language in everyday conversation.	
	he evolution of Modern European languages, underst	anding the important
•	ons between English and Neo-Latin languages by usir	•
	rm, thus becoming more conscious of English vocabu	
	n and Italian.	nary which is derived
		una in contannaran
	nd important cultural aspects and socio-economic iss	
	developing their aptitude for critical thinking and adopt	ing an internationally
	approach in learning.	
	nd the concept of Made in Italy, concerning the w	
design, fa	ashion, food, manufacturing, craftsmanship, and engine	ering industries.
Module:1 Prim	icontatti- Basic interaction	4 hours
Communicative f		4 110013
yourself); chiede congedarsi (leav rispondere (shar di ripetereun'info <u>Grammar and vo</u> I pronomi sogge singolare (simpl alphabet); gli ar singolare (adjec	tto (subjectpronouns io, tu, Lei); il presente di essere epresent tense of the verbs essere, avere, chiam ticoli determinativi (definite articles il & la); gli agge tives of nationality - singular); gli interrogativi: co ome, dove, qual); gli aggettivi numerali cardinali da 1 a	at one's provenance); lefono e l'indirizzo e addresses); chiedere iece of information). e, avere, chiamarsi al harsi); l'alfabeto (the ttivi di nazionalità al me, di dove, quale
Module:2 Pers	one e professioni – People and professions	4 hours
Communicative		
lavoro (share fornireinformazio informarsidellecci one's spoken la chiedere e dire l'	l'età(asking and telling someone's age); indicareoco information about one's profession and work nipersonali (sharing personal details, such as email, noscenzelinguistichealtrui e fornire le proprie (sharin nguages); scusarsi e ringraziare (excusing oneself, età (asking and telling about someone's age).	place); chiedere e phone number etc.); ng information about
(auxiliaryverbs a	ocabulary skills: n -are (regular verbs - first conjugation); i verbi esservivere and essere, irreguarverbs fare and stare); i s la negazione (negative clauses); articoli determina	ostantivi al singolare

(definite and indefinite articles), dimensionalisi accente a superte (de	
(definite and indefinite articles); dimostrativi questo e questa (de	
preposizioni a e in (prepositions a, in); gli interrogativi che, chi, dove, qua	
what, who, where, howmany); gli aggettivi numerali cardinali fino a 100	(numeral cardinal
adjectives up to 100).	
Module:3 Cibi e bevande - Gastronomic culture in Italy	4 hours
Communicative functions:	
ordinare al bar e al ristorante (placing an order at a restaurant/café	/bar); chiedere e
ordinarequalcosa in modo cortese (asking somet	
chiederequalcosachemancasultavolo (making special requests to a waiter	
(requesting the bill); fare una prenotazionetelefonica (making a reserva	
compitare (spelling a name/address).	,,
Grammar and vocabulary skills:	
i verbi regolari in -ere (regular verbs - second conjugation); i verbi	volere e preferire
(irreguarverbs volere and preferire); il plurale dei sostantivi (plu	
determinativi plurali (plural definite articles); bene e buono (adverb b	
buono); gli interrogativi che cosa, quali, quante (interrogative forms:	
howmany).	what, which one,
Module:4 Tempo libero, attivitàabituali - Free time and	4 hours
routine activities	4 110015
Communicative functions:	
	lollofroquenza een
parlare del tempo libero (discussing about free time and leisure); parlared	ieliairequenza con
cui si fa qualcosa (talking about the frequency of a certain activity).	
Grammar and vocabulary skills:	
i verbi regolari in -ire (regular verbs - thirdconjugation); i verbi andare,	
uscire (verbs andare, giocare, leggere and uscire); gli avverbi di frequ	ienza (adverbs of
frequency)	
Module:5 La casa e la stanza d'albergo - Describing a room	4 hours
and everyday objects	
Communicative functions:	
Descrivereun'abitazione (describing a home); descrivereiservizi di un alb	
hotel room and the services available); recensire un albergo (writing a sir	nple hotel review);
chiedereassistenza (asking for someone's assistance).	
Grammar and vocabulary skills:	
iverbiregolari in -ire con -isc (regular verbs - third conjugation in -isc)c' /	
there is / there are); iverbipotere / venire (to be able to, to come); le pre	
da a (prepositions da a); le preposizioniarticolate (articulat	ed prepositions);
da a (prepositions da a); le preposizioniarticolate (articulat imesidell'anno (months of the year); aggettivinumeraliordinali (ordinal nu	ed prepositions); meral adjectives);
da a (prepositions da a); le preposizioniarticolate (articulat imesidell'anno (months of the year); aggettivinumeraliordinali (ordinal nu l'interrogativoquanto (usage of quanto); i numeri cardinalimaggiori di 100	ed prepositions); meral adjectives);
da a (prepositions da a); le preposizioniarticolate (articulat imesidell'anno (months of the year); aggettivinumeraliordinali (ordinal nu l'interrogativoquanto (usage of quanto); i numeri cardinalimaggiori di 100 above 100); la data (date and time).	ed prepositions); imeral adjectives); (cardinal numerals
 da a (prepositions da a); le preposizioniarticolate (articulat imesidell'anno (months of the year); aggettivinumeraliordinali (ordinal nu l'interrogativoquanto (usage of quanto); i numeri cardinalimaggiori di 100 above 100); la data (date and time). Module:6 Spazio e tempo – Space and Time 	ed prepositions); meral adjectives);
da a (prepositions da a); le preposizioniarticolate (articulat imesidell'anno (months of the year); aggettivinumeraliordinali (ordinal nu l'interrogativoquanto (usage of quanto); i numeri cardinalimaggiori di 100 above 100); la data (date and time).Module:6Spazio e tempo – Space and Time Communicative functions:	ed prepositions); imeral adjectives); (cardinal numerals 4 hours
 da a (prepositions da a); le preposizioniarticolate (articulati imesidell'anno (months of the year); aggettivinumeraliordinali (ordinal nu l'interrogativoquanto (usage of quanto); i numeri cardinalimaggiori di 100 above 100); la data (date and time). Module:6 Spazio e tempo – Space and Time <u>Communicative functions</u>: descriverela propria città(describing one's city); chiedereun'informazione 	ed prepositions); meral adjectives); (cardinal numerals <u>4 hours</u> e reagire (asking
da a (prepositions da a); le preposizioniarticolate (articulat imesidell'anno (months of the year); aggettivinumeraliordinali (ordinal nu l'interrogativoquanto (usage of quanto); i numeri cardinalimaggiori di 100 above 100); la data (date and time).Module:6Spazio e tempo – Space and Time Communicative functions:	ed prepositions); meral adjectives); (cardinal numerals <u>4 hours</u> e reagire (asking
 da a (prepositions da a); le preposizioniarticolate (articulati imesidell'anno (months of the year); aggettivinumeraliordinali (ordinal nu l'interrogativoquanto (usage of quanto); i numeri cardinalimaggiori di 100 above 100); la data (date and time). Module:6 Spazio e tempo – Space and Time <u>Communicative functions</u>: descriverela propria città(describing one's city); chiedereun'informazione 	ed prepositions); imeral adjectives); (cardinal numerals <u>4 hours</u> e reagire (asking scribing a route);
 da a (prepositions da a); le preposizioniarticolate (articulat imesidell'anno (months of the year); aggettivinumeraliordinali (ordinal nu l'interrogativoquanto (usage of quanto); i numeri cardinalimaggiori di 100 above 100); la data (date and time). Module:6 Spazio e tempo – Space and Time Communicative functions: descriverela propria città(describing one's city); chiedereun'informazione for directions in an interactive way); descrivere un percorso (descrivere) 	ed prepositions); imeral adjectives); (cardinal numerals 4 hours e reagire (asking scribing a route); unoadaltrepersone
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 da a (prepositions da a); le preposizioniarticolate (articulati imesidell'anno (months of the year); aggettivinumeraliordinali (ordinal nu l'interrogativoquanto (usage of quanto); i numeri cardinalimaggiori di 100 above 100); la data (date and time). Module:6 Spazio e tempo – Space and Time <u>Communicative functions</u>: descriverela propria città(describing one's city); chiedereun'informazione for directions in an interactive way); descrivere un percorso (des rammaricarsi/scusarsi (expressing regret/apologizing); indirizzarequalcu (giving directions); parlaredegliorari di apertura e chiusura (talking about parlare del tempo atmosferico (talking about weather). <u>Grammar and vocabulary skills</u>: ci e il verbo andare (usage of the particle ci in combination with th concordanza degli aggettivi con i sostantivi (adjective-noun agreement); g ca (adjectivesending in -co and -ca); il partitivo - l'articolo indeterm (partitives and quantitatives); molto (usage of molto); i verbi dovere e 	ed prepositions); imeral adjectives); (cardinal numerals 4 hours e reagire (asking scribing a route); unoadaltrepersone it opening hours); e verb to go); la jli aggettivi in -co/- ninativo al plurale sapere (the verbs
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 da a (prepositions da a); le preposizioniarticolate (articulati imesidell'anno (months of the year); aggettivinumeraliordinali (ordinal nu l'interrogativoquanto (usage of quanto); i numeri cardinalimaggiori di 100 above 100); la data (date and time). Module:6 Spazio e tempo – Space and Time <u>Communicative functions</u>: descriverela propria città(describing one's city); chiedereun'informazione for directions in an interactive way); descrivere un percorso (des rammaricarsi/scusarsi (expressing regret/apologizing); indirizzarequalcu (giving directions); parlaredegliorari di apertura e chiusura (talking about parlare del tempo atmosferico (talking about weather). <u>Grammar and vocabulary skills</u>: ci e il verbo andare (usage of the particle ci in combination with th concordanza degli aggettivi con i sostantivi (adjective-noun agreement); g ca (adjectivesending in -co and -ca); il partitivo - l'articolo indeterm (partitives and quantitatives); molto (usage of molto); i verbi dovere e 	ed prepositions); imeral adjectives); (cardinal numerals 4 hours e reagire (asking scribing a route); unoadaltrepersone it opening hours); e verb to go); la jli aggettivi in -co/- ninativo al plurale sapere (the verbs hereis the?); gli

Module:7	Parliamo di me – Habits	and Preferences	4 hours
Communica	ative functions:		
parlare di g	usti e preferenze (talking abou	It preferences and one's tastes);	esprimereaccordo
e disaccord	lo (expressing agreement and	disagreement); chiedere e dire	l'ora (asking and
telling the ti	me).	-	
Grammar a	nd vocabulary skills:		
preposizion	i in, a, con (prepositions in, a,	con); i giorni della settimana (day	s of the week); mi
piace/mi pia	acciono (usage of mi piace); l'in	nterrogativo perché (the interroga	ative perché).
Module:8	Contemporary Issues		2 hours
		Total Lecture hours:	30 hours
Textbook((ئ		
1. L. Zigli	o, G. Rizzo, Nuovo Espresso	1: Libro dello studente e eserc	zizi, 2018(under
license	of ALMA, Italy), ISBN: 978-93	86862853,Goyal Publishing Hou	se, New Delhi
Reference	Books		
1. C.M. N	laddeo, E. Orlandino, <i>Dieci</i>	lezioni di italiano – Corso di l	ingua italiana per
stranie	ri A1, 2020, ALMA edizioni, Flo	prence (Italy).	
Mode of Ev	aluation: CAT, Digital Assignm	nent, Quiz, FAT.	
Recommer	ided by Board of Studies	01-11-2021	
	y Academic Council		

Pre-requisite NIL Syllabus Version Course Objectives The course gives students the necessary background to: 1. Develop interest in Japanese language by teaching them culture and general etiquettes. 2. Develop four basic skills that is reading, writing, listening, and speaking Japanese language. Japanese language everyday expressions as well as basic phrases. Course Outcome Students will be able to: 1. Greet in Japanese and remember Japanese alphabets. 2. Introduce themselves as well as can briefly exchange the personal details related to family, home, favorite foods etc., in Japanese. Students will be able to: 1. Greate simple questions and its answers in Japanese as well as can briefly describe their daily routine in Japanese. A. Understand the Japanese culture and etiquettes. Module:1 Introduction, Hiragana, Katakana and Kanji 4 hours Introduction of Japanese language and alphabets; Hiragana and katakana Reading and writing Hiragana and Katakana, 20 Nouns in Hiragana and 10 Nours in Katakana, Numerals Basic rule of Japanese phonetics. Module:2 Konnichiwa. Hajimemashite. 4 hours
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Module:2 Konnichiwa Hajimemashite 4 hours
Baily grootings and sadio princous to introduce yoursel
Express about your name, occupation, age, where you live, where you are from and what
language you can speak
Body Language such as bowing, pointing to your face, etc.
Module:3WatashinoKazoku4 hoursTalk briefly about your family, how many members there are and who they are,
Talk about your family showing a photo. Learn some phrases to give compliments.
Module:4 Sukinatabemono. Hitotsukudasai. 4 hours
Talk briefly about your favorite foods and dishes. Talk about your breakfast and where to go
for lunch.
Order food in a fast food restaurant.
Module:5 Watashinoie. Ojamashimasu. 4 hours
Say what kind of home you live in. Say what you have in your room and around your home
Invite your friend to your place / visit your friend's house.
Module:6 Nanjiniokimasuka. Itsugaiidesuka. 4 hours
Say the time and days you do something, Talk about your plans in the week
Talk about your plans and schedule. Module:7 KonoHitohaDareDesuka. 4 hours
Demonstrative pronoun - Kore, Sore, Are and Dore, (This, That, Over there, which) Kono,
sono, Ano and Dono (this, that, over there, which) Kochira, Sochira, Achira and Dochira. this
way) Koko, Soko, Asoko and Doko (Here, There location).Classification of Question
words (Dare, Nani, Itsu, Doyatte, dooshite, Ikutsu, Ikura).
Module:8 Contemporary Issues 2 hours
Total Lecture hours: 30 hours

Textbook(s)

1.	The Japan Foundation (2017), Marugoto Japanese Language and Culture Starter
	(A1)Course book For Communicative Language Activities, New Delhi: Goyal
	Publishers (9788183078054).

Reference Books

1.	The Japan Foundation (2017), Marugoto Japanese Language and Culture Starter A1
	Course book For Communicative Language Competences, New Delhi: Goyal Publishers
	(9788183078047).

2. Banno, Eri et al (2020), Genki: An Integrated Course in Elementary Japanese I [Third Edition], Japan: The Japan Times.

Mode of Evaluation: CAT, Digital Assignment, Quiz, FAT

Recommended by Board of Studies	30-10-2021		
Approved by Academic Council	No. 64	Date	16-12-2021

FOUNDATION CORE

- B.Tech HSM Electives Basket

(2021-2022)

B.Tech. Computer Science and Engg with Spec. in Bioinformatics

	Course Title	L	Т	Р	C
BCLE214L	Global Warming	3	0	0	3
Pre-requisite	NIL	Sylla	abus v	versio	n
			1.0		
Course Objective	2 S				
The objectives of					
5	ospheric dynamics and transport of heat.				
	climate changes using models and predict global warming.				
	ne concept of mitigation measures for global warming.				
Course Outcome	S				
Upon completion	of this course, the student will be able to :				
1. Understar	nd the principles of atmospheric dynamics and demon	strate	the		
intimidati	ons of global warming at global and regional level.				
2. Understar	nd the need for mitigation and vulnerability assessment of	regior	nal an	d gloł	bal
warming.					
•	evaluate the scientific insights of the IPCC, global policie	es on	globa	l warı	ming
and mitig					
-	limatic models to predict global warming.				
	owledge of science and engineering for mitigation of global wa	arming			
Module:1 Intro	duction		5 hou	Irs	
-	global warming-Significance of ozone in environment-Dep				-
Greenhouse gas	es-Vienna convention and Montreal protocol-Role of hydrogeneous and hydrogeneous a				-
Greenhouse gase greenhouse gase	es-Vienna convention and Montreal protocol-Role of hydrogeneous s-Carbon cycle.		ical c	cycle	-
Greenhouse gas greenhouse gase Module:2 Char	es-Vienna convention and Montreal protocol-Role of hydrogeneous s-Carbon cycle. acteristics of atmosphere and its effects	drolog	ical c 8 hou	ycle Irs	with
Greenhouse gas greenhouse gases Module:2 Char Physical and c	es-Vienna convention and Montreal protocol-Role of hydrogeneous s-Carbon cycle. acteristics of atmosphere and its effects hemical characteristics of atmosphere-Biogeochemistry-A	drolog Atmosp	ical c 8 hou bheric	ycle Irs stab	with
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National and national legislative frame	works – L	NFCCC – I	PCC – Kyoto p	rotocol – Kyoto
mechanisms, clean development mech			• •	•
International and Regional cooperation.				
Module:7 Mitigation measures of global	warming			5 hours
Carbon sequestration and Carbon captu	are and st	orage (CCS)-Clean develop	ment mechanism
(CDM)-Carbon trading-Future clean to				
building, eco-friendly plastic.				
Module:8 Contemporary issues				2 hours
		Tota	Lecture Hours	45 hours
Text Book(s)				<u> </u>
 Robin Moilveen, Fundamentals of w University Press, UK. Neelin David J, Climate Change and Cambridge University Press, UK. Reference Books 	Climate M	odelling, 201	1, First Edition,	
1. Thomas Stocker, Introduction to Clin Environmental Mechanics and Math		-		l and
2. Robert T. Watson, Marufu C. Zinyov				on and
mitigation of climate change-Scienti	ific Techni	cal Analyses,	1996, Cambridge	e University
Press, Cambridge, USA.		-	_	-
3. J.M. Wallace, P.V. Hobbs, Atmosph	eric Scienc	e, 2006, Seco	nd Edition, Elsev	ier/
Academic Press, USA.				
Mode of Evaluation: CAT, Assignment,	Quiz, FA	Г.		
Recommended by Board of Studies	24.02.202	22		
Approved by Academic Council	No. 66	Date	16-06-2022	

Course Code	Course Title	L	Т	Р	С
BCLE215L	Waste Management	3 0 0			
Pre-requisite	NIL	Syll	abus	versi	on
110-10quisite			1.0		
Course Objectives					
The objectives of this	course is to :				
v	ne different sources of the waste.				
2. Analyse the s	ocio-economic and environmental factors for waste managem	ent.			
3. Imply the shift	ft of waste management in the closed loop approach.				
Course Outcomes					
Upon completion of the	his course, the student will be able to :				
	ne potential impacts of waste management.				
	environmental, social and economic framework towards susta	inable	e		
development.					
3. Apply sustain	able development tools in regulating the waste management.				
4. Implement lif	fe cycle analysis in waste management.				
5. Involve in the	e concepts of closed loop approach and circular economy.				
Module:1 Intr	oduction to Waste Management			5 hou	irs
Perspective of wa	ste generation-Sources, impacts, characteristics, segreg	ation	and	dispo	sal of
-	my – Urbanization and new challenges in waste management			-	
with the waste-Relev	ant Regulations.				
with the waste-Relev Module:2 Mu	ant Regulations. nicipal Solid Waste Management			7 hou	
Module:2 Mu	nicipal Solid Waste Management	nsfer			irs
Module:2 Mun Sources; composition	nicipal Solid Waste Management on; generation-Rates; collection of waste; separation-Tran		and t	anspo	irs ort of
Module:2 Mun Sources; composition waste-Treatment an	nicipal Solid Waste Management on; generation-Rates; collection of waste; separation-Tran d disposal options-Landfill-Bio-mining-Incineration- Bion		and t	anspo	irs ort of
Module:2 Mun Sources; composition waste-Treatment and generation and class	nicipal Solid Waste Management on; generation-Rates; collection of waste; separation-Tran d disposal options-Landfill-Bio-mining-Incineration- Bion ification-Waste management and reduction techniques.		and tr al wa	ranspo ste-So	ort of
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Recovery of	value added products, Reuse o	f waste.			
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Module:7	Closed Loop Approach 7	Towards Cir	cular Eco	nomy	5 hours
chain-Integr	to the Circular Economy-Tratated waste refinery-Sustainal ainable Development.			•	1 11
Module:8	Contemporary issues				2 hours
				Total Lecture Ho	urs 45 hours
Text Book(s)					
	M. El-Haggar, Sustainable Industria Industria Markov Industria Industria Markov Industria Industria Markov Industria		-	•	lle-to-cradle
Reference Bo	oks				
Editio 2. Alexa	or M. Letcher and Daniel A. Va on, Elsevier Academic Press, U andros Stefanakis and Ioannis ne 2: Environmental Engineer	JSA. Nikolaou, C	Circular Ec	conomy and Sustainabi	ility
	valuation: CAT, Assignment	-		i, Lisevier / teadenne i i	1035, 0071.
	ded by Board of Studies	24.02.202			
Recommen					

Course Code	Course Title	L	Т	Р	C
BCLE216L	Water Resource Management	3	0	0	3
Pre-requisite	NIL	Syll	abus	versi	on
			1.0		
Course Objective	S				
The objectives of	this course is to :				
-	he basic principles of water resources and its planning and ma	U			
	he knowledge on recent technologies in assessing the water re				
	he challenges facing water management in varied climate type	pes ar	ound	the w	vorld
Course Outcome	5				
Upon completion	of this course, the student will be able to :				
	d the planning of water resources and need for water resourc	e			
managem					
	d the water resource potential in global, India scenario and e	xplore	e the v	vater	
	using different technologies.				
	knowledge international and national water law and its policy	у.			
_	e concept of water in agricultural and economic aspects. e future trends of water demand and its management during c	ricic			
	er, A Multi-Dimensional Resource	11515.	5	hour	•6
Water resource					
•	nternational policy-Climate change, oceans, challenges and n	leed f	or wa	ter res	sour
management.			4	1	
	al and Indian Scenario for Water Resources			hour	
	d Groundwater Global and Indian Scenario-Quality of w				
	ble reuse methods-Usable water resources by contine	ent a	nd co	untry-	wat
footprint.			5	hour	
	Descenter A successor 4		3	nour	
Network design	er Resources Assessment				
	Stream flow gauging-Weir design-Gauges-Current g				
Geophysical expl	Stream flow gauging-Weir design-Gauges-Current g pration-Test drilling-Application of remote sensing techniqu		g-Sal	t dil	utio
Geophysical expl	Stream flow gauging-Weir design-Gauges-Current g		g-Sal		utio
Geophysical explo Module:4 Wate	Stream flow gauging-Weir design-Gauges-Current g pration-Test drilling-Application of remote sensing techniqu	les.	g-Sal [*] 7	t dil hour	utio s
Geophysical explo Module:4 Wate Water for food p	Stream flow gauging-Weir design-Gauges-Current g pration-Test drilling-Application of remote sensing techniqu er in Agricultural Systems	es. er sec	g-Sal 7 urity,	t dil hour irrig	utio s atio
Geophysical explo Module:4 Wate Water for food p efficiencies, irriga pollution from ag	Stream flow gauging-Weir design-Gauges-Current g pration-Test drilling-Application of remote sensing technique er in Agricultural Systems production, virtual water trade for achieving global water tion methods and current water pricing, water for livestock a ricultural production	es. er sec	g-Sal 7 urity,	t dil hour irrig	utio s atio
Geophysical explo Module:4 Wate Water for food p efficiencies, irriga pollution from ag	Stream flow gauging-Weir design-Gauges-Current g pration-Test drilling-Application of remote sensing techniquer in Agricultural Systems production, virtual water trade for achieving global water tion methods and current water pricing, water for livestock a	es. er sec	g-Sal 7 urity, rocess	t dil hour irrig	utio s ation wate
Geophysical exploit Module:4 Water Water for food perficiencies, irrigate pollution from agen Module:5 Wate	Stream flow gauging-Weir design-Gauges-Current g pration-Test drilling-Application of remote sensing technique er in Agricultural Systems production, virtual water trade for achieving global water tion methods and current water pricing, water for livestock a ricultural production	er sec and p	g-Sal 7 urity, rocess 8	t dil hour irrig sing, v hour	ution s ation wate
Geophysical exploit Module:4 Wate Water for food pefficiencies, irriga pollution from ag Module:5 Wate Economic charac	Stream flow gauging-Weir design-Gauges-Current g pration-Test drilling-Application of remote sensing techniquer in Agricultural Systems production, virtual water trade for achieving global water tion methods and current water pricing, water for livestock a ricultural production er Economics	er sec and pr	g-Sal 7 urity, rocess 8 1ation	t dil hour irrig sing, v hour metl	ution s ation wate
Geophysical exploModule:4WateWater for food perficiencies, irrigation from agepollution from ageModule:5WateEconomic characeWater economic form	Stream flow gauging-Weir design-Gauges-Current g pration-Test drilling-Application of remote sensing technique er in Agricultural Systems production, virtual water trade for achieving global water tion methods and current water pricing, water for livestock a cicultural production er Economics teristics of water good and services-Nonmarket monetary	er sec and pr valu ainab	g-Sal g-Sal urity, rocess 8 uation le use	t dil hour irrig sing, v hour metl e, pri	utio s atio wate
Geophysical exploit Module:4 Water Water for food pefficiencies, irriga pollution from age Module:5 Water Economic charace Water economic fi	Stream flow gauging-Weir design-Gauges-Current g pration-Test drilling-Application of remote sensing technique er in Agricultural Systems production, virtual water trade for achieving global water tion methods and current water pricing, water for livestock a ricultural production er Economics teristics of water good and services-Nonmarket monetary nstruments-Policy options for water conservation and sust	er sec and pr valu ainab	g-Sal g-Sal purity, rocess ation le use ces m	t dil hour irrig sing, v hour metl e, pri	utio s atio wate s hods cing men
Geophysical exploModule:4WateWater for food pefficiencies, irrigationpollution from ageModule:5WateEconomic charactionWater economic charactiondistinction betweeModule:6Wate	Stream flow gauging-Weir design-Gauges-Current g pration-Test drilling-Application of remote sensing technique er in Agricultural Systems production, virtual water trade for achieving global water tion methods and current water pricing, water for livestock a ricultural production er Economics teristics of water good and services-Nonmarket monetary nstruments-Policy options for water conservation and sust en values and charges-Private sector involvement in water r	er sec and pr valu ainab	g-Sal g-Sal purity, rocess ation le uso ces m	t dil hour irrig sing, v hour metl e, pri anage hour	ution rs ation wate rs hods cong men rs
Geophysical exploModule:4WaterWater for food perficiencies, irrigatepollution from ageModule:5WaterEconomic characeWater economic characeWater economic characeModule:6WaterModule:6Water	Stream flow gauging-Weir design-Gauges-Current g pration-Test drilling-Application of remote sensing technique er in Agricultural Systems production, virtual water trade for achieving global water tion methods and current water pricing, water for livestock a cicultural production er Economics teristics of water good and services-Nonmarket monetary nstruments-Policy options for water conservation and sust en values and charges-Private sector involvement in water r er Legal and Regulatory Settings	er sec and pr valu ainab ter lav	g-Sal g-Sal urity, rocess lation le uso ces m 8 w- Ar	t dil hour irrig sing, v hour metl e, pri anage hour	ution rs ation wate mods ficing men rs
Geophysical exploModule:4WateWater for food perficiencies, irrigationollution from ageModule:5WateEconomic charactWater economic charactWater economic charactModule:6WateModule:6WateModule:6WateMational and Interof water law in Inter	Stream flow gauging-Weir design-Gauges-Current g pration-Test drilling-Application of remote sensing technique er in Agricultural Systems production, virtual water trade for achieving global water tion methods and current water pricing, water for livestock a icultural production er Economics teristics of water good and services-Nonmarket monetary nstruments-Policy options for water conservation and sust en values and charges-Private sector involvement in water r er Legal and Regulatory Settings mational Framework for Water Law; Basic structure of water	er sec and pr valu ainab resour- ter lav olvin	g-Sal g-Sal purity, rocess lation le uso ces m 8 w- Ar g wat	t dil hour irrig sing, v hour metl anage hour n over er lav	ution rs ation wate rs hods cong men rs rview v and
Geophysical exploit Module:4 Water Water for food perficiencies, irriga pollution from age Module:5 Water Economic charace Water economic for distinction between Module:6 Water National and Inter of water law in In policy-Water poli	Stream flow gauging-Weir design-Gauges-Current g pration-Test drilling-Application of remote sensing technique er in Agricultural Systems production, virtual water trade for achieving global water tion methods and current water pricing, water for livestock a cicultural production er Economics teristics of water good and services-Nonmarket monetary nstruments-Policy options for water conservation and sust en values and charges-Private sector involvement in water r er Legal and Regulatory Settings mational Framework for Water Law; Basic structure of water dia -Evolution of water law, key features of water law, ev	er sec and pr v valu ainab esour- ter lav olvin on m	g-Sal g-Sal urity, rocess lation le use ces m 8 w- Ar g wat anage	t dil hour irrig sing, v hour mett e, pri anage hour n over er lav ment	utio s atio wate wate nods cing men s view v and , and

Module:7	Demand Management				6 hours	
Balancing s	upply and demand-Economic the	ory of supp	y and der	nand-management b	y use of ariffs-	
_	ng-term, operational time-frame		-	-	-	
Economic v	value of water-Loss control-Water	harvesting.				
Module:8	Contemporary issues				2 hours	
				Fotal Lecture Hou	rs 45 hours	
Text Book	(s)					
1. Da	avid Stephenson, Water Resour	rces Manag	ement, 2	004, A. A. Balken	na Publishers,	
Net	herlands.	-				
Reference	Books					
	uis Theodore, Ryan Dupont R., Applications, 2020, CRC Press,			0	sic Principles	
 Philippe Cullet and Sujith Koonan, Water Law in India- An Introduction to Legal Instruments, 2017. Second Edition, Oxford University Press, New Delhi. 						
3. Sul	oramanya. K., Engineering Hydro		•		Education Pvt.	
	Evaluation: CAT, Assignment,	Quiz, FAT	•			
Recomm	ended by Board of Studies	24.02.202	2			
Approve	d by Academic Council	No. 66	Date	16-06-2022		

Course Cod	le	Course Title		LT	P	С		
BHUM102E		Indian Classical Music		2 0	2	3		
Pre-requisit	te	Nil	Syllabı	Syllabus version				
				1.0				
Course Obj	ectives	5						
1. Bring in	aware	ness of Music and understand the basics						
2. Bring in	aware	ness of Indian Classical Music						
3. Develop	oing ski	lls to sing with t ā ∣aṁ and ś ruti						
Course Out	tcome							
		his course the students will be able to:						
		knowledge on sound, music and history of Indian I tructure of hindusthani, kamataka sangitam and the		orms in	ı bot	h		
		ent aspects in music						
		different genres of music						
		Ivanced scientific aspects of music						
6. Sing so Module:1		th perfection VorId of Music		A 1-	our	_		
		hythm - Introduction to Different Genres of Music.		4 1	our	S		
		-			_			
Module:2		ry of Indian Classical Music			hou	rs		
		usic History and evolution from Sanskrit tradition to	modern (era				
(hindusthār								
		gītam), Folk Music.						
Module:3		atic Classical Music	(hou	rs		
		uti-rāgam,tāļam-sinkarņāļakasangītam.Compositions	(gitamsva	irajati				
Module:4		adamtillāna) – Legends of kamāļaka sangītam. Istani Music		4 h	our	_		
			ndhāt o	4 1	oui	5		
-		iusical forms (khayāl,dhrupad,tappa andtarāna) - Te nindusthāni Music - Legends in hindusthāni Music.	enunal-s.					
Module:5		Music		1	hou	rc		
		isic, Western music, Background Music- Music Con	nnosina	-	nou	13		
Module:6		c and Mind	nposing.	4	hou	rc		
		oning -Therapeutic Effects of Music, Science and N	Ausic scie			13		
		lligence used in music.	10310, 3010					
Module:7		c as a Profession		4	hou	rs		
Concert Plat	forms,	Different Types of Shows, New avenues in Music ir	ndustry.					
Module:8	-	emporary Issues		2 h	our	s		
Guest Lectu	res by	Academician/ Industrial Experts		-				
		Total Lecture H	ours:	30	hou	rs		
Text Book (s)							
1. Prof. P Publish	. Samt							
2. Guideb	book fo	Singha (2018), An Introduction to Hindustani Class r Beginners, Roli Books.	sical Musi	c: A				
Reference E	Books							
		idwan A.S. Panchapakesa Iyer (2014), Ganamrutha Prachuram.	a Bodhini,					
2. Dr. P T Dindigu		adurai (2010), The Splendor of South Indian Music,	Vaigarai	Publis	her	3,		

	ikshminarayana Subramanian <u>anguebar Publisher.</u>	n (2018), Classic	al Music of Indi	a: A Practi	cal Guide <u>.</u>	
4. B.	Subbarao (1979), Raganidhi,	Music Academy,	Madras.			
1	f Evaluation: Continuous Asse ment Test	essment Tests, C	uizzes, Assign	ment, Fina		
List of	Challenging Experiments (Ir	ndicative)				
1.	Swara exercises (sarali vari dhātu variśai) listening to m		, madhyasthāyi	variśai,	6 hours	
2.	Tālaexercises(alankāram-sF	Rūpakatāļam.ēkat	āļam, triputatāļar	'n)	4 hours	
3.	Compositions: (gītam-s.)	Compositions: (gītaṁ-s.)				
4.	Compositions: kīrttanaṁ in Telugu					
5.	Compositions: kīrttanaminT	amil			2 hours	
6.	Compositions: kīrttanam in	Kannaḍa			2 hours	
7.	Compositions: kīrttanam in	Malay ā am			2 hours	
8.	Compositions: kabeer ke de	ohe and abhang			2hours	
9.	Music composing technique	es			4 hours	
10.	Basics of audio recording	Basics of audio recording 4 hour				
			Total Labora Hours	atory	30 hours	
Mode of	f Evaluation: Lab Experiments	and Lab Final A	ssessment Tes	st		
Recomr	mended by Board of Studies	23-05-2022				
Approve	red by Academic Council No. 66 Date 16-06-2022					

Course Code	Course Title	L	Т	Р	C
BHUM103L	Micro Economics	3	0	0	3
Pre-requisite	Nil	Sy	llabu	s vei	sior
			1	.0	
Course Objective	S				
1. To enable	students to understand economic concepts from	a man	ageria	.1	
perspective.	I		0		
	e theoretical knowledge with quantitative and quali	tative	evider	nce f	or
effective dec	cision making.				
3. To evaluate	the consequences of market structure, pricing and cor	npetiti	on at t	he	
domestic an	d global levels.				
Course Outcome	5				
On completion of	this course the students will be able to:				
1. Describe tra	ditional and modern definitions of economics.				
2. Analyse sup	ply and demand forces that determine equilibrium in a	marke	t ecor	omy	•
3. Evaluate the	factors affecting firm behaviour, such as production a	nd cost	s.		
4. Develop the	skills to apply theories, models, and graphs to analyze	the na	tional	and	
international	cases.				
5. Discuss the	behaviour of market, industry and the performance of t	irms u	nder		
different ma	rket structures.				
6. Examine the	e market failures and the role of government in dealing	with tl	nose fa	ailure	es.
	oeconomic Principles			hou	
Introduction to Ec	onomics – Definition (Wealth, Welfare, Scarcity and G	Growth); Ecc	nom	ics
as Arts versus Scie	ence; Positive versus Normative Approaches.				
Module:2 Cons	sumer Behavior Theories		8	hou	rs
	ardinal approach- Law of Diminishing Marginal Ut	•			ce
5	onsumer equilibrium - Demand Analysis - movement			n	
-	n to law of demand; Demandforecasting; Law of supp	oly – M	larket		
equilibrium – Res			1		
	ticity of Demand and Supply			hou	
	and: Price, Income and Cross – Price elasticity's; measured	sureme	nt of e	elasti	city
-Elasticity of supp			1		
	uction Function			hou	
	on; Features of Production - The Production Function				
-	duction Function with Two Variable Inputs – Law of I	Return	s to So	cale -	- Isc
	ost line - Producer Equilibrium.				
	and Revenue Functions	-		hou	
	- Nature of cost – Short Run cost function and Long	Run c	ost cu	rves	-
	ons – Types. Break-even analysis.		1		
	ket Structure – Partial Equilibrium			hou	
	- Perfect and Imperfect Competition- Monopoly, Mon	-		npeti	tion
Duopoly and Olig	opoly, Efficiency and Regulation Factor market – Fact	or pric	ing.		
	eral Equilibrium and Economic Welfare		7 hou		

General Equ	uilibrium of Production and E	Exchange; Ex	ternalities	- Asymmetric in	nformation,
Adverse sel	ection - Moral hazard; Pareto	• Optimality;	Social We	fare Function.	
Module:8	Contemporary Issues				2 hours
			Total L	ecture Hours:	45 hours
Text Book(s)				
1.	N. Gregory Mankiw (2015	5), "Principl	es of Mic	roeconomics",	South-western
	Cengage Learning, USA, 7th	h Edition.			
Reference l	Books				
1.	Jeffrey M Perloff (2019), "N	Microeconon	nics", Pears	on Education, 1	7th Edition.
2	Dominick Salvatore ((2020)	, "Manageria	l Economic	s Principles a	and World
2.	Wide Applications", Oxford	University H	Press, 9th E	dition.	
3.	Varian H.R. (2015), "Intern	nediate Micr	oeconomic	s: A Modern A	pproach", East
5.	West Press Pvt., Ltd, New I	Delhi, 9th Ed	ition.		
Mode of]	Evaluation: Continuous As	sessment Te	ests, Quizzo	es, Assignment	, Final
Assessme	nt Test				
Recomme	ended by Board of Studies	23-05-2022	2		
Approved	l by Academic Council	No. 66	Date	16-06-202	22

Pre-requisite Nil Syllabus version I. To enable students to identify the determinants of macroeconomic aggregates and the major challenges associated with the measurement of these aggregates. 1. To enable students to critically evaluate the consequences of macroeconomic aggregates under differing economic conditions. 3. To discuss the linkages between financial markets and the real economy. Course Outcome On completion of this course the students will be able to: 1. Describe the macroeconomics aggregates. 2. Compute different measures of macroeconomic activity such as the national income. 3. Explain the general principles of consumption function and Investment function. 4. Develop the skills to use theories of multiplier and accelerator models to analyz everyday problems in real world situations and evaluate economic policies. 5. Analyse macroeconomics concepts such as growth and inflation. 6. Evaluate how the government and central bank can influence the economy and the markets through fiscal and monetary policies. Module:1 Macroeconomic Aggregates. Module:2 National Income 5 hours Circular flow of income, National income: Meaning, - Concepts – Nominal and reation enderthy of fiscal policy. Labour market and anemployment – Aggregate demand, aggregate supply and price level. Module:3 Module:3 Theory of Income and Employment Determination 5 hours Circular flow of income, National income: Meaning, - Concepts – Nominal and re	Course Code	Course Title	L	Т	Р	С
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Course Outcome On completion of this course the students will be able to: 1. Describe the macroeconomics aggregates. 2. Compute different measures of macroeconomic activity such as the national income. 3. Explain the general principles of consumption function and Investment function. 4. Develop the skills to use theories of multiplier and accelerator models to analyz everyday problems in real world situations and evaluate economic policies. 5. Analyse macroeconomics concepts such as growth and inflation. 6. Evaluate how the government and central bank can influence the economy and th markets through fiscal and monetary policies. Module:1 Macroeconomics – Macroeconomic issues – Importance of Macroeconomics – Macroeconomic Aggregates. Module:2 National Income 5 hours Circular flow of income, National income: Meaning, - Concepts – Nominal and reatincome -Methods of measurement – Importance – Problems in measurement. 5 hours Classical dichotomy – Keynesian income determination model – Money illusion, wage price rigidity – stability of equilibrium – stabilization of fiscal policy, Labour market and anemployment – Aggregate demand, aggregate supply and price level. 7 hours Module:3 Multiplier and Accelerator 7 hours Consumption: Meaning - Components – Determinants - Investment function: Meaning – Kinds - Application. 7 hours Module:5 Multiplier and Accelerator 7 hours	3. To discuss th	e linkages between financial markets and the real eco	onomy.			
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Viadulat I Vianay Kanking and Kinangial Markat and Institution 7 house	-		-			auo

Demand and Supply of money – The IS curve. Money Market and the LM curve. Liquidity trap. The IS-LM model – C e n t r a 1 B a n k - Monetary policy: meaning – Objectives – Variables – The instruments of Monetary control. Financial Markets - Savings, Investment and Financial System – Financial Markets and Financial Intermediaries. Financial Institution. Global Economic Indicators.

Total Lecture Hours:45 hours

Text Book (s)

1. Mankiw, G. (2019), Macroeconomics, Worth Publishers, 10th Edition.

Reference Books

- 1. Frederic S. Mishkin (2017), "The Economics of Money Banking and Financial Markets", Pearson, 12th Edition.
- 2. Blanchard, O. (2016), "Macroeconomics", Pearson Education Inc. 17th Edition. Paul
- 3. A Samuelson Williamson (2017), "Macroeconomics", Gaurav-APM2NBMGSCY9L,19th Edition.

Mode of Evaluation: Continuous Assessment Tests, Quizzes, Assignment, Final Assessment Test

Recommended by Board of Studies	23-05-2022			
Approved by Academic Council	No. 66	Date	16-06-2022	

Course Code	Course Title	L	Τ	Р	С
BHUM105L	Public Policy and Administration	3	0	0	3
Pre-requisite	Nil	Sy	llabu	s ver	sion
			1	1.0	
Course Objectives	3				
1. To introduc	ce the students to the various aspects of Public Administ	ration	and	Publi	С
Policy					
2. To impart	knowledge on administrative machinery in India and	its co	ontrib	ution	to
public poli	•				
-	he various State and Central level programmes related	d to s	social	and	
	ssues in India.				
Course Outcome					
1	this course the students will be able to:		1	C	
	with the conceptual aspects and theoretical fra	mewo	orks	of p	ublic
administrat	e principles of public organisation and management.				
	e public finance management and budgeting system in In	dia			
•	nowledge on the personal administration system in		inc	ludina	r the
-	t and service condition of central and state civil service c			Iuuiiiž	5 110
	te public policy making, implementation and evaluation.	aures	•		
	nd interpret various legal and welfare policies framed	by t	he di	ifferer	nt
governmen		e j e			
<u> </u>	ground of Public Administration		6	hours	
Meaning, nature ar	d scope of public administration, Private and public adm	inistra	ation.	Evol	utior
-	ation, New public administration.				
Module:2 Theo	ories of Public Administration		6	hours	
Scientific theory, (Classical theory, Bureaucratic theory, Human relation the	eory.			
Module:3 Basi	c Concepts and Principles		6	hour	5
Hierarchy, Unity o	f command, Span of control, Delegation, Line, staff and	auxili	ary a	genci	es.
Module:4 Fina	ncial Administration		6	hours	S
Organs of financia	l administration, Concepts and types of Budgeting, Pro-	epara	tion of	of buc	lget,
Enactment of budg	et, Execution of budget, Auditing of budget, Control over	er puł	olic fi	nance	e .
Module:5 Pers	onnel Administration in India		6	hours	9
	ce in Administration, All India and central services, Rec	ruitm			
	d service conditions.	Iuitiii	ciit, i	1 a 1111	ng,
	oduction to Public Policy		61	iours	
	and significance of Public Policy, Evolution of Public	c Pol			
-	olicy and Public Administration	0 1 01	iley (and I	oney
	ic Policy Process in India		6 I	iours	
	ementation and evaluation.	<u> </u>			
	temporary Issues		3	hour	S

Tex	t Book(s)
1.	Bidyut Chakrabarty, Prakash Chand Kandpal (2020), Public Administration in a
	Globalizing World: Theories and Practices, Sage Publications, New Delhi.
2.	Rumki Basu (2012), Public Administration: Concepts and Theories, Sterling
	Publication, New Delhi.
Refe	erence Books
1.	Raymond W Cox III, Susan Buck, Betty Morgan (2015), Public Administration in Theory
	and Practice, Routledge, New York.
2.	Christoph Knill, JaleTosun (2020), Public Policy: A New Introduction, Bloomsbury
	Publishing, London.
3.	Bidyut Chakrabarty, Prakash Chand (2019), Public Policy: Concept, Theory and
	Practice, Sage Publications, New Delhi.
4.	B.L. Fadia and Kuldeep Fadia (2015), Public Administration: Administrative Theories
	and Concepts, Sahitya Bhawan Publication, Agra.
Μ	ode of Evaluation: Continuous Assessment Tests, Quizzes, Assignment, Final
As	sessment Test
Re	commended by Board of Studies 23-05-2022
A	pproved by Academic Council No.66 Date 16-06-2022

Course Code	e Course Title	L	Т	P C
BHUM106I		3	0	0
Pre-requisit	te Nil	Syl		s versio
Course Objectiv			1.	.0
-	wareness on sociological perspectives and sociological conception	nts		
-	e students to the basic social processes of society, social		titutio	ons an
	ocial behavior.			
-	and understand sociology not merely as a social science di	scipl	ine l	out as
	ranch of knowledge.	-		
Course Outcom	es:			
On completion	n of this course the students will be able to:			
	ology as a discipline and differentiate from other disciplines.			
	field of sociology, major concepts and vocabulary.			
-	relevance of socialization, groups, and institution's influence	and	cons	train o
individual a				
-	e structural distinctions of caste and class within social dynamic			
-	rious social phenomena through the lens of sociological perspect	ctive	s.	
6. Develop and	d prescribe models and solutions to address societal issues.			
Module:1 So	ociology		6	hours
	ure -Scope - Field - Importance - Relationship with other Socia	al Sci		
	ociological Concepts			hours
	munity-Association - Institution - Social Process - Social Stru	cture		
Status.				
Module:3 C	ulture		5	hours
Meaning– Chara	cteristics – Functions - Elements - Cultural Lag - Culture and C	Civili	zatio	n.
	ocialization			hours
Meaning - Socia	alization as a Process - Factors - Importance - Agents - T	ypes	-Ad	lult
Socialization.				
Module:5 So	ocial Groups		6	hours
Meaning – Chara	acteristics - Importance- Types: Primary group and Secondary	grou	p-In-	group
and Out-group-R	Reference group.			
	ocial Institutions		6	hours
	mily – Education – Economics – Polity and Religion.			
	ocial Stratification			hours
Meaning – Ch	aracteristics – Functions – Types. Caste system: Mear	-		
-	- Origin - Functions and Changes. Social Class: Mean	ning	- 1	Vature
Characteristics	veen Caste and Class			
Characteristics Differences betw			-	
Characteristics Differences betw	Contemporary Issues		2	hours
Characteristics Differences betw			2	hours
Characteristics Differences betw				hours 5 hours

1.	Richard T. Schaefer (2021), Socie	ology – A	Brief Introdu	ction, McGraw Hill; 13th
	Edition.			
2.	Antony Giddens and Philip W.	Sutton (20	17), Sociolog	gy, Atlantic Publishers &
	Distributors Pvt. Ltd; 8 th Edition.			
Refe	rence Books			
1.	C.N. Shankar Rao (2019), Sociolo	ogy: Princip	oles of Sociol	logy: With an Introduction to
1.	Social Thoughts, S Chand & Comp	any Ltd.		
2.	Haralmbos, M. & Holborn (2022),	Sociology:	Themes and	Perspectives, Collins
2.	Publishers, 8th Edition.			
Mo	ode of Evaluation: Continuous Asse	essment Te	sts, Quizzes,	Assignment, Final
As	sessment Test			
Re	commended by Board of Studies	24-05-20	22	
Δn	proved by Academic Council	No.66	Date	16-06-2022

	Course Title	L	T P	C
BHUM107L	Sustainability and Society	3) 3
Pre-requisite	Nil	Sylla	bus ve	rsion
			1.0	
Course Objectives				
	holistic and critical perspective on sustainability.	•1• /		
	th clear understanding of social development and sustainal			
	students to think practically and strategically about sustai	nability		
Course Outcome:				
1	f this course the students will be able to:			
	e conceptual aspects of protection and reconcile econom	nc grov	vth,	
	balance and social progress.			
-	rstanding of the labour welfare and human rights.			
	mobility and integration.			
•	esolve conflict in equal manner.			
	inderstanding of the importance of education and equality.		1	
	actors that influence the sustainable society, design, development	op the p	policies	s to
achieve SDGs				
	erstanding Social Sustainability			ours
	xt of Sustainability: Definition – Brief History – Sustainal	ble Dev	elopm	ent in
	Importance and Challenges.		51	
	cation			ours
_	nce of Education in Sustainable Development – Educa es – Education for Climate Action.	ition an	ia Mec	111 10
Module:3 Lab	or Force and Reforms		6 h	ours
		• 1 • 1 •		ole c
	- Green Economy - Problem of Industries and Susta	ainabilii	ty - K	
Green Tribunals -	- Green Economy – Problem of Industries and Sustatives for Labor Welfare in India.	ainabilii	ty - R	
Green Tribunals - Government Initiat				ours
Green Tribunals - Government Initiat Module:4 Hur	ives for Labor Welfare in India.		6 h	
Green Tribunals - Government Initiat Module:4 Hur	ives for Labor Welfare in India. nan Rights grants and Refugees – Human Trafficking – Children's Ri		6 h	on an
Green Tribunals - Government Initiat Module:4 Hur Human Rights: Mi Protection Measure	ives for Labor Welfare in India. nan Rights grants and Refugees – Human Trafficking – Children's Ri		6 h reventio	on an
Green Tribunals - Government Initiat Module:4 Hur Human Rights: Mi Protection Measure Module:5 Gen	ives for Labor Welfare in India. nan Rights grants and Refugees – Human Trafficking – Children's Ri es.	ghts: Pr	6 h reventio	on an Iours
Green Tribunals - Government Initiat Module:4 Hur Human Rights: Mi Protection Measure Module:5 Gen	ives for Labor Welfare in India. nan Rights grants and Refugees – Human Trafficking – Children's Ri es. der Equality nder Equality and Inequality – Forms of Discrimination	ghts: Pr	6 h revention 7 h uppress	on an Iours sion -
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1	Lintsen, H., Veraart, F., Smits,	J. P., & Gri	n, J. (2018). We	ll-being, Sustainability and
1.	Social Development: The Nethe			
2.	Kaltenborn, M., Krajewski, M	., & Kuhn,	H. (2020). Susta	ainable Development Goals
۷.	and Human Rights. Springer Na	ature.		
Refer	ence Books :			
1.	Pandey, U. C., & Kumar, C. (20	020), SDG5	- Gender Equa	lity and Empowerment of
1.	Women and Girls.			
2.	García - TejeroIván Francisco, &	Hugo Durá	nZuazo Victor.	(2018), Water Scarcity and
	Sustainable Agriculture in Semiar			tegies and Challenges for
	Woody Crops. Academic Press, a	n imprint of	Elsevier.	
3	Beeson, G. (2020), A Water Story	/ Learning fi	rom the Past, Pla	nning for the Future,
	CSIRO Publishing.			
4	Anders B., Roy, K. (2020), Indige		ledges and the S	ustainable Development
	Agenda. United Kingdom: Taylor	& Francis.		
Read	ing Material:			
	Mensah, J. (2019). Sustainable de	-		
1.	implications for human action:		-	t Social Sciences, 5 (1),
	1653531. https://doi.org/10.1080/2			
2.	https://www.oecd.org/employmen		-	
3.	Aliber, Michael. (2002). Poverty-	eradication a	nd Sustainable I	Development.
4.	https://www.unicef.org/sdgs#sdg1			
5.	https://sdgs.un.org/goals			
	de of Evaluation: Continuous Ass	sessment Te	sts, Quizzes, As	ssignment, Final
	essment Test	1		
	ommended by Board of Studies	24-05-202	2	
Арр	proved by Academic Council	No. 66	Date	16-06-2022

	Course Title	L	Т	Р	C
BHUM108L	Urban Community Development	3	0	0	3
Pre-requisite	Nil	Syl	labus	s versi	ion
			1	l .0	
Course Objectives					
I.Provides the basic	c understanding on urban society and its way of living				
	ts about urban community issues				
	dents to know about various supporting agencies and i	ts initia	atives	for u	rba
development.					
Course Outcome:					
-	his course the students will be able to;				
-	cepts and approaches of urban community developmen	t.			
	v issues of urban community.	1.0	<i>.</i> .	C	1
	administrative and local bodies structure, power a	nd fun	ction	of u	rba
community.	re agencies in addressing various problems of urban co	mmuni	tx,		
	licies and programmes of urban governance and develo		•		
-	ssional awareness and learning on various develo	-		initia	tive
implemented in		nopme	iitui	minu	
Module:1 Urban				5 hou	irs
	oncept – Characteristics. City: Meaning – Classific	ation			
-					
mazos ana comu	ast : Urban Community Development : Concept -Obje	ectives	and	Histor	rica
-	ast : Urban Community Development : Concept -Obje	ectives	and	Histor	rica
background.		ectives	and	Histor 5 hor	
background. Module:2 Urban	ization and Urban Living			5 ho	urs
background. Module:2 Urban Urbanisation: Cond	ization and Urban Living cept – Definition- Theories of Urbanization. Urbanis	m: Cha	aracte	5 ho eristic	urs s -
background. Module:2 Urban Urbanisation: Cond	ization and Urban Living	m: Cha	aracte	5 ho eristic	urs s -
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		d Development - Urban Env				
Ref	orms -Disa	ster Management –Displac	ement –M	igration -Po	opulation Grow	th and its
Imp	act (social a	nd physical) -Suitable Appro	baches and S	Strategies.		
Мо	dule:8 Cor	ntemporary Issues				2 Hours
				Total	Lecture Hours	45 Hours
Tex	t Book(s)					
1.	Vanita Par	ndey (2021), Urban Sociology	y, Rawat Pi	Iblication		
2	Sidhartha.	K (2019), Cities Urbanisation	n and Urba	n Systems No	ew edition Kitab	Mahal
	Daryaganj	Delhi				
Ref	erence Book	KS				
1.	Dr.Mohd	Akhter Ali, M.Kamraju, Di	r.Muzafar	Ahmad Wan	ni (2020), Urban	nisation
	and Urban	Systems, Rajesh Publication				
2	Talja Blok	kland (2017), Community As	s Urban Pra	actice, Edite	d by Talja Blok	land,
	Polity Pres	S				
3.	Zacchaeus	Ogunnika (2017), Criti	ical Issues	in Comm	nunity Develop	ment: An
	Introductio	on to Rural and Urban Sociol	logy, Traffo	ord Publishin	g	
4.	Pablo Shi	laditya Bose (2015), Urban	n Develop	ment in Ind	ia Global India	ins in the
	Remaking	of Kolkata, Routledge				
Μ	ode of Eval	uation: Continuous Assess	ment Tests	, Quizzes, A	ssignment, Fina	ıl
A	ssessment T	'est.				
R	ecommende	d by Board of Studies	24-05-20	22		
A	pproved by	Academic Council	No. 66	Date	16-06-2022	
A]	pproved by	Academic Council	110.00	Date	10-00-2022	

DITIN/1001	Course Title	L	Τ	P	С
BHUM109L	Social Work and Sustainability	3	0	0	3
Pre-requisite	Nil	Sy		s vers	sion
Course Objective			1	.0	
· · · · ·	the working concept of sustainability at the micro, mezzo,	andr	nooro	lovol	
Social Work p		anu i	nacio	level	5 01
1	lationships among the concepts of environmental, economi	C 1150	of tea	hnold	ωσν
and social sust		e, use	01 101		·6J
	interconnectedness of sustainability with social work me	thods	. valu	les, ar	hd
ethics.			,		
Course Outcome					
	this course the students will be able to:				
1	us concepts of Social Work, sustainability and SDGs.				
	of responsibility in addressing sustainable goals in develop	ing al	better	socie	v.
	licies and programs from global perspectives.	0 **		20010	
-	to work in the community with people of diversity.				
-	ies of social development and human welfare services.				
-	op and implement programs and policies for the better world	l.			
	Work Education and Practice		5 hou	irs	
	ne Social Work profession - Principles – Methods - Ethics	– Val	ues –	Strate	gie
•	mmunity development – Social theory –Social-Ecological				υ
	Work, Ecology, and Social Justice		5 hou		
	Ecological Approaches - Human rights Violations – R				<u>.</u> 09
	baches in Social Work - Case Studies - Role of the Social	-			
	aches in social work case studies. Role of the social	1 11 01	KCI II	I ueint	
sustainability.					. • 1.
sustainability. Module:3 Sustai	nability and Vulnerability		6 hoi	Irs	
Module:3 Sustai	nability and Vulnerability inciples - Limitations - Challenges - Transdiscip		6 hou		
Module:3 Sustai	inciples - Limitations - Challenges - Transdiscip	linary			
Module:3 Sustai Introduction -Pr sustainability and	inciples - Limitations - Challenges - Transdiscip vulnerability –Interlink of Sustainability and vulnerability	olinary	y apj	proacl	
Module:3SustaiIntroduction-Prsustainability andModule:4Theor	inciples - Limitations - Challenges - Transdiscip vulnerability –Interlink of Sustainability and vulnerability ies in Sustainability	olinary	/ apj 8 hou	proacl 1 rs	1
Module:3 Sustai Introduction -Pr sustainability and Module:4 Theor Theories: Social	inciples - Limitations - Challenges - Transdiscip vulnerability –Interlink of Sustainability and vulnerability ies in Sustainability Capital theory and Mobilization - Bottom of the	olinary	/ apj 8 hou	proacl 1 rs	1
Module:3SustainIntroduction-Prsustainability andModule:4Module:4TheorTheories:SocialHumanistic sustai	inciples - Limitations - Challenges - Transdiscip vulnerability –Interlink of Sustainability and vulnerability ies in Sustainability Capital theory and Mobilization - Bottom of the nability theory – Social Economy theory.	linary pyrar	y ap <u></u> 8 hou nid a	proacl Irs Ipproa	1
Module:3SustainIntroduction-Prsustainability andModule:4Module:4TheorTheories:SocialHumanistic sustainSustainModule:5Pillars	inciples - Limitations - Challenges - Transdiscip vulnerability –Interlink of Sustainability and vulnerability ies in Sustainability Capital theory and Mobilization - Bottom of the nability theory – Social Economy theory. s of Sustainability	linary	y apy 8 hou nid a 8 hou	proacl Irs Ipproa	1
Module:3SustaiIntroduction-Prsustainability andModule:4Module:4TheorTheories:SocialHumanistic sustaiModule:5PillarsPillars:Social – Ed	inciples - Limitations - Challenges - Transdiscip vulnerability –Interlink of Sustainability and vulnerability ies in Sustainability Capital theory and Mobilization - Bottom of the nability theory – Social Economy theory. s of Sustainability conomic – Environmental – Cultural - Political - Security as	pyrar	y apy 8 hou nid a 8 hou	proacl Irs Ipproa	1
Module:3SustainIntroduction-Prsustainability andModule:4Module:4TheorTheories:SocialHumanisticsustainModule:5PillarsPillars:Social – EeModule:6Sustain	inciples - Limitations - Challenges - Transdiscip vulnerability –Interlink of Sustainability and vulnerability ies in Sustainability Capital theory and Mobilization - Bottom of the nability theory – Social Economy theory. s of Sustainability conomic – Environmental – Cultural - Political - Security as inable Developmental Goals – I	pyrar	y apy 8 hou nid a 8 hou 6 hou	proacl Irs Ipproa Irs	n ch
Module:3SustainIntroduction-Prsustainability andModule:4Module:4TheorTheories:SocialHumanistic sustainModule:5Pillars:Social – EaModule:6SustainGoal 1:No Povert	inciples - Limitations - Challenges - Transdiscip vulnerability –Interlink of Sustainability and vulnerability ies in Sustainability Capital theory and Mobilization - Bottom of the nability theory – Social Economy theory. s of Sustainability conomic – Environmental – Cultural - Political - Security as mable Developmental Goals – I y - Goal 2: Zero Hunger - Goal 3: Good Health and Well-B	pyran	y apy 8 hou nid a 8 hou 6 hou - Goa	proacl Irs approa Irs Irs I 4: Qu	n ch
Module:3SustainIntroduction-PrSustainability andModule:4Module:4TheorTheories:SocialHumanistic sustainSocialModule:5PillarsPillars:Social - EaModule:6SustainGoal 1: No PovertEducation - Goal	inciples - Limitations - Challenges - Transdiscip vulnerability –Interlink of Sustainability and vulnerability ies in Sustainability Capital theory and Mobilization - Bottom of the nability theory – Social Economy theory. s of Sustainability conomic – Environmental – Cultural - Political - Security as inable Developmental Goals – I y - Goal 2: Zero Hunger - Goal 3: Good Health and Well-B 5: Gender Equality - Goal 6: Clean Water And Sanitation	pyran	y apy 8 hou nid a 8 hou 6 hou - Goa	proacl Irs approa Irs Irs I 4: Qu	n ch
Module:3SustainIntroduction-PrSustainability andModule:4Module:4TheorTheories:SocialHumanistic sustainModule:5Pillars:Social – EdModule:6SustainGoal 1:No PovertEducation - GoalAnd Clean Energy	 inciples - Limitations - Challenges - Transdiscip vulnerability –Interlink of Sustainability and vulnerability ies in Sustainability Capital theory and Mobilization - Bottom of the nability theory – Social Economy theory. s of Sustainability conomic – Environmental – Cultural - Political - Security as inable Developmental Goals – I y - Goal 2: Zero Hunger - Goal 3: Good Health and Well-B 5: Gender Equality - Goal 6: Clean Water And Sanitation y - Goal 8: Decent Work and Economic Growth. 	pyran spects leing l - Go	y apy 8 hou nid a 8 hou 6 hou - Goa	proacl Irs pproa Irs Irs I 4: Qu Afford	n ch
Module:3SustaiIntroduction-Prsustainability andModule:4TheorTheories:SocialHumanisticsustaiModule:5PillarsPillars:Social - EdModule:6SustaiGoal 1:No PovertEducation - GoalAnd Clean EnergyModule:7Sustai	inciples - Limitations - Challenges - Transdiscip vulnerability –Interlink of Sustainability and vulnerability ies in Sustainability Capital theory and Mobilization - Bottom of the nability theory – Social Economy theory. s of Sustainability conomic – Environmental – Cultural - Political - Security as inable Developmental Goals – I y - Goal 2: Zero Hunger - Goal 3: Good Health and Well-B 5: Gender Equality - Goal 6: Clean Water And Sanitation y - Goal 8: Decent Work and Economic Growth. inable Developmental Goals – II	pyran spects leing - Go	 <i>ap</i> <i>8 hou</i> <i>8 hou</i> <i>6 hou</i> <i>6 hou</i> <i>al 7:</i> <i>5 hou</i> 	proacl IITS IITS IITS IITS IITS IITS IITS	n ch nali
Module:3SustainIntroduction-PrSustainability andModule:4Module:4TheorTheories:SocialHumanisticSustainModule:5PillarsPillars:Social – EdModule:6SustainGoal 1:No PovertEducation - GoalAnd Clean EnergyModule:7SustainGoal 9:Industry	 inciples - Limitations - Challenges - Transdiscip vulnerability –Interlink of Sustainability and vulnerability ies in Sustainability Capital theory and Mobilization - Bottom of the nability theory – Social Economy theory. s of Sustainability conomic – Environmental – Cultural - Political - Security as inable Developmental Goals – I y - Goal 2: Zero Hunger - Goal 3: Good Health and Well-B 5: Gender Equality - Goal 6: Clean Water And Sanitation / - Goal 8: Decent Work and Economic Growth. inable Developmental Goals – II Innovation, And Infrastructure - Goal 10: Reduced I 	pyran spects linary pyran spects linary a - Go	y apy 8 hou nid a 8 hou 6 hou - Goa al 7: 5 hou llity -	proacl Irs pproa Irs I 4: Qu Afford Irs - Goa	n ch nali dat
Module:3SustaiIntroduction-Prsustainability andModule:4TheorTheories:SocialHumanistic sustaiModule:5PillarsPillars:Social – EdModule:6SustaiGoal 1:No PovertEducation - GoalAnd Clean EnergyModule:7SustaiGoal 9:Industry,Sustainable Cities	inciples - Limitations - Challenges - Transdiscip vulnerability –Interlink of Sustainability and vulnerability ies in Sustainability Capital theory and Mobilization - Bottom of the nability theory – Social Economy theory. s of Sustainability conomic – Environmental – Cultural - Political - Security as inable Developmental Goals – I y - Goal 2: Zero Hunger - Goal 3: Good Health and Well-B 5: Gender Equality - Goal 6: Clean Water And Sanitation y - Goal 8: Decent Work and Economic Growth. inable Developmental Goals – II	pyran pyran pects leing - Go nequa	<pre>y apy 8 hou nid a 8 hou 6 hou - Goa al 7: 5 hou al 17: - Toduc</pre>	proacl ITS pproa ITS I 4: Qu Afford ITS - Goa tion -	n ch nali dat
Module:3SustainIntroduction-PrSustainability andModule:4Module:4TheorTheories:SocialHumanisticSustainModule:5PillarsPillars:Social – EdModule:6SustainGoal 1:No PovertEducation - GoalAnd Clean EnergyModule:7SustainGoal 9:Industry,SustainableCities13:ClimateActionAction	 inciples - Limitations - Challenges - Transdiscip vulnerability –Interlink of Sustainability and vulnerability ies in Sustainability Capital theory and Mobilization - Bottom of the nability theory – Social Economy theory. s of Sustainability conomic – Environmental – Cultural - Political - Security as inable Developmental Goals – I y - Goal 2: Zero Hunger - Goal 3: Good Health and Well-B 5: Gender Equality - Goal 6: Clean Water And Sanitation / - Goal 8: Decent Work and Economic Growth. inable Developmental Goals – II Innovation, And Infrastructure - Goal 10: Reduced I And Communities - Goal 12: Responsible Consumption A 	pyran pyran pects leing - Go nequa	<pre>y apy 8 hou nid a 8 hou 6 hou - Goa al 7: 5 hou al 17: - Toduc</pre>	proacl ITS pproa ITS I 4: Qu Afford ITS - Goa tion -	n ch nali dat

				Total	Lecture Hours	45 hours
Tex	t Book(s)					
1.		, Lena, 2018, Green Socia wat Publications, India	al Work: F	From Env	ironmental Crise	es to Environmental
2.	Responsib	eal Filho, UbiratãTortato ility and Sustainable D ties, springer publication.			0	0 0
Refe	erence Bool	ζS				
1.		nathan (2021), Social W ^h Edition, Sage Publicatio		ice Asse	ssment, Plannin	g, Intervention and
2.	Heslop, P Publication	hilip &Meredith, Cathry ns Ltd.	vn (2020),	Social	Work Theory	in Practice, SAGE
3.		askara N (2019), Su y, Sage Publication.	ustainable	Good	Governance,	Development and
4.		18), Social Work Statemer Rheinfelden, Switzerland.	nt of ethica	l principl	es. International	Federation of Social
Μ	ode of Eval	luation: Continuous Asso	essment To	ests, Quiz	zzes, Assignmer	nt, Final
As	sessment I	`est				
Re	commende	ed by Board of Studies	23-05-20	22		
A	pproved by	Academic Council	No. 66	Date	16-06-2022	

Course Code	Course Title	L	Т	P	C
BHUM110	Cognitive Psychology	2	0	2	
Pre-requisite	Nil	S	yllab		ers
				1.0	
Course Objective					
	d the higher order process in cognition.				
	students to identify and apply the different aspects of co	-	-	ocess	5.
	students to administer various assessments for mental p	proce	ess.		
Course Outcomes					
-	this course the students will be able to:				
-	information processing works.				
	the various cognitive processes such as attention, p	berce	ption	, me	mo
	meta cognition.				
-	s strategies to enhance problem solving process.				
-	nitive development and disorders.				
	nd techniques to understand the cognitive processes the	nroug	gh ps	ychoi	me
assessment.					
-	ical experiments to assess the cognitive skills.				
	ognitive Psychology			ours	
	gnitive Psychology, Approaches- Experimental Cog	-		-	
-	ognitive Science- Cognitive Neuropsychology- Cog	nitiv	e Ne	euros	cie
	gnitive Psychology.				
	rception and Attention rception, Visual and auditory- Gestalt laws of orga	Ļ		ours	
modalities; Extras selective attention	a perception, size perception, perception of moveme ensory perception. The nature and roles of attention- n models of selective attention divided attention Exogenous Effects in Space.	typ	es of	Atte	nti
Module:3 Th	ninking and Reasoning		4 h	nours	5
Creative – Logic	inition- Nature- Types: Perceptual or concrete- Con al or reasoning - Convergent and Divergent Thin rations. Reasoning: Meaning- Inductive reasoning- D ng.	king	. Thi	nking	g a
Module:4 Ci	reativity		3 k	ours	5
Meaning and Asj	pects of Creativity - Stages of Creativity- Creativity	ty a	nd Iı	ntellig	ger
Measurement of C	reativity.			-	
Module:5 M	emory		4 h	ours	5
Introduction- Type	es- Sensory memory- Short-term memory- Working	mem	ory-	Long	g-te
memory- forgettin	ng and false memory- Everyday memory: Autobiogr	aphi	cal- l	Eyew	vitn
testimony. Memor	ry distortions: Reconstructive Retrieval- Encoding I	Disto	rtions	s – S	Sou
Monitoring - Eyew	vitness Testimony. Meta cognition. Memory Enhancem	ent 7	Techn	iques	5.
Module:6 Pr	oblem Solving and Decision Making		4 ł	ours	5
Introduction- Step	os, Barriers to Problem Solving: Mental Set and Fu	ıncti	onal	Fixe	dne
-					
Unnecessary Con	straints- Irrelevant Information. Problem-Solving Suction- Hypothesis testing- Means-ends analysis- Root				

Modu	ule:7 Cognitive Development and Disorders	5	4 hours
conce Types	itive Development Theories- Piaget's cognitive epts- Skills & Important Milestones. Cognitive disor s- Developmental disorders, Motor skill disorders, dination- Loss of memory- identity confusion- impa	ders -Symptoms, , Dementia - Con	Causes and Effects-
Modu	ule:8 Contemporary Issues		2 hours
	Total	Lecture Hours:	30 hours
Fext]	Book(s)		CONCULS
Refer	Publications. rence Books Goswami, U. C. (2020), Cognitive Developmen	nt and Cognitive	Neuroscience: Th
	Learning Brain. London; New York: Routledge, Ta	U	
	Whiteley, C. (2020), Cognitive Psychology, CGD P	-	-
		-	
	Eysenck, M. W., & Brysbaert, M. (2018), Fundame	entals of Cognition	n. Milton: Taylor an
	Eysenck, M. W., & Brysbaert, M. (2018), Fundame Francis.	entals of Cognition	n. Milton: Taylor an
4.	Francis. Stemberg, R.J., Stenberg, K. (2016), Cognitive I	Psychology, 7 th 1	Edition. Wadsworth
4. 5.	Francis. Stemberg, R.J., Stenberg, K. (2016), Cognitive I Groome, D., & Eysenck, M. W. (2016), An	Psychology, 7 th l introduction to	Edition. Wadsworth
4. 5.	Francis. Stemberg, R.J., Stenberg, K. (2016), Cognitive I Groome, D., & Eysenck, M. W. (2016), An Psychology, London; New York: Routledge, Taylo	Psychology, 7 th 1 introduction to or & Francis.	Edition. Wadsworth Applied Cognitiv
4. 5. 0	Francis. Stemberg, R.J., Stenberg, K. (2016), Cognitive I Groome, D., & Eysenck, M. W. (2016), An Psychology, London; New York: Routledge, Taylo e of Evaluation: Continuous Assessment Tests, Q	Psychology, 7 th 1 introduction to or & Francis.	Edition. Wadsworth Applied Cognitiv
4. 5. 0 Mode	Francis. Stemberg, R.J., Stenberg, K. (2016), Cognitive I Groome, D., & Eysenck, M. W. (2016), An Psychology, London; New York: Routledge, Taylo e of Evaluation: Continuous Assessment Tests, Q ative Experiments	Psychology, 7 th 1 introduction to or & Francis.	Edition. Wadsworth Applied Cognitiv
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4. 5. 0 Mode Indica 1. 2. 3.	Francis. Stemberg, R.J., Stenberg, K. (2016), Cognitive I Groome, D., & Eysenck, M. W. (2016), An Psychology, London; New York: Routledge, Taylor e of Evaluation: Continuous Assessment Tests, Q ative Experiments Assessment of Attention Assessment of Memory Assessment of Creativity	Psychology, 7 th 1 introduction to or & Francis. Quizzes, Assignm	Edition. Wadsworth Applied Cognitiv
4. 5. 0 Mode Indica 1. 2. 3. 4.	Francis. Stemberg, R.J., Stenberg, K. (2016), Cognitive I Groome, D., & Eysenck, M. W. (2016), An Psychology, London; New York: Routledge, Taylor e of Evaluation: Continuous Assessment Tests, Q ative Experiments Assessment of Attention Assessment of Memory Assessment of Creativity Assessment of Perception (Auditory/Spatial/Visua	Psychology, 7 th 1 introduction to or & Francis. Quizzes, Assignm	Edition. Wadsworth Applied Cognitiv
4. 5. 0 Mode Indica 1. 2. 3. 4. 5.	Francis. Stemberg, R.J., Stenberg, K. (2016), Cognitive I Groome, D., & Eysenck, M. W. (2016), An Psychology, London; New York: Routledge, Tayloge e of Evaluation: Continuous Assessment Tests, Q ative Experiments Assessment of Attention Assessment of Memory Assessment of Creativity Assessment of Perception (Auditory/Spatial/Visual Assessment of Intelligence	Psychology, 7 th 1 introduction to or & Francis. Quizzes, Assignm	Edition. Wadsworth Applied Cognitiv
4. 5. 0 Mode Indica 1. 2. 3. 4. 5. 6.	Francis. Stemberg, R.J., Stenberg, K. (2016), Cognitive I Groome, D., & Eysenck, M. W. (2016), An Psychology, London; New York: Routledge, Taylor e of Evaluation: Continuous Assessment Tests, Q ative Experiments Assessment of Attention Assessment of Memory Assessment of Creativity Assessment of Perception (Auditory/Spatial/Visus Assessment of Intelligence Assessment of Critical Thinking	Psychology, 7 th 1 introduction to or & Francis. Quizzes, Assignment al)	Edition. Wadsworth Applied Cognitiv
4. 5. 9 Mode Indica 1. 2. 3. 4. 5. 6. 7.	 Francis. Stemberg, R.J., Stenberg, K. (2016), Cognitive I Groome, D., & Eysenck, M. W. (2016), An Psychology, London; New York: Routledge, Taylor e of Evaluation: Continuous Assessment Tests, Q ative Experiments Assessment of Attention Assessment of Memory Assessment of Creativity Assessment of Perception (Auditory/Spatial/Visus) Assessment of Intelligence Assessment of Problem Solving/Decision Making 	Psychology, 7 th 1 introduction to or & Francis. Quizzes, Assignment al)	Edition. Wadsworth Applied Cognitiv
4. 5. 0 Mode Indica 1. 2. 3. 4. 5. 6.	Francis. Stemberg, R.J., Stenberg, K. (2016), Cognitive I Groome, D., & Eysenck, M. W. (2016), An Psychology, London; New York: Routledge, Taylor e of Evaluation: Continuous Assessment Tests, Q ative Experiments Assessment of Attention Assessment of Memory Assessment of Creativity Assessment of Perception (Auditory/Spatial/Visus Assessment of Intelligence Assessment of Critical Thinking Assessment of Problem Solving/Decision Making Assessment of Logical Reasoning/Inductive	Psychology, 7 th 1 introduction to or & Francis. Quizzes, Assignment al)	Edition. Wadsworth Applied Cognitiv
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4. 5. 6. 7. 8.	 Francis. Stemberg, R.J., Stenberg, K. (2016), Cognitive I Groome, D., & Eysenck, M. W. (2016), An Psychology, London; New York: Routledge, Taylor e of Evaluation: Continuous Assessment Tests, Q ative Experiments Assessment of Attention Assessment of Attention Assessment of Memory Assessment of Creativity Assessment of Perception (Auditory/Spatial/Visus) Assessment of Intelligence Assessment of Problem Solving/Decision Making Assessment of Logical Reasoning/Inductive Reasoning/Diagrammatic Reasoning Assessment of Error checking 	Psychology, 7 th 1 introduction to or & Francis. Quizzes, Assignment al)	Edition. Wadsworth Applied Cognitiv
4. 5. 9. 100 100 100 100 100 100 100 100 100 10	Francis.Stemberg, R.J., Stenberg, K. (2016), Cognitive IGroome, D., & Eysenck, M. W. (2016), AnPsychology, London; New York: Routledge, Taylore of Evaluation: Continuous Assessment Tests, Qative ExperimentsAssessment of AttentionAssessment of MemoryAssessment of CreativityAssessment of Perception (Auditory/Spatial/Visus)Assessment of IntelligenceAssessment of Problem Solving/Decision MakingAssessment of Logical Reasoning/InductiveReasoning/Diagrammatic ReasoningAssessment of Proycholinguistic Abilities	Psychology, 7 th 1 introduction to or & Francis. Quizzes, Assignment al)	Edition. Wadswort Applied Cognitiv
4. 5. 9. 10. 10. 10. 10. 10. 10. 10. 10. 10. 10	Francis.Stemberg, R.J., Stenberg, K. (2016), Cognitive IGroome, D., & Eysenck, M. W. (2016), AnPsychology, London; New York: Routledge, Taylore of Evaluation: Continuous Assessment Tests, Qative ExperimentsAssessment of AttentionAssessment of MemoryAssessment of CreativityAssessment of Perception (Auditory/Spatial/Visus)Assessment of IntelligenceAssessment of Problem Solving/Decision MakingAssessment of Logical Reasoning/InductiveReasoning/Diagrammatic ReasoningAssessment of Proycholinguistic Abilities	Psychology, 7 th 1 introduction to or & Francis. Quizzes, Assignment aal)	Edition. Wadswort Applied Cognitiv nent, FAT
4. 5. 9. 10. Mode	Francis. Stemberg, R.J., Stenberg, K. (2016), Cognitive I Groome, D., & Eysenck, M. W. (2016), An Psychology, London; New York: Routledge, Taylor e of Evaluation: Continuous Assessment Tests, Q ative Experiments Assessment of Attention Assessment of Memory Assessment of Creativity Assessment of Perception (Auditory/Spatial/Visus) Assessment of Intelligence Assessment of Problem Solving/Decision Making Assessment of Logical Reasoning/Inductive Reasoning/Diagrammatic Reasoning Assessment of Proycholinguistic Abilities	Psychology, 7 th 1 introduction to or & Francis. Quizzes, Assignment aal)	Edition. Wadswort Applied Cognitiv nent, FAT

Course code	Course Title	L	Т	P	С					
BMGT101L	Principles of Management	3	0	0	3					
Pre-requisite	NIL	Syllabus version								
			1	.0						
Course Objectiv										
-	e knowledge on management key concepts, evaluation	on of	mai	nager	nent					
thoughts and theories.										
2. To understand the various functions of management and framework.										
3. To gain a holistic understanding of multidisciplinary nature of management for effective										
functioning.										
Course Outcom	es									
At the end of the course, the students will be able to										
1. Understand the basic concepts of management.										
2. Analyse the environmental factors that affect the organization and its growth.										
3. Identify and apply appropriate techniques to manage an organisation.										
4. Critically an	alyse the problem in each functions of the management.									
5. Ascertain th	e role of technologies in management.									
Module:1	Management Basics			6 ho	urs					
Management - na	ature and purpose, evolution of management concept, approa	ches t	o mai	nager	nent					
process, functior	as and roles of management, influence of external and inter-	rnal e	nviro	nmen	it on					
decision making	, factors affecting social responsibility and sustainability,	and e	thical	busi	ness					
management.										
Module:2	Planning		6	6 hou	rs					
Types of plans, steps in planning, strategic planning process, SWOT matrix, portfolio matrix,										
Porter's industry	analysis and generic competitive strategies, decision mak	ing -	impoi	rtance	e of					
decision making,	development of alternatives and evaluation of alternatives,	and de	ecisio	n ma	king					
under certainty, u	incertainty and risk.				_					
Module:3	Organizing		7	' hou	rs					
Formal and info	rmal organization, organizational levels and span of manage	gemen	t, org	aniza	ation					
	tructure and process of organizing, departmentation, r									
	ss units, virtual organization, line and staff authority,		-							
-	hority, and organization culture.									
	Staffing		6	6 hou	rs					
Overview to staf	fing functions, factors affecting staffing, position requirem	ents, [‡]								
	ction process and techniques, orientating new employees, pe									
and career strategy - appraisal criteria, team evaluation, rewards, and formulating career strategy,										
managerial training and development, conflict management, managing change, and learning										
organization.		U			U					
	Leading		6	6 hou	rs					
Understanding motivation, motivation theories, leadership traits, styles, and types, committees,										
e	decision making, communication purpose, communication	• 1								
			, an							
					04					

to eff	fective co	ommunication.							
Mod	ule:6	Controlling				6 hours			
Basic	Basic control process, critical control points, standards and bench marking, real-time								
infor	mation a	nd control, feedforward or p	preventive cor	ntrol, cont	rol of overall perf	formance,			
profit and loss control, control through ROI, management audits - balanced scorecard,									
bureaucratic and clan control, and control techniques and information technology.									
Mod	ule:7	Managing Operations an	g Operations and Technology		6 hours				
Operations management and corporate strategy, value chain management, role of technology in									
modern management practices, virtual organization and its structure, online business management,									
applications of digital technology, e-commerce, m-commerce, social media, and artificial									
intelligence in business management, and challenges to modern									
management practices.									
Module:8 Contemporary Topics					2 hours				
				Tot	al Lecture hours:	45 hours			
Text Book(s)									
1.	Harold Koontz and Heinz Weihrich, Essentials of Management: An International and								
	Leadership Perspective, 2020, 11th edition, McGraw-Hill, India.								
Refe	rence Bo								
1.	Stephen P. Robbins, Mary Coulter and Agna Fernandez, Fundamentals of								
	0	ement, 2019, 14 th Edition, Pea							
2.	Robert N. Lussier, Management Fundamentals: Concepts, Applications, & Skill								
	Development, 9th Edition, 2020, Sage Publications, USA								
3.	Pravin Durai, Principles of Management – Texts and Cases, 2019, 2 nd Edition, Pearson								
	Educati	on, India.							
Mo	ode of Ev	valuation: CAT, Written Ass	signment, Qu	iz, and F	AT				
	Recommended by Board of Studies 27-05-2022								
Ap	Approved by Academic CouncilNo. 66Date16-06-2022								

	Course Title	L	Т	Р	С
BMGT102L	Human Resource Management	3	0	0	3
Pre-requisite	NIL	Sylla	abus		ion
			1	.0	
Course Objectives		1 66			
	the contributions of human resources to organization		ctive	ness.	
	bus concepts of HR to manage the organization effection	•	. CC		
3. To create vario	ous HRM concepts to enhance personal and organizat	ional	enect	lvene	ess.
Course Outcomes					
	ourse, the students will be able to				
	evaluate the basic principles of HRM.				
••	opriate HR planning process for effective recruitment	and se	lectio	m	
	s skills, procedures, and techniques to retain human re				
-	asic and mandatory labor laws governing human reso		-~•		
	environment for managing human resources.				
~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~					
Module:1 HRM	A – Overview		6 Ho	urs	
Nature and scope o	of HRM, evolution and development of HRM, HR	hiloso	nhv	noli	cies
-	ctices, dynamics of HRM environment, business eth			-	
	tunity, work force diversity, HR audit and evalu				-
strategic HRM.	tunity, work force diversity, fix addit and evalu	ation,	C-111	XIVI ,	anu
sualegie mitivi.					
-	an Descurre Planning Process		6 U		
Module:2 Hum	an Resource Planning Process		6 He		a io
Module:2HumHuman resource p	planning and process - forecasting requirements, suc		n pla	nnin	
Module:2HumHuman resource p analysis, job an			n pla	nnin	
Module:2HumHuman resource panalysis, job anmanagement.	planning and process - forecasting requirements, suc alysis methods, job descriptions, job design,		on pla gloł	nnin val	
Module:2HumHuman resource panalysis, job anmanagement.Module:3Recr	planning and process - forecasting requirements, such alysis methods, job descriptions, job design, uitment and Selection	and	n pla gloł 6 He	nnin oal ours	talen
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workplace fl	exibility, and employment la	w.			
Module:7	Employee Relations, Safet	y, and Healt	h		6 Hours
Need for a	safe and healthy environm	ent, employe	e union a	and union stru	icture, welfare
	ature of industrial relation				
	isputes, concept of collecti				
-	orking and employee we	-			
	ograms, and HR ethical pract			1 0	× 1 5
1	Contemporary Topics				2 Hours
			Tota	l Lecture Hou	rs 45 hours
Text Book(s	;)				
1. Gary D	essler & Biju Varrkey, Hun	nan Resource	Managen	nent, 2020, 16	th Edition,
-	Education, India		U		
2. Neeru	Kapoor, Concept Building	Approach to 1	Human Re	esource Manag	ement, 2021.
	ion, Cengage Learning, India			e	,,,
2					
Reference B		1.11 The F			2010 10 th
	Armstrong & Barbara Mite	chell, The Es	sential H	R Handbook,	2019, 10
	, Red Wheel/Weiser, USA				
	thappa and Sadhna Dash, Hu	iman Resourc	e Manage	ment - Text an	d Cases, 2021,
	ion, McGraw-Hill, India				
	Evaluation: CAT, Written A	<u> </u>	- · · · · · · · · · · · · · · · · · · ·	FAT	
Recomme	nded by Board of Studies	27-05-2022			
Approved	by Academic Council	No. 66	Date	16-06-2022	
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BMGT103L	Course Title	L	Т	P	C
	Organizational Behavior	3	0	0	3
Pre-requisite	NIL	Sylla			rsio
Course Objectiv	765			1.0	
	rize the basic concepts of organizational behavior.				
	tand, evaluate, and manage individual and group behavior	effe	ctiv	elv i	in a
organizatio		UIIC	CU V	Ciy i	in u
-	ate appropriate strategies based on individual and group beha	avio	ur		
<i>3.</i> 10 Ionnu	are appropriate strategies based on marvidual and group ben	u 110			
Course Outcom	es				
At the end of th	e course, the students will be able to				
1. Appraise t	he basic organizational and individual behaviour.				
2. Describe t	he various dimensions of motivations.				
3. Measure a	nd monitor different aspects of stress and emotions.				
4. Explain th	e various elements of groups and teams.				
5. Analyze th	ne different dimensions of organizational structure, culture, a	and c	han	ge.	
6. Formulate	leadership traits for effective work culture.				
Module:1 Or	ganisational Behaviour - Essentials		4	5 ho	ur
	rganizational behaviour, learning style, OB model, demogra	phic	and	l cul	tura
-	anizations, ethical behaviour, tools of OB research, and	-			
opportunites for		~ ~			
opportunites IOI	UB.				
			,	7 ho	1111
Module:2 Att	itudes, Personality, and Values	b di		7 ho	
Module:2 Att	itudes, Personality, and Values des, attitudes and behaivour, job attitudes, job satisfaction, jo		ssati	isfac	ctio
Module:2 Att Individual attitud job satisfaction	Eitudes, Personality, and Values des, attitudes and behaivour, job attitudes, job satisfaction, jo and job performance, personality frameworks, personalit	y tr	ssati aits	isfac in	tio Ol
Module:2 Att Individual attitud job satisfaction personality and	itudes, Personality, and Values des, attitudes and behaivour, job attitudes, job satisfaction, jo	y tr	ssati aits	isfac in	tio Ol
Module:2 Att Individual attitud job satisfaction personality and values.	Example 1 itudes, Personality, and Values des, attitudes and behaivour, job attitudes, job satisfaction, jo and job performance, personality frameworks, personalit situations, understanding values, values and workplace, a	y tr	ssati aits inte	isfac in rnat	tio O ion
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and approcaches to organizational change.

		Leadership	-		6 hours
		leadership - traditional an	-		
	-	attributes of a leader, devel		s across th	e organization, leadershi
gric	d, and cha	llenges to understanding lead	ership.		
Μ	odule:8	Contemporary Topics			2 hours
Gu	est lecture	es from Industry and, Research	h and Develop	oment Organ	nisations
				Total	Lecture Hours 45 hours
	xt Book(s				
1.	Stephe	n P. Robbins and Timothy	A. Judge, O	rganization	al Behaviour, 2019, 14 ^d
	Edition,	Pearson Education, India			
2.	Knud Si	nding, Robert Kreitner, and A	ngeloi Kinec	ki, Organisa	ational Behaviour, 2018, 6 ^t
	Edition,	McGraw-Hill Education, UK	-		
Ref	ference B	ooks			
1.	Organiz	ational Behavior, Open Textl	book, Univers	ity of Minn	esota Libraries Publishing
	2017, IS	BN 13: 9781946135155			
2.	J.Stewa	art Black et.al., Organization	al Behavior,	OpenStax 7	Fextbook, Rice University
	USA, V	Web Version Last updated: Fe	b 23, 2021		
3.	Christo	pher P. Neck, Jeffrey D.	Houghton an	d Emma L	. Murray, Organizationa
	Behavio	r: A Skill-Building Approach	, 2019, 2 nd Ed	ition. Sage	Publications, USA
N	lode of E	valuation: CAT, Written A	ssignment, Q	uiz, and FA	AT
R	ecomme	nded by Board of Studies	27-05-202	22	
Δ	nnroved	by Academic Council	No. 66	Date	16-06-2022

Course code	Course Title	L	Т	P	C
BMGT104L	Marketing Management	3	0	0	
Pre-requisite	NIL	S	yllab	us vei	rsio
Course Objectiv	PS			1.0	
•	nd the basics of marketing and its related concepts.				
-	narketing plan for the given situation.				
_	market research survey.				
Course Outcom	es				
At the end of the	e course, the students will be able to				
1. Create mark	eting strategy for the given business scenario.				
2. Analyze the	factors that affect the marketing program of an organization.				
3. Identify man	ket gaps and develop product ideas with appropriate STP stra	tegie	es.		
4. Formulate n	narketing mix strategies for a given business situation.				
5. Develop pro	motional mix for a given business case.				
6. Ascertain th	e latest trends in marketing.				
Module:1	Marketing Basics	6 h	ours		
Module:2	arketing strategy, and marketing plan. Environment Scanning and Market Research environment analysis - micro and macro factors, Porte		ours	forces	
-	teting research process, and demand measurement.				
Module:3	Connecting with Customers and Building Strong Brands	9 h	ours		
consumer buying and bases of	er value, satisfaction, and loyalty, maximizing customer life g decision process, segmentation, targeting, and positioning (segmentation, market targeting, positioning, reposition lding and managing brand equity.	STP)	strat	egy -	lev
Module:4	Setting Product and Pricing Strategies	8 h	ours		
market growth s	ations, product levels, product line and mix, product life constrategies - Ansoff matrix and BCG matrix, new product ricing, pricing strategies and methods, and responding to	deve	lopm	ent (l	
Module:5	Channel Management	5 h	ours		
distribution stra	ns and flows, channel levels, channel design, channel int ategies, channel intermediaries - wholesalers and re d channel conflict and resolution strategies.				
Module:6	Integrated Marketing Communications (IMC)	<u>6</u> h	ours		
-	types, advertising medium, and evaluation of ads, Sales Pr				
_	promotion, and consumer promotion, Direct Marketing - kios machines, and telemarketing, Public Relations - publicit		-		
				1	10

sponsorships,	and advertorials, Digital Ad	vertising - Tyr	bes of dig	gital media,	, display ads, search
engine ads, s	ocial media marketing, and	artificial intell	igence b	ased	
marketing tec	hniques, and Personal Selling.	•			
Module:7	Marketing for long-term	n Success			3 hours
Holistic mar	keting organization, soci	ially respon	sible b	usiness n	nodels, cause - related
marketing, so	cial marketing, marketing imp	plementation ar	nd contro	l, and futur	e of marketing.
Module:8	Contemporary Topics				2 hours
		Τα	otal Lect	ure hours:	45 hours
Text Book(s)					
1.	Philip Kotler and Keller	Kevin, Marke	ting Ma	nagement,	2021, Global
	Edition (16 th), Pearson Education	ation, UK			
2.	Ramaswamy, V. S., and S.	. Namakumari,	Marketin	ng Manage	ment: Indian Context,
	Global Perspective, 2018, 6 th	^h Edition, SAG	E Public:	ations India	a Pvt
	Limited, India				
Reference Bo	oks				
1.	Hermawan Kartajaya, Iw	an Setiawan	and Ph	nilip Kotle	er, Marketing 5.0:
	Technology for Humanity, 2	2021, 1 st Edition	n, Wiley,	USA	
2.	Lilien, Gary L., Arvind F	Rangaswamy,	and Arn	aud De F	Bruyn, Principles of
	Marketing Engineering and	Analytics, 2017	7, 3 rd Edi	tion, Decis	ionPro Inc.
Mode of Ev	valuation: CAT, Written Ass	signment, Qui	z, and F	AT	
Recommen	ded by Board of Studies	27-05-2022			
Approved	by Academic Council	No. 66	Date	16-06-20	22

	Course Title	L	Т	Р	C
BMGT105L	Consumer Behavior	3	0	0	3
Pre-requisite	NIL	S		s vers	sion
Course Objectiv	700]	.0	
Course Objectiv	dynamics of consumer behavior and market.				
	v evaluate various factors influencing the buying behavior	ior of	indivi	واقتله	
=	consumer research survey based on the given problem.		11101 11	uuuis.	
5. 10 execute (consumer research survey based on the given problem.				
Course Outcom	65				
	e course, the students will be able to				
	e basics of consumer behavior and consumer decision r	nakin	g nroc	ess	
	chological and personal factors that influence consume			000.	
	cial, cultural, and digital influence on consumer behavi		u / 1011		
	arious theories of consumer behavior in consumer decis		naking	proce	ess.
	d the significance of marketing and consumer ethics.		2		
-	imer research process for a given problem.				
~~ •					
Module:1	Consumer Behavior - Basics	5 ho	urs		
	sumer behavior, dynamism in consumer behavior, con			vior	nd
	ket segmentation, targeting, and positioning, custome				
	fects of marketing mix on consumer behavior, consum-				
and retention, en	fects of marketing mix on consumer behavior. consum	er aec		makin	g
	-			maxm	0
	f various disciplines, and consumer decision making p			maxm	0
	-		S.		-8
and integration o Module:2	f various disciplines, and consumer decision making p Psychological Influence - Perception and	oroces: 6 ho	s. urs		
and integration o Module:2 Meaning of perce	f various disciplines, and consumer decision making p Psychological Influence - Perception and Learning	6 ho theori	s. urs es of p	percep	otio
and integration o Module:2 Meaning of perception level,	f various disciplines, and consumer decision making p Psychological Influence - Perception and Learning eption, components of perception, perception process,	6 ho 6 ho theori	s. urs es of p n and	percep	otio
And integration on Module:2 Meaning of perception level, perception and perception and perceptio	f various disciplines, and consumer decision making p Psychological Influence - Perception and Learning eption, components of perception, perception process, challenges in formulating consumer perception, perc positioning, perceived quality and perceived risk, may ts of learning, categories of learned behavior, dimension	6 ho 6 ho theori ception eaning	s. urs es of p n and g of	bercep semic	otio
And integration on Module:2 Meaning of perception level, perception and perception and perceptio	f various disciplines, and consumer decision making p Psychological Influence - Perception and Learning eption, components of perception, perception process, challenges in formulating consumer perception, perceptio	6 ho 6 ho theori ception eaning	s. urs es of p n and g of	bercep semic	otio
and integration o Module:2 Meaning of perce perception level, perception and p learning, element of learning, and l Module:3	f various disciplines, and consumer decision making p Psychological Influence - Perception and Learning eption, components of perception, perception process, to challenges in formulating consumer perception, perception	6 ho theori ception eaning ns of l 6 ho	s. urs es of p n and g of earnin urs	percep semic g, the	otio
and integration o Module:2 Meaning of percer perception level, perception and p learning, element of learning, and l Module:3 Types of motive	f various disciplines, and consumer decision making p Psychological Influence - Perception and Learning eption, components of perception, perception process, to challenges in formulating consumer perception, perception	6 ho theori ception eaning ns of l 6 ho	s. urs es of p n and g of earnin urs ion, c	bercep semic g, the	otic
and integration o Module:2 Meaning of percer perception level, perception and p learning, element of learning, and l Module:3 Types of motive emotions, motiva	f various disciplines, and consumer decision making p Psychological Influence - Perception and Learning eption, components of perception, perception process, to challenges in formulating consumer perception, perception	6 ho theori ception eaning ns of l 6 ho ootivat	s. urs es of p n and g of earnin urs ion, c navior	bercep semic g, the	otio otic orie
and integration o Module:2 Meaning of percer perception level, perception and p learning, element of learning, and l Module:3 Types of motive emotions, motiva and characteristic	f various disciplines, and consumer decision making p Psychological Influence - Perception and Learning eption, components of perception, perception process, to challenges in formulating consumer perception, perce- positioning, perceived quality and perceived risk, me ts of learning, categories of learned behavior, dimension learning and memory. Psychological Influence - Motivation, Beliefs, and Attitude s, drivers of motivation, categories and theories of me ation and decision making, types of beliefs and consum- cs of attitude, attitude formation, tri-component model	6 ho theori ception eaning ns of l 6 ho ootivat	s. urs es of p n and g of earnin urs ion, c navior	bercep semic g, the	otio otic orie
and integration o Module:2 Meaning of percer perception level, perception and p learning, element of learning, and l Module:3 Types of motive emotions, motiva and characteristic	f various disciplines, and consumer decision making p Psychological Influence - Perception and Learning eption, components of perception, perception process, to challenges in formulating consumer perception, perception	6 ho theori ception eaning ns of l 6 ho ootivat	s. urs es of p n and g of earnin urs ion, c navior	bercep semic g, the	otio otic orie
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And integration on Module:2 Meaning of percer perception level, perception and perception and perception and perception and perception and perception and perception and perception, and perception, and perception, and perception, and perception, motive emotions, motive and characteristic multi-attribute merception and perception	f various disciplines, and consumer decision making p Psychological Influence - Perception and Learning eption, components of perception, perception process, to challenges in formulating consumer perception, perce- positioning, perceived quality and perceived risk, me to of learning, categories of learned behavior, dimension learning and memory. Psychological Influence - Motivation, Beliefs, and Attitude s, drivers of motivation, categories and theories of me ation and decision making, types of beliefs and consum- cs of attitude, attitude formation, tri-component model odels, cognitive dissonance, and conflict resolution. Personal, Social, and Cultural Influence personality, elements of personality, personality	6 ho theori ception eaning ns of l 6 ho totivat ner bel of att	s. urs es of p n and g of earnin urs ion, c navior itude, <u>urs</u> y, sel	oercep semic g, the onsum , elen	otio otic orio mer nem
And integration o Module:2 Meaning of percer perception level, perception and p learning, element of learning, and l Module:3 Types of motive emotions, motiva and characteristic multi-attribute m Module:4 Understanding p personality traits	f various disciplines, and consumer decision making p Psychological Influence - Perception and Learning eption, components of perception, perception process, the challenges in formulating consumer perception, perceptin	6 ho theori ception eaning ns of l 6 ho otivat her bel of att 9 ho theor e, valu	s. urs es of p n and g of earnin urs ion, c navior itude, urs y, sel ues an	oercep semic g, the onsum , elen lf-con d lifes	otio otic orio mer nen cep
And integration on Module:2 Meaning of percer- perception level, perception and perception and perception, and perception, and perception, motive and characteristic multi-attribute merceptions, motive Module:4 Understanding personality traits approaches to merception of perception and perception a	f various disciplines, and consumer decision making p Psychological Influence - Perception and Learning eption, components of perception, perception process, to challenges in formulating consumer perception, perce- positioning, perceived quality and perceived risk, make to of learning, categories of learned behavior, dimension learning and memory. Psychological Influence - Motivation, Beliefs, and Attitude s, drivers of motivation, categories and theories of mation and decision making, types of beliefs and consumers cs of attitude, attitude formation, tri-component model odels, cognitive dissonance, and conflict resolution. Personal, Social, and Cultural Influence personality, elements of personality, personality , anthromorphism, elements and categories of lifestyle marketing strategies based on personality and lifestyle parketing strategies based on personality and lifestyle	6 ho theori ception eaning ns of l 6 ho totivat ner bel of att 9 ho theor e, valu	s. urs es of p n and g of earnin urs ion, c navior itude, urs y, sel ues an pes of	onsum onsum , elen ff-con d lifes	otio otic oric mer nen
And integration on Module:2 Meaning of percer perception level, perception and percert in the perception and perception and perception and perception is the perception and characteristic multi-attribute mentions, motive and characteristic multi-attribute mentions, motive personality traits approaches to mention perception and perception a	f various disciplines, and consumer decision making p Psychological Influence - Perception and Learning eption, components of perception, perception process, to challenges in formulating consumer perception, perce- positioning, perceived quality and perceived risk, makes to of learning, categories of learned behavior, dimension learning and memory. Psychological Influence - Motivation, Beliefs, and Attitude s, drivers of motivation, categories and theories of making, types of beliefs and consume co of attitude, attitude formation, tri-component model odels, cognitive dissonance, and conflict resolution. Personal, Social, and Cultural Influence personality, elements of personality, personality , anthromorphism, elements and categories of lifestyle marketing strategies based on personality and lifestyle eference groups, impact of reference groups on market	6 ho theori ception eaning ns of l 6 ho otivat ner bel of att 9 ho theor e, valu le, typ ting s	s. urs es of p n and g of earnin urs ion, c navior itude, urs y, sel ues an bes of trateg	oercep semic g, the onsum , elen lf-con d lifes refer ies, fa	ner ner cep styl
And integration o Module:2 Meaning of percer- perception level, perception and percer- learning, element of learning, and level, Module:3 Types of motive emotions, motive and characteristic multi-attribute mentions Module:4 Understanding personality traits approaches to mention groups, role of re- and consumer be	f various disciplines, and consumer decision making p Psychological Influence - Perception and Learning eption, components of perception, perception process, to challenges in formulating consumer perception, perce- positioning, perceived quality and perceived risk, me to of learning, categories of learned behavior, dimension learning and memory. Psychological Influence - Motivation, Beliefs, and Attitude s, drivers of motivation, categories and theories of mation and decision making, types of beliefs and consum- cs of attitude, attitude formation, tri-component model odels, cognitive dissonance, and conflict resolution. Personal, Social, and Cultural Influence personality, elements of personality, personality , anthromorphism, elements and categories of lifestyle marketing strategies based on personality and lifestyle personality structure, family life cycle, cultural in	6 ho theori ception eaning ns of l 6 ho of att of att 9 ho theor e, valu le, typ ting s nfluen	s. urs es of p n and g of earnin urs ion, c navior itude, y, sel ues an bes of trateg ce on	onsum onsum , elen	otio otic oric oric mer nen
And integration o Module:2 Meaning of percer perception level, perception and p learning, element of learning, and l Module:3 Types of motive emotions, motiva and characteristic multi-attribute m Module:4 Understanding p personality traits approaches to m groups, role of re and consumer be behavior, cultura	f various disciplines, and consumer decision making p Psychological Influence - Perception and Learning eption, components of perception, perception process, to challenges in formulating consumer perception, perception	6 ho theori ception eaning ns of l 6 ho of att of att 9 ho theor e, valu le, typ ting s nfluen	s. urs es of p n and g of earnin urs ion, c navior itude, y, sel ues an bes of trateg ce on	onsum onsum , elen	otion otic oric oric mer nen cep styli renc
And integration o Module:2 Meaning of perception level, perception and perception and perception and perception and perception and perception and perception and perception, and learning, element of learning, element of learning, and le	f various disciplines, and consumer decision making p Psychological Influence - Perception and Learning eption, components of perception, perception process, to challenges in formulating consumer perception, perception	6 ho theori ception eaning ns of l 6 ho of att of att 9 ho theor e, valu le, typ ting s nfluen	s. urs es of p n and g of earnin urs ion, c navior itude, y, sel ues an bes of trateg ce on	onsum onsum , elen	otion otic oric oric mer nen cep styli renc

Media integration and consumer behavior, theoretical frameworks - TRA and UG, consumer behavior on digital platforms, blogs and consumer behavior, virtual and brand communities influence on consumer behavior, usage of mobile and its influence on consumer behavior, virtual shopping and its influence on consumer behavior, luxury and consumer behavior, and changing tri-component model of attitude.

Module:6Information Processing and Decision Making6 hours

Understanding information processing, information processing theories, information processing and persuasive communication, information processing and memory, methods of

information processing, information retrieval, levels of decision making, decision making methods, and consumer decision making models.

Module:7	Marketing Ethics and Consumer Behavior Research	5 hours
Socially response	sible marketing, consumers' privacy, misleading la	bels, camouflaged
advertising, cons	umer ethics, and consumer research and process.	

Module:8	Contemporary Topics			2 hours
		Total Leo	cture Hours	45 hours
Text Book(s)				
1.	Schiffman Leon G., Wise	enblit Joe, Kum	ar S. Rames	h, Consumer Behavior,
	2018, 12 th Edition, Pearso	on Education, I	ndia	
2.	Jain, Varsha, and Jagdi	sh Sheth. Cons	sumer Behav	ior: A digital Native,
	2019, 1 st Edition, Pearson	n Education, Ind	dia	
Reference Boo	ks			
1.	David L Mothersbaugh	, Del I. Haw	kins, Amit	Mookerjee, Consumer
	Behavior: Building Ma	rketing Strate	gy, 2019, 1	3 th Edition, McGraw-
	Hill,			
	India			
2.	Hoyer, Wayne D., De	borah J. Mac	Innis, and	Rik Pieters, Consumer
	Behavior, 2016, 7 th Editi	on, Cengage L	earning, USA	A
3.	Marieke de Mooij, Con	sumer Behavio	our and Cult	ure: Consequences for
	Global Marketing and Ad	lvertising, 2019	9, 3 rd Edition	, SAGE, USA
Mode of Eva	luation: CAT, Written As	signment, Qui	z, and FAT	
Recommend	ed by Board of Studies	27-05-2022		
Approved by	y Academic Council	No. 66	Date 16	-06-2022

Course Code	Course Title	L	Т	P	С
BMGT106L	Digital Marketing	3	0	0	3
Pre-requisite	NIL	S	llabu	is vei	sio
•				1.0	
Course Objective	es				
6. To evaluate di	igital marketing and digital media.				
7. To get expose	ed to various digital marketing channels.				
8. To develop or	nline ads and assess the performance of ads.				
<u> </u>					
Course Outcome					
	e course, the students will be able to marketing strategies for a given business scenario.				
	ch engine marketing strategy with the use of SEO and Ad	Word	le		
	ategies for various digital marketing channels.				
	campaigns on any one of the social media platforms	s and	anal	vze	its
outcomes.	r gut of the second model partoning			,	
	os on google analytics dashboard and measure campaign	perfo	rmanc	ce.	
	temporary technologies of DM and its effects on DM.	•			
Module:1 Digi	ital Marketing (DM) Fundamentals				
			0 n	ours	
	, introduction to DM, origin and development of DM, the	raditi		ours Vs di	
Marketing basics,			onal '	Vs di	git
Marketing basics, marketing, digital	, introduction to DM, origin and development of DM, the	ng, di	onal ` gital r	Vs di narke	gita etin
Marketing basics, marketing, digital funnel, creating b	, introduction to DM, origin and development of DM, the marketing channels, digital customer journey and mapping	ng, di	onal ` gital r	Vs di narke	gita etin
Marketing basics, marketing, digital funnel, creating b in DM, developin Module:2 Sea	, introduction to DM, origin and development of DM, the marketing channels, digital customer journey and mappin uyer persona, types of digital media (paid, shared, owned og DM strategy and objectives, and challenges to DM. rch Engine Optimization (SEO)	ng, di 1, and	onal ` gital r l learr 6 h	Vs di narke ned), 1	gita etin IM
Marketing basics, marketing, digital funnel, creating b in DM, developin <u>Module:2</u> Sear Building websites	, introduction to DM, origin and development of DM, the marketing channels, digital customer journey and mappin uyer persona, types of digital media (paid, shared, owned og DM strategy and objectives, and challenges to DM. rch Engine Optimization (SEO) s and web pages, web hosting, subdomains and subfolders.	ng, di 1, anc , web	onal ` gital r l learr 6 h site na	Vs di narke ned), 1 ours aviga	gita etin IM tio
Marketing basics, marketing, digital funnel, creating b in DM, developin <u>Module:2</u> Sear Building websites social media icon	, introduction to DM, origin and development of DM, the marketing channels, digital customer journey and mappin uyer persona, types of digital media (paid, shared, owned og DM strategy and objectives, and challenges to DM. rch Engine Optimization (SEO) s and web pages, web hosting, subdomains and subfolders, s, advanced website features, setting up google analytics,	ng, di l, and , web	onal ` gital r l learr 6 h site na	Vs di narke ned), ours aviga gine v	gita etin IM tion
Marketing basics, marketing, digital funnel, creating b in DM, developin <u>Module:2</u> Sear Building websites social media icons mechanism, pillar	, introduction to DM, origin and development of DM, the marketing channels, digital customer journey and mappin uyer persona, types of digital media (paid, shared, owned by DM strategy and objectives, and challenges to DM. rch Engine Optimization (SEO) and web pages, web hosting, subdomains and subfolders s, advanced website features, setting up google analytics, rs of SEO, on-page and off-page optimization, SEO - visu	ng, di l, and , web , sear al an	onal V gital I l learr 6 h site na ch eng d void	Vs di marke ned), ours aviga gine v ce sea	gita etin IM tion wor
Marketing basics, marketing, digital funnel, creating b in DM, developin <u>Module:2</u> Sear Building websites social media icons mechanism, pillar SEO tactics - wh	, introduction to DM, origin and development of DM, the marketing channels, digital customer journey and mappin uyer persona, types of digital media (paid, shared, owned og DM strategy and objectives, and challenges to DM. rch Engine Optimization (SEO) and web pages, web hosting, subdomains and subfolders, s, advanced website features, setting up google analytics, rs of SEO, on-page and off-page optimization, SEO - visu nite-hat and black-hat SEO, SEO - UX and UI, conten	ng, di l, and , web , sear al an	onal V gital I l learr 6 h site na ch eng d void	Vs di marke ned), ours aviga gine v ce sea	gita etin IM tion wor
Marketing basics, marketing, digital funnel, creating b in DM, developin Module:2 Sear Building websites social media icons mechanism, pillar SEO tactics - wh success, and exter	, introduction to DM, origin and development of DM, the marketing channels, digital customer journey and mappin uyer persona, types of digital media (paid, shared, owned og DM strategy and objectives, and challenges to DM. rch Engine Optimization (SEO) and web pages, web hosting, subdomains and subfolders, s, advanced website features, setting up google analytics, rs of SEO, on-page and off-page optimization, SEO - visu nite-hat and black-hat SEO, SEO - UX and UI, conten rnal link building.	ng, di l, and , web , sear al an	onal Y gital r l learr 6 h site na ch eng d void keting	Vs di narke ned), 1 ours aviga gine v ce sea g for 1	gita etin IM ¹ tion arcl SE ¹
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Twitter building blocks, content strategy, Twitter usage, Twitter ads, Twitter analytics, Twittertools and tips for marketers. Mobile advertising model, mobile marketing (MM) media (paidand owned), MM features, mobile apps, website and mobile responsive ads, MM strategy,and MM analytics. Needs of video marketing (VM), VM channels, VM strategy, and types ofmarketing videos, video production process, video optimization, and video analytics.Module:6Digital Analytics and Online Reputation Management (ORM)6 hoursData collection, key metrics, affiliate marketing, multi-channel attribution, types of tracking
and owned), MM features, mobile apps, website and mobile responsive ads, MM strategy, and MM analytics. Needs of video marketing (VM), VM channels, VM strategy, and types of marketing videos, video production process, video optimization, and video analytics.Module:6Digital Analytics and Online Reputation Management (ORM)6 hours
and MM analytics. Needs of video marketing (VM), VM channels, VM strategy, and types of marketing videos, video production process, video optimization, and video analytics.Module:6Digital Analytics and Online Reputation Management (ORM)6 hours
marketing videos, video production process, video optimization, and video analytics.Module:6Digital Analytics and Online Reputation Management (ORM)6 hours
Module:6Digital Analytics and Online Reputation Management (ORM)6 hours
Data collection key metrics affiliate marketing multi-channel attribution types of tracking
codes, and competitive intelligence. ORM Vs SEO, social commerce: reviews and ratings
user generated content, blogs, marketing partners, native advertising, landing page, and
influencer marketing.
Module:7Recombination and Reverse Transcription5 hours
Recombination - Conjugation, Transformation, Transduction and sexduction; Revers
transcription - Classification and life cycle of retrovirus, Structure and function of reverse
transcriptase, Mechanism of reverse transcription.
Module:8 Technological Advancements in DM 4 hours
Voice search, beacon strategy, micro-moment marketing, cross device marketing,
anthropomorphic AI, virtual reality (VR), augmented reality (AR), mixed reality (MR),
extended reality (XR), chat bots, block chain technology, and role of virtual agents in
customer relationship management.
Total Lecture hours: 45 hour
Text Book(s)
1. Seema Gupta, <i>Digital Marketing</i> , 2020, 2 nd Edition, McGraw-Hill Education, India
2. Alan Charlesworth, Digital Marketing: A practical Approach, 2018, 3 rd Edition
Routledge, UK
Reference Books
1. Jeremy Kagan and Siddharth Shekhar Singh, Digital Marketing: Strategy and Tactics,
2020, 1 st Edition, Wiley, USA
 2020, 1st Edition, Wiley, USA 2. David Meerman Scott, The new rules of marketing and PR: How to use Content Marketing,
2. David Meerman Scott, The new rules of marketing and PR: How to use Content Marketing,
 David Meerman Scott, The new rules of marketing and PR: How to use Content Marketing, Podcasting, Social Media, AI, Live Video, And NewsJacking to reach buyers directly,
 David Meerman Scott, The new rules of marketing and PR: How to use Content Marketing, Podcasting, Social Media, AI, Live Video, And NewsJacking to reach buyers directly, 2020, 7th Edition, Wiley, USA
 David Meerman Scott, The new rules of marketing and PR: How to use Content Marketing, Podcasting, Social Media, AI, Live Video, And NewsJacking to reach buyers directly, 2020, 7th Edition, Wiley, USA Dave Chaffey and Paul Russell Smith, Digital Marketing Excellence: Planning,
 David Meerman Scott, The new rules of marketing and PR: How to use Content Marketing, Podcasting, Social Media, AI, Live Video, And NewsJacking to reach buyers directly, 2020, 7th Edition, Wiley, USA Dave Chaffey and Paul Russell Smith, Digital Marketing Excellence: Planning, Optimizing and Integrating Online Marketing, 2017, 5th Edition, Routledge, UK Mode of Evaluation: CAT, Quiz, Assignment and FAT
 David Meerman Scott, The new rules of marketing and PR: How to use Content Marketing, Podcasting, Social Media, AI, Live Video, And NewsJacking to reach buyers directly, 2020, 7th Edition, Wiley, USA Dave Chaffey and Paul Russell Smith, Digital Marketing Excellence: Planning, Optimizing and Integrating Online Marketing, 2017, 5th Edition, Routledge, UK

Course code	Course Title	Т	Р	C
BMGT107L	Business Analytics	0	0	
Pre-requisite	NIL		yllab	
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Course Objectiv	VOS		1.0	
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	ze, analyze, and report the data for effective business decision-ma	•	• •	
-	end the advanced analytical tools available for various business provide the second state of the second st			
	various analytical tools and choose the appropriate tool(s) for the	given	l	
problem and da	ita.			
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Course Outcom				
	e course, the students will be able to			
-	ious BA tools and evaluate various data types and scales.			
	characteristics of data to summarize it effectively.			
	is supervised and unsupervised learning algorithms to business pr	roblen	18.	
	t techniques of BA to any one of the management domains.			
5. Create and in	nterpret the data analysis report to make business decisions.			
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	dule:7	Report Writing				3 hours
-	-	- summary, problem id		-		alization and
explo	oration, met	hodology, interpretations, f	findings, and co	onclusion	ns.	
Mo	dule:8	Contemporary Topics				2 hours
				Total L	ecture Hours:	45 hours
Text	Book(s)					
1.	Dinesh	Kumar U, Business A	nalytics: The	Scien	ce of Data-l	Driven Decision
	Making,	2017, 1 st Edition, Wiley, Ir	ndia.			
2.	Jeffrey 1	D. Camm, James J. Co	chran, Micha	el J. F	ry, Jeffrey W	V.Ohlmann, and
	David R	. Anderson, Essentials of	Business An	alytics,	2017, 2 nd Ec	lition, Cengage
	Learning	Inc., USA.		-		
Refe	rence Book	S				
1.	Evans, J	R., Business Analytics:	Methods, Mod	lels and	Decisions, 20	021, 3 rd Edition,
	Pearson I	Education, USA.				
2.	Albright,	S. C., and Winston, W. L	, Business Ar	nalytics:	Data Analysis	and Decision
	Making,	2020, 7 th Edition, Cengag	ge Learning Ir	ndia Pvt.	. Ltd, India.	
3.	Shmueli,	G., Bruce, P. C., Yahav, I	., Patel, N. R.,	and Lic	htendahl, K. C	., Data Mining
	for Bus	iness Analytics: Concer	ots, Techniqu	es, and	Applications	in R, 2017, 1 st
		Wiley, USA.	· · · · ·			
Mo	de of Eval	uation: CAT, Written As	signment, Qui	z, Proje	ct, Seminar, (Group
Dis	cussion, C	ase Study, and FAT	-	-		_
Ree	commende	d by Board of Studies	27-05-2022			
Ap	proved by	Academic Council	No. 66	Date	16-06-2022	

DISCIPLINE-LINKED ENGINEERING SCIENCES

(2021-2022)

B.Tech. Computer Science and Engg with Spec. in Bioinformatics

Sl.No.	Course Code	Course Title	Page No.
1.	BECE102L	Digital Systems Design	120
2.	BECE102P	Digital Systems Design Lab	122
3.	BECE204L	Microprocessors and Microcontrollers	123
4.	BECE204P	Microprocessors and Microcontrollers Lab	125
5.	BMAT205L	Discrete Mathematics and Graph Theory	126

Course Code	Course Title	L	Т	P	С
BECE102L	Digital Systems Design	3	0	0	
Pre-requisite		Sy	llabus	s ver	sior
			1.0		
Course Objective	es	•			
1. Provide a	an understanding of Boolean algebra and logic function	ns.			
	the knowledge of combinational and sequential logic of	circuit	design	l.	
-	nd model the data path circuits for digital systems.				
	a strong understanding of programmable logic.				
5. Enable th	he student to design and model the logic circuits using	Verilo	g HDI	.	
Course Outcome	S				
At the end of the	course the student will be able to				
1. Optimize	e the logic functions using and Boolean principles and	K-map			
2. Model th	e Combinational and Sequential logic circuits using V	erilog	HDL.		
3. Design th	ne various combinational logic circuits and data path c	ircuits.			
-	and apply the design aspects of sequential logic circuit	s.			
	and apply the design aspects of Finite state machines.				
6. Examine	the basic architectures of programmable logic devices	•			
Module:1 Digi	tel Logia		8 hou	N C	
Mounter Digi			() II()(I		
Boolean Algebra	Basic definitions. Axiomatic definition of Boo				lasi
_	a: Basic definitions, Axiomatic definition of Boo operties of Boolean Algebra, Boolean Functions, Ca	lean A	Algebr	a, B	
Theorems and Pr	operties of Boolean Algebra, Boolean Functions, Ca	lean A nonica	Algebr l and	a, B Stan	dar
Theorems and Pr Forms, Simplifica	operties of Boolean Algebra, Boolean Functions, Ca ation of Boolean functions. Gate-Level Minimization:	lean A nonica The M	Algebr l and ap Me	a, B Stand thod	dar I (K
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Einite state	Mashing(ECM), Mashr ECM	and Maana	EGM D	anion Error				
Finite state Machine(FSM):Mealy FSM and Moore FSM, Design Example : Sequence detection Modeling of FSM using Verilog HDI								
detection, M	detection, Modeling of FSM using Verilog HDL.							
Module:7	Programmable Logic Devic	ces			4 hours			
Types of Pro	grammable Logic Devices: P	LA, PAL, CP	LD, FPGA	A Generic A	architecture.			
Module:8	Module:8 Contemporary issues			2 hours				
		T	otal Lectu	ire hours:	45 hours			
Textbook(s)								
1. M. Mo	orris Mano and Michael D.	Ciletti, Digi	tal Desig	n: With an	Introduction to			
the Ve	rilog HDL and System Verilo	og, 2018, 6 th E	dition, Pe	arson Pvt. I	Ltd.			
Reference B	ooks							
1. Ming-l	Bo Lin, Digital Systems Des	ign and Pract	ice: Using	g Verilog H	IDL and FPGAs,			
2015, 2	2nd Edition, Create Space Ind	lependent Pub	lishing Pla	atform.				
2. Samir	Palnitkar, Verilog HDL: A	Guide to Dig	ital Desig	n and Synt	hesis, 2009, 2nd			
edition	, Prentice Hall of India Pvt. I	Ltd.						
3. Stephe	n Brown and ZvonkoVrane	sic, Fundame	entals of	Digital Log	gic with Verilog			
-	, 2013, 3rd Edition, McGraw			-				
Mode of I	Evaluation: Continuous Ass	essment Test	, Digital A	Assignment	, Quiz and Final			
Assessme	nt Test							
Recomme	ended by Board of Studies	14-05-202	2					
Approved	d by Academic Council	No. 66	Date	16-06-20	022			

Course Code	Course Title	L	Т	Р	С
BECE102P	Digital Systems Design Lab	0	0	2	1
Pre-requisite	Nil	Syllabus versio		sion	
			1	.0	

Course Objective

To apply theoretical knowledge gained in the theory course and get hands-on experience of the topics.

Course Outcomes

At the end of the course the student will be able to

- 1. Design, simulate and synthesize combinational logic circuits, data path circuits and sequential logic circuits using Verilog HDL.
- 2. Design and implement FSM on FPGA.
- 3. Design and implement small digital systems on FPGA.

Indica	Indicative Experiments						
1.	Characteristics of Digital ICs, Realization of Boolean expressions						
2.	Design and Verilog modeling of Combinational Logic circuits						
3.	Design and Verilog modeling of va	arious data p	oath eleme	ents - Adders			
4.	Design and Verilog modeling of va	arious data p	oath eleme	ents - Multipliers	5		
5.	Implementation of combinational c	circuits – (F	PGA / Tra	ainer Kit)			
6.	Implementation of data path circuit	t - (FPGA /	Trainer K	iit)			
7.	Design and Verilog modeling of sir	mple seque	ntial circu	its like Counters			
	and Shift registers						
8.	Design and Verilog modeling of co	omplex sequ	ential circ	cuits			
9.	Implementation of Sequential circu	uits - (FPGA	A / Trainer	: Kit)			
10.	Design and Verilog modeling of FS	SM based d	esign – Se	erial Adder			
11.	Design and Verilog modeling of FS	SM based d	esign – Tı	affic Light Cont	troller / Vending		
	Machine						
12.	Design of ALU						
		Т	otal Labo	oratory Hours	30 hours		
M	ode of Assessment: Continuous Ass	sessment ar	d Final A	Assessment Test	t		
Re	ecommended by Board of Studies	14-05-202	22				
Ap	pproved by Academic Council	No. 66	Date	16-06-2022			

1.0 Course Objectives 1. To acquaint students with architectures of Intel microprocessors, microcontroller ARM processors. 2. To familiarize the students with assembly language programming in 8 microcontroller and ARM processor. 3. To interface peripherals and I/O devices with the 8051 microcontroller. Course Outcomes transport the architecture and Programming of Intel 8086 Microprocessors 2. Infer the architectures and programming of 8051 microcontroller. 4. Deploy the implementation of various peripherals such as general purpose in output, timers, serial communication, LCD, keypad and ADC with 8 microcontroller 5. Infer the architecture of ARM Processor 6. Develop the simple application using ARM processor. Module:1 Overview of Microprocessors 13. 5, i7) Series Processor. Module:2 Microprocessor Architecture and Addressing modes, Memory Segmentat nstruction Set, Assembly Language Processing, Programming with DOS and BIOS funct alls, minimum and maximum mode configuration, Programmable Peripheral Interf8255), Programmable Timer Controller (8254), Memory Interface to 8086. Module:3 Microcontroller Architecture: Intel 8051 7 hours Aicrocontroller 8051 - Organization and Architecture, RAM-ROM Organization, Mac Sycle, Instruction set: Addressing modes, Data Processing - Stack, Arithmetic, Log 8ranching – Unconditional and Condititonal, Assembly programming. <t< th=""><th>Syllabus version 1.0 ents with architectures of Intel microprocessors, microcontroller and b. the students with assembly language programming in 8051 and ARM processor. pherals and I/O devices with the 8051 microcontroller. the student should be able to various microprocessors including Intel Pentium Processors ture and Programming of Intel 8086 Microprocessor. architectures and programming of 8051 microcontroller. tementation of various peripherals such as general purpose input/serial communication, LCD, keypad and ADC with 8051 sture of ARM Processor ple application using ARM processor. of Microprocessors sessor Architecture and Interfacing: Intel x86 8 hours cessor Architecture and Addressing modes, Memory Segmentation, V Language Processing, Programming with DOS and BIOS function wimum mode configuration, Programmable Peripheral Interface mer Controller (8254), Memory Interface to 8086. coller Architecture: Intel 8051 7 hours Organization and Architecture, RAM-ROM Organization, Machin Addressing modes, Data Processing - Stack, Arithmetic, Logical al and Conditional, Assembly programming. coller 8051 Peripherals 5 hours rs, Serial Communication and Interrupts. 7 hours cing with Microcontroller 8051 7 hours roller Architecture 5 hours rs,</th><th>Course Code</th><th>Course Title</th><th>L</th><th>Т</th><th>P</th><th>С</th></t<>	Syllabus version 1.0 ents with architectures of Intel microprocessors, microcontroller and b. the students with assembly language programming in 8051 and ARM processor. pherals and I/O devices with the 8051 microcontroller. the student should be able to various microprocessors including Intel Pentium Processors ture and Programming of Intel 8086 Microprocessor. architectures and programming of 8051 microcontroller. tementation of various peripherals such as general purpose input/serial communication, LCD, keypad and ADC with 8051 sture of ARM Processor ple application using ARM processor. of Microprocessors sessor Architecture and Interfacing: Intel x86 8 hours cessor Architecture and Addressing modes, Memory Segmentation, V Language Processing, Programming with DOS and BIOS function wimum mode configuration, Programmable Peripheral Interface mer Controller (8254), Memory Interface to 8086. coller Architecture: Intel 8051 7 hours Organization and Architecture, RAM-ROM Organization, Machin Addressing modes, Data Processing - Stack, Arithmetic, Logical al and Conditional, Assembly programming. coller 8051 Peripherals 5 hours rs, Serial Communication and Interrupts. 7 hours cing with Microcontroller 8051 7 hours roller Architecture 5 hours rs,	Course Code	Course Title	L	Т	P	С	
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Module:6 ARM Processor Architecture 5 hours	essor Architecture 5 hours y; Overview of ARM architecture; States [ARM, Thumb, Jazelle			Conv	verto	rs, S	ense	
	; Overview of ARM architecture; States [ARM, Thumb, Jazelle	with Signal Condit	loning Interface.					
ARM Design Philosophy; Overview of ARM architecture; States [ARM, Thumb, Jaze Registers, Modes; Conditional Execution; Pipelining; Vector Tables; Exception handling		-						

М	odule:7	ARM Instruction Set				8 hours		
		ction- data processing instruction	ons branch	instructio	ons load stor			
		tion, Loading instructions, cond						
	I Institue	tion, Loading instructions, cond		ution, As	sembry 1 logi	amming.		
Mo	odule:8	Contemporary issues				2 hours		
		То	tal Lecture	hours:		45 hours		
Tex	t Book(s	3)						
1.	A.K. I	Ray, K.M. Bhurchandi, Advan	ced Microp	processor	and Peripher	rals, 2012, 2 nd		
	Edition	n, Tata McGraw-Hill, India.						
2.	Mohan	nmad Ali Mazidi, Janice C	6. Mazidi,	Rolin I	D. McKinlay	v, The 8051		
	Microo	controller and Embedded System	ns, 2014, 2 nd	¹ Edition,	Pearson, India	a.		
Refe	erence E	Books						
1.	Muhar	nmad Ali Mazidi, ARM Assen	nbly Langu	age Progr	amming & A	Architecture: 1,		
	2016, 2	2nd Edition, Microdigitaled.com						
2.	A. Nag	oor Kani, 8086 Microprocessor	s and its Ap	plications	, 2017, Secon	d Edition, Tata		
	McGra	w-Hill Education Pvt. Ltd., Nev	v Delhi, Ind	ia.				
3.	Joseph	Yiu, The Definitive Guide to A	RM® Corte	x®-M0 a	nd Cortex-M)+ Processors,		
	2015, 2	2 nd Edition, Elsevier Science & 7	Fechnology,	, UK				
N		Evaluation: Continuous Asses			Assignment, (Quiz and Final		
	ssessm		·	Ų	Ç ,	-		
R	Recomm	ended by Board of Studies	14-05-20)22				
		d by Academic Council	No. 66	Date	16-06-202	2		
A	Approve	d by Academic Council	No. 66	Date	16-06-202	2		

	Course Title	L	Т	Р	С
BECE204P	Microprocessors and Microcontrollers Lab	0	0	2	1
Pre-requisite	BECE102L	Sy	llabu	ıs ver	sion
_			1	1.0	
ourse Objectives					
1. To famili microproce	iarize the students with assembly language pressor and microcontroller.	program	mmin	g u	sing
2. To famili microcontr	arize the students with Embedded C language oller.	progra	mmir	ng u	sing
3. To interface	e peripherals and I/O devices with the microcontroller a	nd mic	cropro	cesso	or.
Course Outcomes					
tudent will be able	e to				
1. Showcase	the skill, knowledge and ability of programming	micro	contro	oller	and
microproce	essor using its instruction set.				
2. Expertise	with microcontroller and interfaces including general p	110000			
	Finite interfocontroller und interfaces interfacing general p	urpose	: mpu	t/ out	put,
timers, ser	ial communication, LCD, keypad and ADC.	urpose	: mpu	t/ out	put,
timers, ser		urpose	: mpu		put,
			: mpu		put,
ndicative Experim	ial communication, LCD, keypad and ADC.				put,
adicative Experiment1Assembly 1	ial communication, LCD, keypad and ADC. nents [Experiments using 8086/8051/ARM]		- mpu		put,
adicative Experim1Assembly2Assembly	ial communication, LCD, keypad and ADC. nents [Experiments using 8086/8051/ARM] language programming of Arithmetic/logical operations language programming of memory operations.				
1Assembly2Assembly3Assembly	ial communication, LCD, keypad and ADC. nents [Experiments using 8086/8051/ARM] language programming of Arithmetic/logical operations	g for	inter	facin	g th
1Assembly2Assembly3Assembly	ial communication, LCD, keypad and ADC. nents [Experiments using 8086/8051/ARM] language programming of Arithmetic/logical operations language programming of memory operations. language programming/ Embedded C programmin s: General purpose input/ output, timers, serial co	g for	inter	facin	g th
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Adicative Experim1Assembly2Assembly3Assemblybperipheralskeypad and4Hardware	ial communication, LCD, keypad and ADC. nents [Experiments using 8086/8051/ARM] language programming of Arithmetic/logical operations language programming of memory operations. language programming/ Embedded C programmin s: General purpose input/ output, timers, serial co d ADC.	g for ommu	inter	facin on, 1	g th
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Adicative Experim1Assembly2Assembly3Assembly3Assemblyperipheralskeypad and4Hardwaretimers, seriesMode of Assess	ial communication, LCD, keypad and ADC. nents [Experiments using 8086/8051/ARM] language programming of Arithmetic/logical operations language programming of memory operations. language programming/ Embedded C programmin s: General purpose input/ output, timers, serial co d ADC. implementation of peripheral interfacing: General p ial communication, LCD, keypad and ADC. Total Laboratory Hours:	g for ommur urpose	inter nicatio	facin on, l ıt/ oı	g th

	c Course Title I		Р	С
BMAT2051	Discrete Mathematics and Graph Theory	3 1	0	4
Pre-requisi	te NIL	Syllab	us Ve	rsion
			1.0	
Course Object	ives:			
1. To add	lress the challenges of the relevance of lattice theoryand alg	ebraic st	ructure	es to
-	ter science and engineering problems.			
	e Counting techniques, in particular recurrence relations to	compute	er scie	ence
proble				
3. To uno	lerstand the concepts of graph theory and related algorithm c	oncepts.		
Course Outco	nes:			
	is course, students are expected to			
1. Learn	proof techniques and concepts of inference theory			
	gebraic structures in applications			
	ing techniques in engineering problems.			
	ttice and Boolean algebra properties in Digital circuits.			
	Science and Engineering problems using Graph theory.			
Module 1	Iathematical Logic	7	hours	8
	Notation-Connectives–Tautologies-Equivalence - Implicat			
	Inference for the Statement Calculus - Predicate Calculus - In			
		nierence	i neor	v of fl
=		hierence	Ineor	y of tl
Predicate Calci	ılus			-
Predicate Calco Module:2 A		6	hours	5
Predicate Calco Module:2 A	ilus Igebraic Structures Id Monoids - Groups – Subgroups – Lagrange's Theore	6	hours	5
Predicate Calcu Module:2 A Semigroups an Properties-Gro	ilus Igebraic Structures Id Monoids - Groups – Subgroups – Lagrange's Theore up Codes.	6 em Homo	hours	s hism
Predicate CalcuModule:2ASemigroupsanProperties-GroModule:3OO	ilus Igebraic Structures Id Monoids - Groups – Subgroups – Lagrange's Theore	em Homo	hours	s s
Module:2AModule:2ASemigroups anProperties-GroModule:3CBasics of course	Ilus Igebraic Structures Id Monoids - Groups – Subgroups – Lagrange's Theore up Codes. Jounting Techniques	6 em Homo 6 vinations	hours omorp hours - Inc	s hism s clusio
Predicate Calcu Module:2 A Semigroups an Properties-Gro Module:3 C Basics of cou exclusion prin	Ilus Igebraic Structures Id Monoids - Groups – Subgroups – Lagrange's Theore up Codes. Jounting Techniques nting - Pigeonhole principle - Permutations and comb	6 em Homo 6 vinations	hours omorp hours - Inc	s hism s clusio
Predicate Calcu Module:2 A Semigroups an Properties-Gro Module:3 C Basics of cou exclusion prin Functions - So	Igebraic Structures Id Monoids - Groups – Subgroups – Lagrange's Theore up Codes. Ounting Techniques nting - Pigeonhole principle - Permutations and comb ciple - Recurrence relations - Solving recurrence rel ution to recurrence relations.	em Home 6 oinations lations -	hours omorp hours - Inc - Ger	s hism s clusio heratin
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Module:2AModule:2ASemigroups anProperties-GroModule:3CBasics of couexclusion printFunctions - SoModule:4LPartially OrdeBoolean algebriModule:5F	Igebraic Structures Id Monoids - Groups – Subgroups – Lagrange's Theore up Codes. ounting Techniques nting - Pigeonhole principle - Permutations and comb ciple - Recurrence relations - Solving recurrence rel ution to recurrence relations. attices and Boolean algebra red Relations - Lattices as Posets – Hasse Digram – Pro a-Properties of Boolean Algebra-Boolean functions. undamentals of Graphs	6 m Home of 6 operties of 6	hours omorp hours - Inc - Ger hours of Lat	s hism s clusio heratin s ttices
Module:2AModule:2ASemigroups anProperties-GroModule:3CBasics of couexclusion printFunctions - SoModule:4LPartially OrdeBoolean algebriModule:5F	Igebraic Structures Id Monoids - Groups – Subgroups – Lagrange's Theore up Codes. Ounting Techniques nting - Pigeonhole principle - Permutations and comb iciple - Recurrence relations - Solving recurrence rel ution to recurrence relations. attices and Boolean algebra red Relations - Lattices as Posets – Hasse Digram – Pro a-Properties of Boolean Algebra-Boolean functions.	6 m Home of 6 operties of 6	hours omorp hours - Inc - Ger hours of Lat	s hism s clusio heratio s ttices
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Module:2AModule:2ASemigroups anProperties-GroModule:3CBasics of couleExclusion printFunctions - SolModule:4LPartially OrdeBoolean algebrModule:5FBasic ConceptGraphs – GrapalgorithmsModule:6T	Idus Igebraic Structures ad Monoids - Groups – Subgroups – Lagrange's Theore up Codes. ounting Techniques nting - Pigeonhole principle - Permutations and comb aciple - Recurrence relations - Solving recurrence rel ution to recurrence relations. attices and Boolean algebra red Relations -Lattices as Posets – Hasse Digram – Pro a-Properties of Boolean Algebra-Boolean functions. undamentals of Graphs s of Graph Theory – Planar and Complete graph - Ma h Isomorphism – Connectivity–Cut sets-Euler and Hamilton rees, Fundamental circuits, Cut sets	6 em Homo oinations lations lations coperties f trix reproon Paths-	hours omorp hours - Inc - Ger hours of Lat hours esenta Shorte hours	s hism s clusio heratin s ttices ttices s
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Predicate Calca Module:2 A Semigroups an Properties-Groo Module:3 C Basics of coulor exclusion print Functions - Sol Module:4 L Partially Orde Boolean algebra Module:5 F Basic Concept Graphs – Grap algorithms Module:6 T Trees – proper algorithms- Tree Module:7 G	Igebraic Structures Id Monoids - Groups – Subgroups – Lagrange's Theore up Codes. Ounting Techniques nting - Pigeonhole principle - Permutations and comb ciple - Recurrence relations - Solving recurrence rel ution to recurrence relations. attices and Boolean algebra red Relations -Lattices as Posets – Hasse Digram – Pro a-Properties of Boolean Algebra-Boolean functions. undamentals of Graphs s of Graph Theory – Planar and Complete graph - Ma h Isomorphism – Connectivity–Cut sets-Euler and Hamilto rees, Fundamental circuits, Cut sets ties of trees – distance and centres in tree – Spanning the te traversals- Fundamental circuits and cut-sets traph colouring, covering, Partitioning	6 m Homo 6 m Homo 6 pinations 1 ations - 6 perties of 6 trix repro- 5 n Paths- 6 rees - Sp 6 for a f	hours omorp hours - Inc - Ger hours of Lat hours esenta Shorte hours oannin hours	s hism s clusio heratio s ttices ttices s s s
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Module:8	Contemporary Issues				2 hours
		Total Lec	turo hou	PC •	45 hours
		Total Tut			45 hours
Fext Books:		10101101		15.	10 110115
1. Discrete	Mathematical Structures v Ianohar, Tata McGraw Hill			Computer Science	e, J .P. Tremble
	eory with application to En	-		er Science, Naras	ingDeo, Prentic
Reference Boo	oks:				
1. Discrete M	athematics and its applicati	ons, Kenneth	H. Rose	n, 8 th Edition, Tat	ta McGraw Hill
2019.					
2. Discrete M	athematical Structures, Ko	lman, R.C.Bı	sby and	S.C.Ross, 6 th Edi	tion, PHI, 2018
3. Discrete M	athematics, Richard Johnso	onbaugh, 8 th	Edition,	Prentice Hall, 20	17.
4. Discrete M	athematics, S. Lipschutz ar	nd M. Lipson	, McGrav	v Hill Education ((India) 2017.
5. Elements o	f Discrete Mathematics-A	Computer O	riented A	pproach, C.L.Liu	, Tata McGraw
Hill, Special	Indian Edition, 2017.				
6.Introduction	n to Graph Theory, D. B. W	Vest, 3 rd Editi	on, Prent	ice-Hall, Englewo	ood Cliffs, NJ,
2015.					
Mode of Ev	valuation: CAT, Quizzes,	Digital Assi	gnments,	FAT	
Recommen	ded by Board of Studies	15.02.202	2		

DISCIPLINE CORE

(2021-2022)

B.Tech. Computer Science and Engg with Spec. in Bioinformatics

Sl.No	. Course Code	Course Title	Page No.
1.	BCSE202L	Data Structures and Algorithms	130
2.	BCSE202P	Data Structures and Algorithms Lab	132
3.	BCSE204L	Design and Analysis of Algorithms	133
4.	BCSE204P	Design and Analysis of Algorithms Lab	135
5.	BCSE205L	Computer Architecture and Organization	137
6.	BCSE301L	Software Engineering	139
7.	BCSE301P	Software Engineering Lab	141
8.	BCSE302L	Database Systems	142
9.	BCSE302P	Database Systems Lab	144
10.	BCSE303L	Operating Systems	145
11.	BCSE303P	Operating Systems Lab	147
12.	BCSE304L	Theory of Computation	149
13.	BCSE305L	Embedded Systems	151
14.	BCSE306L	Artificial Intelligence	153
15.	BCSE307L	Compiler Design	155
16.	BCSE307P	Compiler Design Lab	157
17.	BCSE308L	Computer Networks	158
18.	BCSE308P	Computer Networks Lab	160
19.	BCSE309L	Cryptography and Network Security	161
20.	BCSE309P	Cryptography and Network Security Lab	163

	Course Title	L	Т	Р	C
BCSE202L	Data Structures and Algorithms	3	0	0	3
Pre-requisite	NIL	Sylla	abus	s vers	sion
			1	.0	
Course Objective	25 25				
-	ic concepts of data structures and algorithms.				
	te linear, non-linear data structures and their operations.				
3. To comprehen	d the necessity of time complexity in algorithms.				
Course Outcome	s				
	this course, students should be able to:				
1. Understand th	e fundamental analysis and time complexity for a given probl	em.			
2. Articulate line	ear, non-linear data structures and legal operations permitted o	on the	m.		
3. Identify and a	pply suitable algorithms for searching and sorting.				
4. Discover varie	bus tree and graph traversals.				
Madala A		0.1			
	gorithm Analysis gorithms and data structures - Fundamentals of algorithm analy	8 ho		aand	tim
			-		
	n algorithm, Types of asymptotic notations and orders of g	-		-	
=	st case, worst case, average case - Analysis of non-recu				
	mptotic analysis for recurrence relation: Iteration Method, S	ubstit	utio	n Me	tno
Master Method a	and Recursive Tree Method.				
	near Data Structures	7 ho			
Arrays: 1D and	2D array- Stack - Applications of stack: Expression Evalua	tion,	Con		
Arrays: 1D and Infix to postfix	2D array- Stack - Applications of stack: Expression Evalua and prefix expression, Tower of Hanoi – Queue - Types	tion, of Q	Con [°] ueue	: Cir	cula
Arrays: 1D and Infix to postfix Queue, Double F	2D array- Stack - Applications of stack: Expression Evalua and prefix expression, Tower of Hanoi – Queue - Types of Ended Queue (deQueue) - Applications – List: Singly linked	tion, of Q	Con [°] ueue	: Cir	cula
Arrays: 1D and Infix to postfix a Queue, Double H lists, Circular lin	2D array- Stack - Applications of stack: Expression Evalua and prefix expression, Tower of Hanoi – Queue - Types of Ended Queue (deQueue) - Applications – List: Singly linked hked lists- Applications: Polynomial Manipulation.	tion, of Q lists,	Con ueue Dou	: Cir	cula
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Arrays: 1D andInfix to postfix aQueue, Double Hlists, Circular linModule:3Searching: Linea	2D array- Stack - Applications of stack: Expression Evalua and prefix expression, Tower of Hanoi – Queue - Types of Ended Queue (deQueue) - Applications – List: Singly linked nked lists- Applications: Polynomial Manipulation. arching and Sorting or Search and binary search – Applications. Sorting: Insertion	tion, of Q lists, 7 ho t sort,	Con ueue Dou urs Sele	: Cir bly li	cula
Arrays: 1D and Infix to postfix a Queue, Double H lists, Circular lin Module:3 Searching: Linea	2D array- Stack - Applications of stack: Expression Evalua and prefix expression, Tower of Hanoi – Queue - Types of Ended Queue (deQueue) - Applications – List: Singly linked hked lists- Applications: Polynomial Manipulation.	tion, of Q lists, 7 ho t sort,	Con ueue Dou urs Sele	: Cir bly li	cula
Arrays: 1D andInfix to postfix aQueue, Double Hlists, Circular linModule:3Searching: Linea	2D array- Stack - Applications of stack: Expression Evalua and prefix expression, Tower of Hanoi – Queue - Types of Ended Queue (deQueue) - Applications – List: Singly linked hked lists- Applications: Polynomial Manipulation. Arching and Sorting or Search and binary search – Applications. Sorting: Insertion anting sort, Quick sort, Merge sort - Analysis of sorting algorit	tion, of Q lists, 7 ho t sort,	Con ueue Dou urs Sele	: Cir bly li	cula
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Arrays: 1D andInfix to postfixQueue, Double Flists, Circular linModule:3SeaSearching: LineaBubble sort, CouModule:4TrIntroduction - BiSearch Trees - Gminimum elementModule:5GrTerminology - F	2D array- Stack - Applications of stack: Expression Evalua and prefix expression, Tower of Hanoi – Queue - Types of Ended Queue (deQueue) - Applications – List: Singly linked hked lists- Applications: Polynomial Manipulation. arching and Sorting or Search and binary search – Applications. Sorting: Insertion anting sort, Quick sort, Merge sort - Analysis of sorting algorit ees nary Tree: Definition and Properties - Tree Traversals- Express Operations in BST: insertion, deletion, finding min and m nt. aphs Representation of Graph – Graph Traversal: Breadth First So S) - Minimum Spanning Tree: Prim's, Kruskal's - Single So	tion, of Q lists, 7 ho sort, thms. 6 ho ax, fi 6 ho earch	Con ueue Dou urs Sele urs Tree andir urs (BF	ction es:- B g the S), I	inke

		ons - Separate chaining - Oper osed hashing - Random probing	-	-		
Mo	dule:7	Heaps and AVL Trees				5 hours
Heaps - Heap sort- Applications -Priority Queue using Heaps. AVL trees: Terminology, bas operations (rotation, insertion and deletion).						
Mo	dule:8	Contemporary Issues				2 hours
				Total Le	cture hours:	45 hours
1.	ference B Alfred V	. Weiss, Data Structures & A				
2.		z, Sahni and S. Anderson-Fre Universities Press.	ed, Fundai	nentals of	Data Structu	ures in C, 2008, 2nd
3.						
M	ode of Ev	valuation: CAT, Assignment,	Quiz and	FAT		
Re	commen	ded by Board of Studies	04-03-20	22		
Ap	oproved b	oy Academic Council	No. 65	Date	17-03-2022	

Course Code	Course Title	L	Т	Р	(
BCSE202P	Data Structures and Algorithms Lab	0	0	2	
Pre-requisite	NIL	Syl	labu	s ver	sic
		1	.0		
Course Objective	8				
-	ic concepts of data structures and algorithms.				
	te linear, non-linear data structures and their operations.				
3. To compreher	d the necessity of time complexity in algorithms.				
Course Outcome	5				
-	of this course, students should be able to:				
	iate data structures to find solutions to practical problems.				
2. Identify suitab	le algorithms for solving the given problems.				
Indicative Experi	ments				
	ion of stack data structure and its applications				
2. Implementat	ion of queue data structure and its applications				
3. Implementat	ion linked list and its application				
4. Implementat	ion of searching algorithms				
5. Implementat	ion of sorting algorithms				
6. Binary Tree	Traversal implementation				
7. Binary Searce	ch Tree implementation				
8. Graph Trave	rsal – Depth First Search and Breadth First Search algorithm				
9. Minimum S	panning Tree – Prim's and Kruskal's algorithm				
10. Single Source	e Shortest Path Algorithm - Dijkstra's algorithm				
	Total Laboratory Hours		30	hour	'S
Text Book(s)		1			
1. Mark A. Wei	ss, Data Structures & Algorithm Analysis in C++, 2013, 4th I	Editio	n, Pe	arson	i.
Reference Books					
1. Alfred V. Ah 1983, Pearson	o, Jeffrey D. Ullman and John E. Hopcroft, Data Structures an Define Education.	nd Al	gorit	hms,	
	hni and S. Anderson-Freed, Fundamentals of Data Structures ersities Press.	in C,	2008	3, 2nd	
	ormen, C.E. Leiserson, R L. Rivest and C. Stein, Introduction ition, MIT Press.	to A	lgori	thms,	
	ent: Continuous Assessments and FAT				
Recommended b	y Board of Studies 04-03-2022				

Course C	Code		Course Tit	le	L	Τ	Р	(
BCSE204I		Design	n and Analysis	of Algorithms	3	0	0	3
Pre-requis	ite	NIL			S	yllabu	s vers	ion
						·	1.0	
Course Obje	ctives							
				g the complexity of				
_		-	ous design strat	egies that can help	in solvi	ng the	e real	wo
problems		-	in waniowa anain	anning design situat	iona			
3. TO Synthe			in various engin	eering design situat	IOIIS			
Course Outo	comes							
On complet	tion of t	his course, stude	ent should be a	ble to:				
			•	e the running time o	f the alg	orithn	ıs	
		najor algorithm d	010					
-	major gr	aph algorithms,	string matching	and geometric alg	gorithms	along	g with	th
analysis.	a Dond	and Algorithe						
	-	omized Algorithi		respect to algorithm	ic offici	onou	and loo	rni
to cope w		255 Of Teal-world	problems with	respect to argorithm		ency a		u 11.
	1011 10.							
1								
Module:1 Overview ar problem, Ide	Design nd Impo ntifying	a suitable techniq	thms - Stages ue, Design of a	d Conquer of algorithm devel n algorithm, Derive gn Stages - Greed	opment: Time C	omple	xity, F	Pro
Module:1 Overview ar problem, Iden of Correctne Knapsack Pr	Design nd Impo ntifying ss of th roblem, a	tance of Algori a suitable techniq e algorithm, Illus	thms - Stages ue, Design of a stration of Desi ing - Divide an	of algorithm devel n algorithm, Derive	opment: Time C y techni	Desc omple iques:	xity, F Fracti	Pro ion
Module:1 Overview ar problem, Iden of Correctne Knapsack Pr	Design nd Impo ntifying ss of th oblem, a multipli Design	tance of Algori a suitable techniq e algorithm, Illus nd Huffman cod cation algorithm.	thms - Stages ue, Design of a stration of Desi ing - Divide an namic Program	of algorithm devel n algorithm, Derive gn Stages - Greed	opment: Time C y techni um Sub	Desc omple iques:	xity, F Fracti Karat	Provi
Module:1 Overview ar problem, Iden of Correctne Knapsack Pr faster integer Module:2	Design nd Impo ntifying ss of th oblem, a multipli Design and Br	tance of Algori a suitable techniq e algorithm, Illus nd Huffman cod cation algorithm. Paradigms: Dyr anch & Bound 7	thms - Stages ue, Design of a stration of Desi ing - Divide an namic Program Sechniques	of algorithm devel n algorithm, Derive gn Stages - Greed d Conquer: Maxim	opment: Time C y techni um Sub	Desc omple iques: array, hour	xity, F Fracti Karat	Pro ion sul
Module:1 Overview ar problem, Iden of Correctne Knapsack Pr faster integer Module:2 Dynamic pr	Design nd Impo ntifying ss of th oblem, a multipli Design and Br ogramm	tance of Algori a suitable techniq e algorithm, Illus nd Huffman cod cation algorithm. Paradigms: Dyn anch & Bound T ng: Assembly	thms - Stages ue, Design of a stration of Desi ing - Divide an namic Program Cechniques Line Schedulir	of algorithm devel n algorithm, Derive gn Stages - Greed d Conquer: Maxim ming, Backtrackin	opment: Time C y techni um Sub ng 10 Multipli	Desc omple aques: array, hour ication	xity, F Fracti Karat s	Pro ion sul
Module:1 Overview ar problem, Iden of Correctne Knapsack Pr Faster integer Module:2 Dynamic pr Common Sul Coloring- Bra	Design nd Impo ntifying ss of th oblem, a multipli Design and Br ogramm bsequend	tance of Algori a suitable techniq e algorithm, Illus nd Huffman cod cation algorithm. Paradigms: Dyn anch & Bound T ng: Assembly e, 0-1 Knapsack,	thms - Stages ue, Design of a stration of Desi ing - Divide an namic Program Cechniques Line Schedulir TSP- Backtrack	of algorithm devel n algorithm, Derive gn Stages - Greed d Conquer: Maxim ming, Backtrackin g, Matrix Chain	opment: Time C y techni um Sub ng 10 Multipli olem, Su	Desc omple aques: array, hour ication bset S	xity, F Fracti Karat s n, Lor	Pro ion ssul
Module:1 Overview ar problem, Ider of Correctne Knapsack Pr faster integer Module:2 Dynamic pr Common Sul	Design nd Impo ntifying ss of th oblem, a multipli Design and Br ogramm bsequend	tance of Algori a suitable techniq e algorithm, Illus nd Huffman cod cation algorithm. Paradigms: Dyn anch & Bound T ng: Assembly e, 0-1 Knapsack,	thms - Stages ue, Design of a stration of Desi ing - Divide an namic Program Cechniques Line Schedulir TSP- Backtrack	of algorithm devel n algorithm, Derive gn Stages - Greed d Conquer: Maxim ming, Backtrackin ng, Matrix Chain king: N-Queens prot	opment: Time C y techni um Sub ng 10 Multipli olem, Su	Desc omple aques: array, hour ication bset S	xity, F Fracti Karat s n, Lor	Pro ion ssul
Module:1 Overview ar problem, Iden of Correctne Knapsack Pr Faster integer Module:2 Dynamic pr Common Sul Coloring- Bra	Design nd Impo ntifying ess of th oblem, a multipli Design and Br ogramm bsequence anch & F	tance of Algori a suitable techniq e algorithm, Illus nd Huffman cod cation algorithm. Paradigms: Dyn anch & Bound T ng: Assembly e, 0-1 Knapsack,	thms - Stages ue, Design of a stration of Desi ing - Divide an namic Program Cechniques Line Schedulir TSP- Backtrach and FIFO BB m	of algorithm devel n algorithm, Derive gn Stages - Greed d Conquer: Maxim ming, Backtrackin ng, Matrix Chain king: N-Queens prot	opment: Time C y techni um Sub ng 10 Multipli olem, Su n proble	Desc omple aques: array, hour ication bset S	xity, F Fracti Karat s n, Lor	Pro ion ssul
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Module:1 Dverview ar problem, Iden of Correctne Knapsack Pr Faster integer Module:2 Dynamic pr Common Sul Coloring- Bra Problem Module:3	Design nd Impo ntifying ss of th oblem, a multipli Design and Br ogramm bsequence anch & F String g-matchi	tance of Algori a suitable techniq e algorithm, Illus nd Huffman cod cation algorithm. Paradigms: Dyn anch & Bound T ng: Assembly e, 0-1 Knapsack, ound: LIFO-BB Matching Algorithms, K	thms - Stages ue, Design of a stration of Desi ing - Divide an namic Program Cechniques Line Schedulir TSP- Backtrach and FIFO BB m	of algorithm devel n algorithm, Derive gn Stages - Greed d Conquer: Maxim ming, Backtrackin g, Matrix Chain king: N-Queens prob ethods: Job Selectio	opment: Time C y techni um Sub ng 10 Multipli olem, Su n proble	Desc omple iques: array, hour ication bset S m, 0-1 nours	xity, F Fracti Karat s n, Lor um, G	Pro ion ssul
Module:1 Dverview ar problem, Iden of Correctne Knapsack Pr Faster integer Module:2 Dynamic pr Common Sul Coloring- Bra Problem Module:3 Naïve String Module:4	Design nd Impo ntifying ss of th oblem, a multipli Design and Br ogramm bsequend anch & F String g-matchi Graph	tance of Algori a suitable techniq e algorithm, Illus nd Huffman cod cation algorithm. Paradigms: Dyn anch & Bound T ng: Assembly e, 0-1 Knapsack, cound: LIFO-BB Matching Algorithms, K Algorithms	thms - Stages ue, Design of a stration of Desi ing - Divide an namic Program Cechniques Line Schedulir TSP- Backtrach and FIFO BB m	of algorithm devel n algorithm, Derive gn Stages - Greed d Conquer: Maxim ming, Backtrackin g, Matrix Chain king: N-Queens prob ethods: Job Selectio	opment: Time C y techni um Sub ng 10 Multipli olem, Su n proble	Desc omple aques: array, hour ication bset S m, 0-1 nours ix Tre ix Tre	xity, F Fracti Karat s h, Lor um, G Knap ees.	Pro ion sul
Module:1 Overview ar problem, Iden of Correctne Knapsack Pr Faster integer Module:2 Dynamic pr Common Sul Coloring- Bra Problem Module:3 Naïve String Module:4 All pair shor	Design nd Impo ntifying ss of th oblem, a multipli Design and Br ogramm bsequence anch & F String g-matchi Graph rtest path	tance of Algori a suitable techniq e algorithm, Illus nd Huffman cod cation algorithm. Paradigms: Dyn anch & Bound T ng: Assembly e, 0-1 Knapsack, sound: LIFO-BB Matching Algori ng Algorithms, K Algorithms	thms - Stages ue, Design of a stration of Desi ing - Divide an namic Program Cechniques Line Schedulir TSP- Backtrach and FIFO BB m thms MP algorithm, Toyd	of algorithm devel n algorithm, Derive Ign Stages - Greed Id Conquer: Maxim ming, Backtrackin Ig, Matrix Chain King: N-Queens prob ethods: Job Selectio	opment: Time C y techni um Sub ng 10 Multipli olem, Su n proble 51 hm, Suff 61 m - Netw	Desc omple array, hour ication bset S m, 0-1 hours ix Tre ix Tre ork F	xity, F Fracti Karat s n, Lor tum, G Knap ees.	Pro ion ssul
Module:1 Dverview ar problem, Iden of Correctne Knapsack Pr Faster integer Module:2 Dynamic pr Common Sul Coloring- Bra Problem Module:3 Naïve String Module:4 All pair shor Networks,	Design nd Impo ntifying ss of th oblem, a multipli Design and Br ogramm bsequend anch & F String g-matchi Graph Maximu	tance of Algori a suitable techniq e algorithm, Illus nd Huffman cod cation algorithm. Paradigms: Dyn anch & Bound T ng: Assembly e, 0-1 Knapsack, sound: LIFO-BB Matching Algori ng Algorithms, K Algorithms	thms - Stages ue, Design of a stration of Desi ing - Divide an namic Program Cechniques Line Schedulir TSP- Backtrack and FIFO BB m thms MP algorithm, Toyd -Fulkerson, Ed	of algorithm devel n algorithm, Derive gn Stages - Greed d Conquer: Maxim ming, Backtrackin ag, Matrix Chain sting: N-Queens prot ethods: Job Selectio Rabin-Karp Algorith -Warshall Algorithr mond-Karp, Push	opment: Time C y techni um Sub ng 10 Multipli olem, Su n proble 51 hm, Suff 61 m - Netw	Desc omple array, hour ication bset S m, 0-1 hours ix Tre ix Tre ork F	xity, F Fracti Karat s n, Lor tum, G Knap ees.	Pro ion ssul
Module:1 Dverview ar problem, Iden of Correctne Knapsack Pr Faster integer Module:2 Dynamic pr Common Sul Coloring- Bra Problem Module:3 Naïve String Module:4 All pair shor Networks,	Design nd Impo ntifying ss of th oblem, a multipli Design and Br ogramm bsequend anch & F String g-matchi Graph rtest path Maximu of Max	tance of Algori a suitable techniq e algorithm, Illus nd Huffman cod cation algorithm. Paradigms: Dyn anch & Bound T ng: Assembly e, 0-1 Knapsack, ound: LIFO-BB Matching Algorithms, K Algorithms : Bellman Ford A m Flows: Ford Flow to maximur	thms - Stages ue, Design of a stration of Desi ing - Divide an namic Program Cechniques Line Schedulir TSP- Backtrack and FIFO BB m thms MP algorithm, Toyd -Fulkerson, Ed	of algorithm devel n algorithm, Derive gn Stages - Greed d Conquer: Maxim ming, Backtrackin ag, Matrix Chain sting: N-Queens prot ethods: Job Selectio Rabin-Karp Algorith -Warshall Algorithr mond-Karp, Push	opment: Time C y techni um Sub g 10 Multipli olem, Su n proble 51 hm, Suff n - Netw Re-lab	Desc omple array, hour ication bset S m, 0-1 hours ix Tre ix Tre ork F	xity, F Fracti Karat s n, Lor tum, G Knap ees.	Pro ion ssul
Module:1 Dverview ar problem, Iden- problem, Iden- problem, Iden- problem Integer Module:2 Dynamic problem Module:3 Naïve String Module:4 All pair shorn Networks, Application Module:5	Design nd Impo ntifying ss of th oblem, a multipli Design and Br ogramm bsequence anch & F String g-matchi Graph rtest path Maximu of Max	tance of Algori a suitable techniq e algorithm, Illus nd Huffman cod cation algorithm. Paradigms: Dyn anch & Bound T ng: Assembly e, 0-1 Knapsack, ound: LIFO-BB Matching Algori ng Algorithms, K Algorithms : Bellman Ford A m Flows: Ford Flow to maximur tric Algorithms	thms - Stages ue, Design of a stration of Desi ing - Divide an namic Program Cechniques Line Schedulir TSP- Backtrach and FIFO BB m thms MP algorithm, Floyd -Fulkerson, Ec n matching prob	of algorithm devel n algorithm, Derive gn Stages - Greed d Conquer: Maxim ming, Backtrackin ag, Matrix Chain sting: N-Queens prot ethods: Job Selectio Rabin-Karp Algorith -Warshall Algorithr mond-Karp, Push	opment: Time C y techni um Sub ng 10 Multipli olem, Su n proble 51 hm, Suff 61 n - Netw Re-lab	Desc omple ques: array, hour ication bset S m, 0-1 iours ix Tre ork F el Al	xity, F Fracti Karat s n, Lor um, G Um, G Knap ees.	Pro ion su mge draj osa Flo m
Module:1 Dverview ar problem, Iden- problem, Iden- problem, Iden- problem, Iden- f Correctne Knapsack Pr Faster integer Module:2 Dynamic pr Common Sul Coloring- Bra Problem Module:3 Naïve String Module:4 All pair shor Networks, Application Module:5 Line Segmo	Design nd Impo ntifying ss of th oblem, a multipli Design and Br ogramm bsequend anch & F String g-matchi Graph rtest path Maximu of Max Geome ents: Pro	tance of Algori a suitable techniq e algorithm, Illus nd Huffman cod cation algorithm. Paradigms: Dyn anch & Bound T ng: Assembly e, 0-1 Knapsack, ound: LIFO-BB Matching Algori ng Algorithms, K Algorithms : Bellman Ford A m Flows: Ford Flow to maximur tric Algorithms	thms - Stages ue, Design of a stration of Desi ing - Divide an namic Program Cechniques Line Schedulir TSP- Backtrach and FIFO BB m ithms MP algorithm, Floyd -Fulkerson, Ec n matching prob	of algorithm devel n algorithm, Derive ign Stages - Greed d Conquer: Maxim ming, Backtrackin g, Matrix Chain dig, Matrix Chain dig: N-Queens prob ethods: Job Selectio Rabin-Karp Algorith -Warshall Algorithr mond-Karp, Push olem	opment: Time C y techni um Sub ng 10 Multipli olem, Su n proble 51 hm, Suff 61 n - Netw Re-lab	Desc omple ques: array, hour ication bset S m, 0-1 iours ix Tre ork F el Al	xity, F Fracti Karat s n, Lor um, G Um, G Knap ees.	Pro ion csul nge draj osad Flo m

Randomized	d quick sort - The hiring proble	m - Finding	g the globa	al Minimum C	Cut.
Module:7	Classes of Complexity and A	Approxima	tion Algo	rithms	7 hours
statement),	 The Class NP - Reducibility 3SAT, Independent Set, Clique ng salesman 		-	,	
Module:8	Contemporary Issues				2 hours
			Total Lo	ecture hours:	45 hours
Text Book(s))				
	H. Cormen, C.E. Leiserson, I dition, MIT Press, 2009.	R L.Rivest	and C. S	tein, Introduc	ction to Algorithms,
Reference B	ooks				
1. Jon Klei	nberg and ÉvaTardos, Algorit	thm Desigr	n, Pearson	Education, 1	st Edition, 2014.
-	Motwani, Prabhakar Raghavar 995 (Online Print – 2013)	n; Random	ized Algo	rithms, Camb	oridge University
	a K. Ahuja, Thomas L. Magna ms, and Applications, 1st Ed				Flows: Theory,
Mode of E	valuation: CAT, Written assi	gnments, (Quiz, FAT	•	
Recommen	nded by Board of Studies	04-03-20	22		
Approved	by Academic Council	No. 65	Date	17-03-2022	

	Course Code		Course	Title		L	Т	P	(
	BCSE204P	Design	and Analysis	of Algorithm	ns Lab	0	0	2	
I	Pre-requisite	Nil				Sy	llabus	vers	io
							1.	0	
Cou	rse Objectives								
	To provide ma			• •	1 •		0		
	To impart the	-	various desig	gn strategies	that can hel	p in	solving	g the	re
	world problem	•	· · · · · · · · · · · · · · · · · · ·		1	•			
0.,	Synthesize effi	cient argorithin	is in various (engineering	lesign situat	IONS			
Cou	Irse Outcomes								
1. (On completion	of this course.	, student shou	ld be able to	:				
	Demonstrate th			-					
	Explain major	graph algorith	ms, string ma	atching and	geometric al	gorit	hms al	ong	W
1	their analysis.								
Indi	icative Experin	aonta							
1.		egy : Activity S	Falastian & L	Juffman andi	20				
1. 2.		ogramming :				Lo	ngast	Com	
Ζ.		, 0-1 Knapsa		Chan wi	Inplication	, L0	ngest	Com	111
3.	-	Conquer :		Subarray a	and Karats	uba	faster	int	eg
	multiplicatio	-		2					
4.	Backtracking	-							
	_	-	lection						
5.	Branch and I	g: N-queens		IP and Rabin	n Karp,suffi	x tree	es		
5.	Branch and I String match	g: N-queens Bound: Job se	s : Naïve, KN		ı Karp,suffi	x tree	es		
5. 6 7	Branch and D String match MST and all	g: N-queens Bound: Job se ing algorithms	s : Naïve, KN oath algorithr	ns		x tree	es		
5. 6 7 8	Branch and D String match MST and all Network Flo	g: N-queens Bound: Job se ing algorithms pair shortest p	s : Naïve, KM path algorithr lkerson and F	ns Edmond - Ka	urp			poir	nts
5. 6 7 8 9	Branch and D String match MST and all Network Flo Intersection of	g: N-queens Bound: Job se ing algorithms pair shortest p ws : Ford –Ful	s : Naïve, KN path algorith lkerson and F nts &Finding	ns Edmond - Ka Convexhull,	rp Finding clo			` poir	nts
5. 6 7 8 9 10	Branch and D String match MST and all Network Flo Intersection of Polynomial ti	g: N-queens Bound: Job se ing algorithms pair shortest p ws : Ford –Ful of line segmen	s : Naïve, KN path algorith lkerson and F its &Finding for verificatio	ns Edmond - Ka Convexhull, on of NPC pr	rp Finding clo			[°] poir	nts
5. 6 7 8 9 10 11	Branch and I String match MST and all Network Flo Intersection of Polynomial ti Approximatio	g: N-queens Bound: Job se ing algorithms pair shortest p ws : Ford –Ful of line segmen me algorithm	s : Naïve, KN path algorith lkerson and F its &Finding for verificatio	ns Edmond - Ka Convexhull, on of NPC pr nms	rp Finding clo	osest	pair of	[°] poir 30 h	
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5. 6 7 8 9 10 11 Tex	Branch and D String match MST and all Network Flo Intersection of Polynomial ti Approximation	g: N-queens Bound: Job se ing algorithms pair shortest p ws : Ford –Ful of line segmen me algorithm on and Randon	s : Naïve, KM path algorithm lkerson and E tts &Finding for verification nized algorith Leiserson,	ns Edmond - Ka Convexhull, on of NPC pr nms Total I R L.Rivest	rp Finding clo roblems	bsest :	pair of	30 h	οι
5. 6 7 8 9 10 11 11 Tex 1.	Branch and D String match MST and all Network Flo Intersection of Polynomial ti Approximation Ct Book Thomas H. Algorithms, T	g: N-queens Bound: Job se ing algorithms pair shortest p ws : Ford –Ful of line segmen me algorithm on and Randon Cormen, C.E. 'hird edition, M	s : Naïve, KM path algorithm lkerson and E tts &Finding for verification nized algorith Leiserson,	ns Edmond - Ka Convexhull, on of NPC pr nms Total I R L.Rivest	rp Finding clo roblems	bsest :	pair of	30 h	οι
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5. 6 7 8 9 10 11 11 Tex 1. Ref	Branch and D String match MST and all Network Flo Intersection of Polynomial ti Approximation Xt Book Thomas H. Algorithms, T Gerence Book Jon Kleinberg	g: N-queens Bound: Job se ing algorithms pair shortest p ws : Ford –Ful of line segmen me algorithm on and Randon Cormen, C.E. 'hird edition, M s and ÉvaTardo	s : Naïve, KM path algorithr lkerson and E its &Finding for verification nized algorith Leiserson, IIT Press, 200 ps, Algorithm	ns Edmond - Ka Convexhull, on of NPC pr nms Total I R L.Rivest)9.	roblems and C. Stress son Education	hours ein,	pair of	30 h action	ot n
5. 6 7 8 9 10 11 11 Tex 1. Ref	Branch and I String match MST and all Network Flo Intersection of Polynomial ti Approximation xt Book Thomas H. Algorithms, T cerence Book Jon Kleinberg Rajeev Motwa	g: N-queens Bound: Job se ing algorithms pair shortest p ws : Ford –Ful of line segmen me algorithm on and Randon Cormen, C.E. 'hird edition, M s and ÉvaTardo ani, Prabhakar	s : Naïve, KM path algorithr lkerson and E its &Finding for verification nized algorith Leiserson, fIT Press, 200 ps, Algorithm Raghavan; Ra	ns Edmond - Ka Convexhull, on of NPC pr nms Total I R L.Rivest)9.	roblems and C. Stress son Education	hours ein,	pair of	30 h action	ot n
5. 6 7 8 9 10 11 Tex 1. Ref 1. 2.	Branch and D String match MST and all Network Flo Intersection of Polynomial ti Approximation Xt Book Thomas H. Algorithms, T Cerence Book Jon Kleinberg Rajeev Motwa Press, 1995 (C	g: N-queens Bound: Job se ing algorithms pair shortest p ws : Ford –Ful of line segmen me algorithm on and Randon Cormen, C.E. 'hird edition, M s and ÉvaTardo ani, Prabhakar Dnline Print – 2	s : Naïve, KM path algorithr lkerson and E its &Finding for verification nized algorith Leiserson, IIT Press, 200 ps, Algorithm Raghavan; Ra 2013)	ns Edmond - Ka Convexhull, on of NPC pr ms Total I R L.Rivest)9. Design, Pear andomized A	Finding clo roblems and C. St son Education lgorithms, C	bsest hours ein, on, 1s cambr	pair of	30 h	01 n
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Recommended by Board of Studies	04-03-20	22	
Approved by Academic Council	No. 65	Date	17-03-2022

	Course Title	L	Т	Р	C
BCSE205L	Computer Architecture and Organization	3	0	0	3
Pre-requisite	NIL	Sy	llabu	s ver	sioi
			1	.0	
Course Objectives	S				
register organi of data repres algorithms in a 10. To teach path design fo machine level p 11. To make techniques and	tudents with the basic concepts of fundamental com zation and performance metrics of a computer and to in sentation in binary and to understand the implement a typical computer. In students how to describe machine capabilities and des or instruction execution. To introduce students to synt programming. I e students understand the importance of memory syst l external storage and their performance metrics for a ty s alternate techniques for improving the performance of	mpart ntation sign a cax ar tems, pical	the k n of n effe nd ser IO i comp	arithi arithi ective nantio nterfa	led met da cs acin
-	this course, student should be able to:				
 the performance formats and added arithmetic oper 12. Explain larger memories algorithms for and correction. 13. Underse IO mapping to Appraise the system of the system of	n the importance of hierarchical memory organizationes. Analyze and suggest efficient cache mapping technigiven design requirements. Demonstrate hamming contrast the need for an interface. Compare and contrast nechniques. Describe and Differentiate different modulation of the performance and an anterface of the performance and the performance a	diffe bint ar n. At que a le for nemori les of arbitr	rent i nd floa ole to nd rep error ry ma f data ation.	nstru ating cons place dete pping trar	ctic poin stru men ctic g ar
 the performance formats and added arithmetic oper 12. Explain larger memories algorithms for and correction. 13. Underss IO mapping to Appraise the sy 14. Assess 	ce of machine with different capabilities. Recognize dressing modes. Validate efficient algorithm for fixed po- rations. In the importance of hierarchical memory organization es. Analyze and suggest efficient cache mapping techni given design requirements. Demonstrate hamming coo tand the need for an interface. Compare and contrast mechniques. Describe and Differentiate different mod	diffe bint ar n. At que a le for nemori les of arbitr	rent i nd floa ole to nd rep error ry ma f data ation.	nstru ating cons place dete pping trar	ctic poin stru men ctic g ar nsfe
the performand formats and add arithmetic oper 12. Explain larger memorie algorithms for and correction. 13. Unders IO mapping to Appraise the sy 14. Assess machine model Module:1 Intro Overview of Organ and register files	ce of machine with different capabilities. Recognize dressing modes. Validate efficient algorithm for fixed po- rations. In the importance of hierarchical memory organization es. Analyze and suggest efficient cache mapping techning given design requirements. Demonstrate hamming coo stand the need for an interface. Compare and contrast mechniques. Describe and Differentiate different mod ynchronous and asynchronous bus for performance and the performance of IO and external storage syster	diffe pint ar n. At que a le for nemori les of arbitr ns. C	rent i nd floa ole to nd rep error ry ma f data ation. Classif 5 h outer: 1 uter fi	nstru ating j cons place dete pping trar y pa ours Regis	ctic poi stru me ctic g an ster rall
the performand formats and add arithmetic oper 12. Explain larger memorie algorithms for and correction. 13. Unders IO mapping to Appraise the sy 14. Assess machine model Module:1 Intro Overview of Organ and register files - Organization of to Architectures.	ce of machine with different capabilities. Recognize dressing modes. Validate efficient algorithm for fixed po- rations. In the importance of hierarchical memory organization es. Analyze and suggest efficient cache mapping techni- given design requirements. Demonstrate hamming coo tand the need for an interface. Compare and contrast mechniques. Describe and Differentiate different mod ynchronous and asynchronous bus for performance and the performance of IO and external storage system ls. Analyze the pipeline hazards and solutions.	diffe pint ar n. At que a le for nemori les of arbitr ns. C	rent i nd floa ole to nd rej error ry ma f data ation. Classif 5 h uter fi ISC	nstru ating j cons place dete pping trar y pa ours Regis	ctic poi stru me ctic g an ster rall
the performand formats and add arithmetic oper 12. Explain larger memorie algorithms for and correction. 13. Unders IO mapping to Appraise the sy 14. Assess machine model Module:1 Intro Overview of Organ and register files - Organization of to Architectures. Module:2 Data Algorithms for fix Division (restoring	ce of machine with different capabilities. Recognize dressing modes. Validate efficient algorithm for fixed po- rations. In the importance of hierarchical memory organization es. Analyze and suggest efficient cache mapping techni- given design requirements. Demonstrate hamming cod- tand the need for an interface. Compare and contrast mechniques. Describe and Differentiate different mod- ynchronous and asynchronous bus for performance and the performance of IO and external storage syster ls. Analyze the pipeline hazards and solutions.	diffe bint ar n. At que a le for hemore les of arbitr ns. C on comp - C s, Mc	rent i ad floa ole to ind rej error ry ma f data ation. lassif 5 h outer: 1 uter ff ISC 5 h	nstru ating j cons place dete pping trar y pa ours Regis unctio & R ours 1 Boo	stru me ctic g an ster on ISC

Computer Instructions: Instruction sets, I Instruction set categories - Addressing mod				
and control unit: Hardwired control Performance metrics: Execution time calcul	unit and	Micro p	orogrammed c	-
Module:4 Memory System Organizatio	on and Ar	chitecture	;	7 hours
Memory systems hierarchy: Characteristi	, ,	U		1
memory cell - Design of scalable memory us	C		1	U
size memories - Memory Interleaving - I principles, Cache memory management te	•		-	•
memory access time evaluation of cache.	eninques,	rypes or	caenes, caenes	misses, wiedn
Module:5 Interfacing and Communica	tion			5 hours
I/O fundamentals: handshaking, buffering		ules - I/O	techniques: Pr	
Interrupt-driven I/O, Direct Memory Acc			-	0
Vectored and Prioritized-interrupt overho				
Arbitration.	cau - Dus	ses. Sync	monous and a	isynemonous -
Module:6 Subsystems				5 hours
External storage systems: Solid state driv	iora Ora	onization	and Structure	
Electronic- magnetic and optical technologi	-			
and error correcting systems - RAID Levels		-	mory systems -	Enor detecting
		ormanee		
Module:7 High Performance Processor			1.1. (0105	7 hours
Classification of models - Flynn's taxonom	• •			
MIMD) - Pipelining: Two stages, Multi stag				
Hazards, Methods to prevent and resolve l				
branches - Superscalar architecture: Limita pipeline architecture, superscalar techniques			-	-
- performance evaluation of parallel process	-		-	
			speed-up and er	
Module:8 Contemporary Issues				2 hours
		Total	Lecture hours	: 45 hours
Text Book(s)				
 David A. Patterson and John L. Hen Hardware / Software Interface 6th Editi 				l Design -The
Reference Books	ion, morgu			
1. Computer Architecture and Organization	on-Designi	ng for Per	formance, Willi	am Stallings,
Tenth edition, Pearson Education series	-	C	,	
 Carl Hamacher, Zvonko Vranesic, Safv Fifth edition, Reprint 2011. 	vat Zaky, C	Computer	organization, M	c Graw Hill,
Mode of Evaluation: CAT, Written Ass	ignments,	Quiz and	FAT.	
Recommended by Board of Studies	04-03-20	22		
Approved by Academic Council	No. 65	Date	17-03-2022	
-	1	1	I	

Course Code	Course Title	Т	P	С
BCSE301L	Software Engineering	0	0	3
Pre-requisite	NIL	Syllabus	versi	on
		1.	.0	

Course Objectives

1. To introduce the essential Software Engineering concepts.

- 2. To impart concepts and skills for performing analysis, design ,develop, test and evolve efficient software systems of various disciplines and applications
- 3. To make familiar about engineering practices, standards and metrics for developing software components and products.

Course Outcomes

On completion of this course, student should be able to:

- 1. Apply and assess the principles of various process models for the software development.
- 2. Demonstrate various software project management activities that include planning, Estimations, Risk assessment and Configuration Management
- 3. Perform Requirements modelling and apply appropriate design and testing heuristics to produce quality software systems.
- 4. Demonstrate the complete Software life cycle activities from requirements analysis to maintenance using the modern tools and techniques.
- 5. Escalate the use of various standards and metrics in evaluating the process and product.

Module:1 Overview Of Software Engineering

6 hours

Nature of Software, Software Engineering, Software process, project, product, Process Models Classical Evolutionary models, Introduction to Agility - Agile Process-Extreme programming -XP Process – Principles of Agile Software Development framework - Overview of System Engineering.

Module:2Introduction To Software Project Management6 hours

Planning, Scope, Work break-down structure, Milestones, Deliverables, Cost and Estimates -(Human Resources, Time-scale, Costs), Risk Management, RMMM Plan, CASE TOOLS, Agile Project Management, Managing team dynamics and communication, Metrics and Measurement

Module:3	Modelling Requirements	8 hours
Software re-	quirements and its types, Requirements Engineering proce	ess, Requirement
Elicitation, S	System Modeling - Requirements Specification and Require	ement Validation,
Requirement	s Elicitation techniques, Requirements management in Agile.	

Module:4 Software Design

8 hours

Design concepts and principles - Abstraction - Refinement - Modularity Cohesion coupling, Architectural design, Detailed Design Transaction Transformation, Refactoring of designs, Object oriented Design User-Interface Design

Module:5	Validation And Verification	7 hours
Execution, R oriented test	pproach to Software Testing, Testing Fundamentals Test Plan, Reviews, Inspection and Auditing – Regression Testing – Mutatio ing - Testing Web based System - Mobile App testing – Mobil DevOps Testing – Cloud and Big Data Testing	n Testing - Object
Module:6	Software Evolution	4 hours
	Maintenance, Types of Maintenance, - Software Configuration - SCM Tools. Re-Engineering, Reverse Engineering, Software Re	U
Module:7	Quality Assurance	4 hours
improveme	d Process Metrics, Quality Standards Models ISO, TQM, Six-Sig nt Models: CMM & CMMI. Quality Control and Quality Assura nt - Quality Factors - Methods of Quality Management	
Module:8	Contemporary Issues	2 hours
	Total Lecture hours:	45 hours
Text Book	(s)	
1. Ian So	omerville, Software Engineering, 10th Edition, Addison-Wesley,	2015
T	S. Pressman and Bruce R. Maxim, Software Engineering: ach, 10th edition, McGraw Hill Education, 2019	A Practitioner's
<i>4</i> •	n E. Lewis , Software Testing and Continuous Quality Improvemuch Publications, 2017	ent, Third Edition,
Mode of Ev	aluation: CAT, Written assignment, Quiz, FAT.	
Recommend	led by Board of Studies 04-03-2022	
Approved b	y Academic Council No. 65 Date 17-03-2022	
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Cou	rse Code	Cor	urse Title			L	Τ	Р	С	
BCSE301P		Software Engineering Lab				0	0	2	1	
Pre-	requisite	NIL				Sy	llabu	s vers	ion	
						1.0				
Cours	e Objectives									
 To eff To 	impart con icient softw make fam	he essential Software Excepts and skills for per are systems of various of iliar about engineering ponents and products.	forming ana disciplines a	alysis, des and applic	cations.					
Cours	e Outcome									
1. De	monstrate t	this course, student sho he complete Software I g the modern tools and	life cycle ad	ctivities f	rom requ	iiren	nents	analy	sis t	
Indica	tive Experir	nents								
an 3. Ro 4. Ro 5. Ro 6. O	d Role Base equirement equirement equirement O design – I	ak-down Structure (Pr ed) and Estimations modelling using Entity modelling using Contex modelling using State T Use case Model, Class I	Relationship at flow diago Transition D	p Diagrar ram, DFE	n (Struct) (Functio	ural onal	Mode Mode	eling) eling)		
	e	lesign – Interaction Models								
8. O	O design – l	gn – Package, Component and deployment models								
	esign and demonstration of test cases. Functional Testing and Non-Functional Testing sing any open-source tools)									
10. St	ory Boardin	g and User Interface de	sign Model	ling						
			Total L	aborator	y Hours:		30	hours	5	
	ook(s)									
		e, Software Engineering	g, 10th Editi	ion, Addi	son-Wes	ley,	2015			
1. Ro A 2. W	pproach, 10 illiam E. I	essman and Bruce R. th edition, McGraw Hi Lewis, Software Testir	ll Education	n, 2019		-				
Ec	dition, Auer	bach Publications, 2017	1							
		ent: Continuous assess								
		by Board of Studies	04-03-202		1					
Amm	round by An	ademic Council	No. 65	Date	17-03-2	71122				

Course Code	Course Title	L	Т	Р	С
BCSE302L	Database Systems	3	0	0	3
Pre-requisite	NIL	S	yllabı	is vei	rsio
				1.0	
Course Objective					
 To understand Entity-Relation the ER model. To differentiat optimize a que To impart the control, recove its managemen Course Outcomes 4. On completion 5. Comprehend th structure and o 6. Develop a dat various design 7. List the concep 8. Explain the con- database facility	the concepts of File system and structure of the databas aship model for a real-life application and Mapping a date e various normal forms, evaluate relational schemas for ry. working methodologies of transaction management, undery, indexing, access methods and fundamental view on unt. a of this course, student should be able to: the role of database management system in an organization peration of the relational data model. tabase project depending on the business requirement issues. the of indexing and accessing methods. the core of a database transaction processing and comprehe- ties including concurrency control, backup and recovery undamental view on unstructured data and describe	atabas desig dersta unstru- on an nts, c end th	se sch gn qu and co ucture ad des consid	alities oncur ed dat ign th ering	fror s an rend a ar ne
Need for database	base Systems Concepts and Architecture systems – Characteristics of Database Approach – A - Actors on the Database Management Scene: Databa		ntages		sing
Three-Schema A	latabase management systems - Data Models - Schen rchitecture - The Database System Environment hitectures for DBMSs – Overall Architecture of Dat	- C	entral	ized	an
			6 h	ours	
	tional Model and E-R Modeling				
Relational Model: Handling of Nulls Constraints, Relat Extended ER Mod	Candidate Keys, Primary Keys, Foreign Keys - Inter- - Entity Relationship Model: Types of Attributes, Relational model Constraints – Mapping ER model to a related of the second	tions	hips,	Struc	nts tura
Relational Model: Handling of Nulls Constraints, Relat Extended ER Mod	Candidate Keys, Primary Keys, Foreign Keys - Inter- - Entity Relationship Model: Types of Attributes, Relational model Constraints – Mapping ER model to a 1	tions	hips, onal	Struc	nts tura na -

Module:4 Physical Database Design and Query Processing	
	8 hours
File Organization - Indexing: Single level indexing, multi-level i	ndexing, dynamic multilevel
Indexing - B+ Tree Indexing – Hashing Techniques: Static and D	ynamic Hashing – Relational
Algebra - Translating SQL Queries into Relational Algebra	- Query Processing – Query
Optimization: Algebraic Query Optimization, Heuristic query op	-
Optimization using Indexing and Hashing - Tuple Relational Cal	culus.
Module:5 Transaction Processing and Recovery	8 hours
Introduction to Transaction Processing – Transaction con	cepts: ACID Properties o
Transactions, Transaction States - Serial and Serializable Sch	edules - Schedules based or
recoverability - Schedules based on Serializability - Confli	ct Serializabilty - Recovery
Concepts: Log Based Recovery Protocols, Recovery based o	n deferred update, Recovery
techniques based on immediate update – Shadow Paging Algorith	nm
Module:6 Concurrency Control In Transaction Processing	8 hours
Concurrent Transactions - Lost Update Problem - Concurrent	cy Control Techniques: Time
Stamp Based Protocols, Thomas Write Rule, Lock Based Protoco	ls, Lock Compatibility Matrix
- Two-Phase Locking Protocol - Lock Conversions - Graph Bas	ed Protocols for Concurrence
Control - Tree Protocol for Concurrency Control – Deadlocks Ba	ased on Locks in Transaction
– Deadlock Handling Techniques – Transaction Deadlock Detec	tion Techniques – Transactio
Deadlock Prevention Techniques – Multi-Granularity Locki	ng for avoiding Transaction
Deadlocks	
Module:7 NOSQL Database Management	3 hours
Introduction, Need of NoSQL, CAP Theorem, different NoSQ	L data bases: Key-value dat
stores, Columnar families, Document databases, Graph databases	3
Module:8 Contemporary Issues	2 Hours
	2 Hours
Total	
Total Total	2 Hours Lecture hours: 45 hours
Total Text Book(s) 1. R. Elmasri & S. B. Navathe, Fundamentals of Database Sy	2 Hours Lecture hours: 45 hours
Total 1 Total 1 Text Book(s) 1. R. Elmasri & S. B. Navathe, Fundamentals of Database Sy Edition, 2016	2 Hours Lecture hours: 45 hours
Total 1 Text Book(s) 1. R. Elmasri & S. B. Navathe, Fundamentals of Database Sy Edition, 2016 Reference Books	2 Hours Lecture hours: 45 hours vstems, Addison Wesley, 7th
Total 1 Total 1 Text Book(s) 1. R. Elmasri & S. B. Navathe, Fundamentals of Database Sy Edition, 2016 Reference Books 1. A. Silberschatz, H. F. Korth & S. Sudarshan, Database System	2 Hours Lecture hours: 45 hours vstems, Addison Wesley, 7th
Total 1 Total 1 Text Book(s) 1. R. Elmasri & S. B. Navathe, Fundamentals of Database Sy Edition, 2016 Reference Books 1. A. Silberschatz, H. F. Korth & S. Sudarshan, Database Sys 7th Edition 2019.	2 Hours Lecture hours: 45 hours //stems, Addison Wesley, 7th tem Concepts, McGraw Hill,
Total 1 Total 1 Total 1 1. R. Elmasri & S. B. Navathe, Fundamentals of Database Sy Edition, 2016 Reference Books 1. A. Silberschatz, H. F. Korth & S. Sudarshan, Database Sys 7th Edition 2019. 2. Raghu Ramakrishnan, Database Management Systems, Mcg	2 Hours Lecture hours: 45 hours vstems, Addison Wesley, 7th tem Concepts, McGraw Hill, raw-Hill, 4th Edition, 2018
Total 1 Total 1 Text Book(s) 1. R. Elmasri & S. B. Navathe, Fundamentals of Database Sy Edition, 2016 Reference Books 1. A. Silberschatz, H. F. Korth & S. Sudarshan, Database Sys 7th Edition 2019. 2. Raghu Ramakrishnan, Database Management Systems, Mcg 3. C.J.Date, A.Kannan, S.Swamynathan," An Introduction to 1	2 Hours Lecture hours: 45 hours vstems, Addison Wesley, 7th tem Concepts, McGraw Hill, raw-Hill, 4th Edition, 2018
Total 1 Total 1 Text Book(s) 1. R. Elmasri & S. B. Navathe, Fundamentals of Database Sy Edition, 2016 Reference Books 1. A. Silberschatz, H. F. Korth & S. Sudarshan, Database Sys 7th Edition 2019. 2. Raghu Ramakrishnan, Database Management Systems, Mcg 3. C.J.Date, A.Kannan, S.Swamynathan," An Introduction to Eighth Edition, 2006.	2 HoursLecture hours:45 hoursvstems, Addison Wesley, 7thtem Concepts, McGraw Hill,raw-Hill, 4th Edition, 2018Database Systems", Pearson,
Total 1 Total 1 Total 1 1. R. Elmasri & S. B. Navathe, Fundamentals of Database Sy Edition, 2016 Reference Books 1. A. Silberschatz, H. F. Korth & S. Sudarshan, Database Sys 7th Edition 2019. 2. Raghu Ramakrishnan, Database Management Systems, Mcg 3. C.J.Date, A.Kannan, S.Swamynathan," An Introduction to 1 Eighth Edition, 2006. Eighth Edition, 2006. 4. Gerardus Blokdyk, NoSQL Databases A Complete Guide, 55	2 HoursLecture hours:45 hoursvstems, Addison Wesley, 7thtem Concepts, McGraw Hill,raw-Hill, 4th Edition, 2018Database Systems", Pearson,
Total 1 Total 1 Text Book(s) 1. R. Elmasri & S. B. Navathe, Fundamentals of Database Syge Edition, 2016 Reference Books 1. A. Silberschatz, H. F. Korth & S. Sudarshan, Database Syse 7th Edition 2019. 2. Raghu Ramakrishnan, Database Management Systems, Mcg 3. C.J.Date, A.Kannan, S.Swamynathan," An Introduction to Eighth Edition, 2006. 4. Gerardus Blokdyk, NoSQL Databases A Complete Guide, 55 Mode of Evaluation: CAT, Quiz, Assignment and FAT	2 HoursLecture hours:45 hoursvstems, Addison Wesley, 7thtem Concepts, McGraw Hill,raw-Hill, 4th Edition, 2018Database Systems", Pearson,
Total 1 Total 1 Total 1 1. R. Elmasri & S. B. Navathe, Fundamentals of Database Sy Edition, 2016 Reference Books 1. A. Silberschatz, H. F. Korth & S. Sudarshan, Database Sys 7th Edition 2019. 2. Raghu Ramakrishnan, Database Management Systems, Mcg 3. C.J.Date, A.Kannan, S.Swamynathan," An Introduction to 1 Eighth Edition, 2006. Eighth Edition, 2006. 4. Gerardus Blokdyk, NoSQL Databases A Complete Guide, 55	2 HoursLecture hours:45 hoursvstems, Addison Wesley, 7thtem Concepts, McGraw Hill,raw-Hill, 4th Edition, 2018Database Systems", Pearson,

Cour	se Code	Cour	se Title		ΙT	Р	C
BCS	E302P	Datab	ase Systems	Lab	0	2	1
Pre-	requisite	NIL			Syllabu	s versi	on
						1.0	
Cours	e Objectives	5			•		
	-	to understand the conc	-	-			
		Entity-Relationship mod	lel for a real-	life application and	d Mapping	g a data	abas
		he ER model.	avaluata mala	ional schemes for	daaion a		
	timize a que	various normal forms, o rv		ional schemas for	design q	uanties	s ai
-		ry. orking methodologies of	transaction r	nanagement and gi	ve a soluti	ion dur	ing
	-	ilure. Understand the					-
		ss methods and fundame			-		
Cours	e Outcomes						
On co	ompletion of	this course, student sho	ould be able to):			
	-	cture and operation of t					
2. Ex	amine the da	ata requirements of the 1	real world and	l design a database	managem	nent sys	stei
	tive Experi						
		on and Data Manipulati	on Language				
2. 0	Constraints						
3. S	Single row fu	inctions					
4. (Operators and	d group functions					
5. 5	Sub query, vi	lews and joins					
		anguage Extensions - P	Procedures Fi	unctions Cursors a	nd Trigger	rs	
<i>.</i>							
D 4 T) l-		Total L	aboratory Hours:		30 hou	Irs
Fext E		S. B. Navathe, Fundar	nentals of D	atabase Systems	Addison V	Vesley	7ť
	dition, 2016	St Dt Tturuno, Tunun		acabase Systems, I	iuuison (, estej,	, .
E	ence Books						
							, 7t
Refere	. Silberschat	z, H. F. Korth & S. Suda	arshan, Datab	ase System Concep	ots, McGra	w Hill	
Refere	. Silberschat dition 2019.	z, H. F. Korth & S. Suda	arshan, Datab	ase System Concep	ots, McGra	w Hill	
Refere	dition 2019.	z, H. F. Korth & S. Suda rishnan, Database Mana					8
Reference I. A E E 2. R 3. C	dition 2019. aghu Ramak .J.Date, A.K	rishnan, Database Mana annan, S.Swamynathan	agement Syste	ems, Mcgraw-Hill,	4th Editio	on, 201	
Reference 1. A Ed Ed 2. Ra 3. C Ed Ed	dition 2019. aghu Ramak J.Date, A.K ighth Editior	rishnan, Database Mana annan, S.Swamynathan 1, 2006.	agement Syste a," An Introd	ems, Mcgraw-Hill, uction to Database	4th Editio Systems	on, 201	
Reference I. A Ed Ed 2. Ra 3. C. Ei Ei	dition 2019. aghu Ramak J.Date, A.K ighth Editior	rishnan, Database Mana annan, S.Swamynathan	agement Syste a," An Introd	ems, Mcgraw-Hill, uction to Database	4th Editio Systems	on, 201	
Reference 1. A Ed 2. R3 3. C. Ei 4. G	dition 2019. aghu Ramak J.Date, A.K ighth Editior erardus Blok	rishnan, Database Mana annan, S.Swamynathan n, 2006. adyk, NoSQL Databases	ngement Syste ," An Introd s A Complete	ems, Mcgraw-Hill, uction to Database Guide, 5STARCo	4th Editio Systems	on, 201	
Reference I. A Ea Ea 2. Ra 3. C. Ei Ei I. G	dition 2019. aghu Ramak J.Date, A.K ighth Editior erardus Blok le of assessn	rishnan, Database Mana annan, S.Swamynathan 1, 2006.	ngement Syste ," An Introd s A Complete	ems, Mcgraw-Hill, uction to Database Guide, 5STARCo	4th Editio Systems	on, 201	

Course Code	Course Title	L	Т	P	С
BCSE303L	Operating Systems	3	0	0	3
Pre-requisite	NIL	Syl	labus	vers	ion
			1	.0	
Course Objective	es				
1. To introduce	the operating system concepts, designs and provide	ski	lls re	quire	d to
implement the					
	ne trade-offs between conflicting objectives in large scale s	•		-	
3. To develop th	e knowledge for application of the various design issues a	nd se	ervices	•	
Course Outcome	8				
	this course, student should be able to:				
-	evolution of OS functionality, structures, layers and app	oly v	arious	type	es of
system calls	of various process states.				
	aling algorithms to compute and compare various scheduli	ng ci	riteria.		
3. Apply and	analyze communication between inter process ar	nd s	synchi	oniza	atior
techniques.		1. 1			
4. Implement pa	ge replacement algorithms, memory management p	orobi	ems		anc
U U	he file systems for applying different allocation, access tec	hnia	ue rer	reser	nting
	and providing protection and security to OS.		, rep	10501	
Module:1 Intr		3	hours		
	S: Functionality of OS - OS design issues - Structuring m				
=	, micro-kernel models) - Abstractions, processes, resour	rces	- Influ	ience	e of
	ing, and multimedia.				
Module:2 OS			hours		ta
	tem/Application Call Interface – Protection: User/Kernel r ructures (Process Control Block, Ready List etc.),			-	
	nix – Threads: User level, kernel level threads and thread			creat	ion,
Module:3 Sch			hours		
	uling - CPU Scheduling: Pre-emptive, non-pre-emptive				nor
	eadlocks - Resource allocation and management - I		-		
-	vention, avoidance, detection, recovery.				8
	currency	8	hours	1	
	nmunication, Synchronization - Implementing synchron				ves
	on, Bakery algorithm, synchronization hardware) - Sema		-		
	problems, Monitors: Solution to Dining Philosophers prob	-			
•	nd Locking - Scalable Locks - Lock-free coordination.				

			• • • •	• • • • 1	-	r r 1
		y management, Memory al	-		•	
		emory (caching, TLB) – Pa		itation - Deman	d Pagin	ng - Page Faults -
Page	Replace	ement -Thrashing - Workin	g Set.			
Mo	dule:6	Virtualization and File S	ystem Manage	ement		6 hours
Virtu	al Mach	nines - Virtualization (Hardy	ware/Software,	Server, Service	, Netw	ork – Hypervisors
- Co	ntainer	virtualization - Cost of vi	rtualization - 1	File system inte	erface	(access methods,
direc	tory str	uctures) - File system imp	lementation (d	irectory implem	nentatio	on, file allocation
meth	ods) - l	File system recovery - Jou	rnaling - Soft	updates - Log-	structu	red file system -
Distr	ibuted f	ile system.				
Mo	dule:7	Storage Management, P	Protection and	Security		6 hours
Disk	structu	re and attachment – Disk	scheduling alg	gorithms (seek	time,	rotational latency
based	1)- Syste	em threats and security – Po	olicy vs mechan	ism - Access vs	auther	ntication - System
prote	ction: A	Access matrix – Capability	y based syster	ns - OS: perfo	rmanc	e, scaling, future
direc	tions in	mobile OS.				
Mo	dule:8	Contemporary Issues				2 hours
				Total Lecture	hours:	45 hours
Text	Book					
1.	Abraha	m Silberschatz, Peter B. Ga	lvin, Greg Gag	ne, "Operating S	System	Concepts", 2018,
	10th Ec	lition, Wiley, United States				
Refe	rence B	ooks				
1.	Andrev	S. Tanenbaum, "Moderr	o Operating Sy	ystems", 2016,	4th E	Edition, Pearson,
	United	Kingdom.				
2.	Willian	n Stallings, "Operating S	ystems: Interna	als and Design	Princi	iples", 2018, 9th
	Edition	, Pearson, United Kingdom				
Mod	e of Eva	aluation: CAT, Written A	ssignment, Qu	iz, FAT		
Rec	comme	nded by Board of Studies	04-03-2022			
Ap	proved	by Academic Council	No. 65	Date	17-0	3-2022

Pr Cours 1. To th 2. To 3. To Cours 0n c 1. In sy 2. D	ne services. o describe the o develop the se Outcomes completion of the nterpret the every stem calls of pesign scheduli		ired to stem des	1.0 imple	
Cours 1. To th 2. To 3. To Cours On c 1. In sy 2. D	se Objectives o introduce the ne services. o describe the o develop the se Outcomes completion of the netrpret the every stem calls of Design scheduli	e operating system concepts, designs and provide skills requ trade-offs between conflicting objectives in large scale sys knowledge for application of the various design issues and this course, student should be able to: rolution of OS functionality, structures, layers and apply	ired to stem des	1.0 imple	
1. To th 2. To 3. To Cours On c 1. In sy 2. D	o introduce the ne services. o describe the o develop the se Outcomes completion of the nterpret the every stem calls of pesign scheduli	trade-offs between conflicting objectives in large scale sys knowledge for application of the various design issues and this course, student should be able to: rolution of OS functionality, structures, layers and apply	ired to stem des	imple	eme
1. To th 2. To 3. To Cours On c 1. In sy 2. D	o introduce the ne services. o describe the o develop the se Outcomes completion of the nterpret the every stem calls of pesign scheduli	trade-offs between conflicting objectives in large scale sys knowledge for application of the various design issues and this course, student should be able to: rolution of OS functionality, structures, layers and apply	stem des service	sign.	eme
th 2. To 3. To Course On c 1. In sy 2. D	ne services. o describe the o develop the se Outcomes completion of the nterpret the every stem calls of pesign scheduli	trade-offs between conflicting objectives in large scale sys knowledge for application of the various design issues and this course, student should be able to: rolution of OS functionality, structures, layers and apply	stem des service	sign.	eme
2. To 3. To Cours On c 1. In sy 2. D	o describe the o develop the se Outcomes completion of the nterpret the every stem calls of besign scheduli	knowledge for application of the various design issues and his course, student should be able to: rolution of OS functionality, structures, layers and apply	service	-	
3. To Cours On c 1. In sy 2. D	o develop the se Outcomes completion of the nterpret the every stem calls of besign scheduli	knowledge for application of the various design issues and his course, student should be able to: rolution of OS functionality, structures, layers and apply	service	-	
Cours On c 1. In sy 2. D	se Outcomes completion of the interpret the every stem calls of besign scheduli	this course, student should be able to: rolution of OS functionality, structures, layers and apply		s.	
On c 1. In sy 2. D	completion of the evolution of the evolu	olution of OS functionality, structures, layers and apply	variou		
1. In sy 2. D	stem calls of the events of the events of the second secon	olution of OS functionality, structures, layers and apply	variou		
sy 2. D	ystem calls of besign scheduli			s typ	bes
2. D	esign scheduli	*		- J I	
2 1	nnly and analy	ng algorithms to compute and compare various scheduling	g criteria	ı.	
3. A	and anal	yze communication between inter process and synchroniza	tion tec	hniqu	les
		replacement algorithms, memory management problems a	-		
		e file systems for applying different allocation, access techn	ique, re	prese	enti
vi	irtualization ar	nd providing protection and security to OS.			
	ative Experim				
		e Linux Commands ur own bootloader program that helps a computer to boot a	n OS		
	1 1	ming (I/O, Decision making, Looping, Multi-level branchi			
	-	process using fork () system call, Orphan and Zombie pro	-	ation	
	-	CPU scheduling algorithms (FCFS, SJF, Priority and Rour			I
		ocess synchronization using semaphores / monitors.	10001	,	
		Banker s algorithm to check whether the given system is in	n safe st	ate o	or n
		hether addition resource requested can be granted immedia			
		d management using Pthreads library. Implement a data	•	lism	usi
	multi-threadin		-		
9.	Dynamic men	nory allocation algorithms - First-fit, Best-fit, Worst-fit alg	orithms		
10.	Page Replace	nent Algorithms FIFO, LRU and Optimal			
11.	Implement a f	ile locking mechanism.			
12.	Virtualization	Setup: Type-1, Type-2 Hypervisor (Detailed Study Report	t)		
		Total Laboratory Hours:	30	hour	S
Text]					
	ox, Richard, " Iall/CRC, UK	Linux with Operating System Concepts", 2022, 2nd Editio	on, Chap	oman	an
Refer	ence Books				
		Linux System Programming: talking directly to the kernel on, O'Reilly Media, Inc, United States.	and C l	ibrar	y",
		rschatz, Peter B. Galvin, Greg Gagne, "Operating System (Viley, United States.	Concept	ts", 2	01

Mode of Assessment: Continuous Asse	ssments, FA	Т	
Recommended by Board of Studies	04-03-20)22	
Approved by Academic Council	No. 65	Date	17-03-2022

Course Code	e	Course T	itle	L	Т	Р	C
BCSE304L		Theory of Cor	nputation	3	0	0	3
Pre-requisit	te Nil			Sy	llabus	s vers	ion
•						1.0	
Course Objec	tives						
2. Limitation	of compu	nd models of automata. tation: What can be and ions among grammars, a			s.		
Course Outco	mes						
		ourse, student should be	able to:				
-		e different computational					
-	-	mal mathematical metho		f lang	uages	s, gran	nma
and automa	-		1 · · · · · · · · · · · · · · · · · · ·	2		, ,	
		f some computational m	odels and possible meth	ods of	f prov	ing th	em
-		t concepts mathematical		2	r.,	B til	
	uosuu		-,				
Module:1 I	ntroducti	on to Languages and G	rammars		4 ho	urs	
Recall on Proo	of techniqu	es in Mathematics - Over	rview of a Computationa	al Mo	dels -	Langu	iage
	_	ets - Strings - Operations	=			-	-
Module:2 F	Finite Stat	e Automata			8 ho	urs	
		- Deterministic Finite	Automata (DFA) - No	n-dete			Finit
		with epsilon transitions					
		ence of NFA and DFA -	_		,		
		xpressions and Langua			7 ho	urs	
		A and Regular Express		nress			ուլն
		ern matching and regula					
-		lar languages - Closure	1 0	•		anu	17
		ree Grammars	properties of regular fair	guage	7 ho		
		CFG) – Derivations - Par	Trace Ambiguity in	CEC			the
	,		υ.			U	
-		- Elimination of Useless			-		
		: CNF and GNF - Pum	ping Lemma for CFL -	Close	lle FI	operu	esc
CFL							
Module:5 F	Pushdown	Automata			5 ho	urs	
		wn automata - Language			- Pow	er of	Non
Deterministic	Pushdown	Automata and Determin	istic pushdown automat	a			
Module:6	Furing Ma	chine			6 ho	urs	
Turing Machin	nes as acco	eptor and transducer - N	fulti head and Multi ta	е Тш	ring N	A achii	nes
raing macilli					ing n	1001111	100
Universal Turi	ing Machu) - Turing-Church thesis				
	-	and Recursively Enum	1 - Turing-Church thesis		6 ho		

	1 7	т	.1	. D. 1.1
Recursive and Recursively Enumerat	•••	-	-	
Enumerable (RE) – computable function	ons – Chomsky	y Hierar	chy – Undecid	lable problems -
Post's Correspondence Problem				
Module:8 Contemporary Issues				2 hours
		Total I	ecture hours:	45 hours
Text Book				
1. J.E. Hopcroft, R. Motwani and J.D.	Ullman, "Intro	duction t	o Automata Th	eory, Languages
and Computation", Third Edition, Pe				
1		,		,
Reference Books				
1. Peter Linz, "An Introduction to For	mal Language	s and Au	tomata", Sixth	Edition, Jones &
Bartlett, 2016. ISBN: 978-93843232	219			
2. K. Krithivasan and R. Rama, "I	ntroduction t	o Form	al Languages.	Automata and
Computation", Pearson Education, 2			6 6 7	,
		10 01511	23302	
Mode of Evaluation: CAT, Assignme	ent, Quiz, FA	Г.		
Recommended by Board of Studies	04-03-2022			
Approved by Academic Council	No. 65	Date	17-03-2022	
L				

	Course Title	L	Т	Р	(
BCSE305L	Embedded Systems	3	0	0	
Pre-requisite	NIL	Syll	abus	versio	n
			1	l .0	
Course Objectiv	es				
systems in te 2. To introduce actuators, da developing a components 3. To make stud and debuggin scheduling is Course Outcom 0n completion 1. Identify the c	tudents to various challenges and constraints of spea rms of resources and functional requirements. students to various components of typical embedded s ita converters, UART etc., their interfacing, program my smart systems and various serial communication interfacing and communication. lents understand the importance of program modeling, ng tools for product development and explore various sues in terms of resources and deadline.	ystems nming n proto optimi s soluti	s viz., envir pcols zation ons fo	sensor onmer for op techn or real	rs a nt otii
 smart solutio 3. To examine create progra environment 4. To evaluate t well as to an other state of the stat	s the functionality of any special purpose computing ns to engineering challenges at the prototype level. the working principle and interface of typical embedd amme models, apply various optimization approache and demonstration using debugging tools. he working principle of serial communication protocols halyze the benefits and drawbacks of real-time schedu acceptable solutions for specific challenges.	syster led sys es incl	n, and stem c uding neir pr	l to pro ompoi simu oper u	opo ner lati
 To summaries smart solutio To examine create progra environment To evaluate t well as to an 	ns to engineering challenges at the prototype level. the working principle and interface of typical embedd amme models, apply various optimization approache and demonstration using debugging tools. he working principle of serial communication protocols halyze the benefits and drawbacks of real-time schedu acceptable solutions for specific challenges.	syster led sys es incl	n, and stem c uding neir pr	l to pro ompor simu oper u hms a	opo ner lati
 To summaries smart solution To examine create prograte environment To evaluate the well as to an recommend at the second sec	ns to engineering challenges at the prototype level. the working principle and interface of typical embedd amme models, apply various optimization approache and demonstration using debugging tools. he working principle of serial communication protocols halyze the benefits and drawbacks of real-time schedu acceptable solutions for specific challenges.	syster led sys es incl s and th uling a	n, and atem c uding heir pr algorit 5 ho	l to pro ompor simu oper u hms a urs	op ner lat use
 To summaries smart solutio To examine create prograenvironment To evaluate t well as to an recommend a Module:1 Int Overview of E Hardware Design Module:2 I/O 	ns to engineering challenges at the prototype level. the working principle and interface of typical embedded amme models, apply various optimization approached and demonstration using debugging tools. The working principle of serial communication protocols analyze the benefits and drawbacks of real-time scheded acceptable solutions for specific challenges. Troduction mbedded Systems, Design challenges, Embedded and Micro-controller architecture -8051, PIC, and ARM. Interfacing Techniques	syster led sys es incl s and th uling a proces	n, and tem c uding heir pr algorit 5 ho sor to 8 ho	l to pro ompor simu oper u hms a urs echnol urs	op ner lat use und
 To summaries smart solutio To examine create progra environment To evaluate t well as to an recommend a Module:1 Int Overview of E Hardware Design Module:2 I/O Memory interface 	ns to engineering challenges at the prototype level. the working principle and interface of typical embedd amme models, apply various optimization approache and demonstration using debugging tools. he working principle of serial communication protocols halyze the benefits and drawbacks of real-time schede acceptable solutions for specific challenges. roduction mbedded Systems, Design challenges, Embedded h, Micro-controller architecture -8051, PIC, and ARM.	syster led sys es incl s and th uling a proces	n, and tem c uding heir pr algorit 5 ho sor to 8 ho	l to pro ompor simu oper u hms a urs echnol urs	op nei lat ise ind
 To summaries smart solutio To examine create prograenvironment To evaluate t well as to an recommend a Module:1 Int Overview of E Hardware Design Module:2 I/O Memory interface UART, Sensors a Module:3 Are ATM, Handheld 	ns to engineering challenges at the prototype level. the working principle and interface of typical embedd amme models, apply various optimization approaches and demonstration using debugging tools. he working principle of serial communication protocols alyze the benefits and drawbacks of real-time schede acceptable solutions for specific challenges. roduction mbedded Systems, Design challenges, Embedded h, Micro-controller architecture -8051, PIC, and ARM. Interfacing Techniques Eing, A/D, D/A, Timers, Watch-dog timer, Counters,	syster led sys es incl s and th uling a proces , Enco	n, and etem c uding neir pr algorit 5 ho sor to 8 ho der & 6 ho	l to pro ompor simu oper u hms a urs echnol urs c Deco urs	op nei lat ise ind log
 To summaries smart solutio To examine create prograte environment To evaluate the well as to an recommend at the second seco	ns to engineering challenges at the prototype level. the working principle and interface of typical embedd amme models, apply various optimization approaches and demonstration using debugging tools. he working principle of serial communication protocols halyze the benefits and drawbacks of real-time schede acceptable solutions for specific challenges. roduction mbedded Systems, Design challenges, Embedded h, Micro-controller architecture -8051, PIC, and ARM. Interfacing Techniques eting, A/D, D/A, Timers, Watch-dog timer, Counters, and actuators interfacing. chitecture of Special Purpose Computing System I devices, Data Compressor, Image Capturing Dev hallenges & Constraints of special purpose computing se gramming Tools	syster led syster incl s and th uling a proces , Enco	n, and tem c uding neir pr algorit 5 ho sor to 8 ho der & 6 ho Archito 7 ho	l to pro ompor simu oper u hms a urs echnol urs c Deco urs ecture urs	op nei lat use und log ode
 To summaries smart solutio To examine create prograte environment To evaluate the well as to an recommend at the recommendation at the recommendatin at the reco	ns to engineering challenges at the prototype level. the working principle and interface of typical embedd amme models, apply various optimization approaches and demonstration using debugging tools. he working principle of serial communication protocols halyze the benefits and drawbacks of real-time schedu acceptable solutions for specific challenges. roduction mbedded Systems, Design challenges, Embedded h, Micro-controller architecture -8051, PIC, and ARM. Interfacing Techniques cing, A/D, D/A, Timers, Watch-dog timer, Counters, and actuators interfacing. chitecture of Special Purpose Computing System I devices, Data Compressor, Image Capturing Dev hallenges & Constraints of special purpose computing second	syster led syster incl s and th uling a proces , Enco	n, and tem c uding neir pr algorit 5 ho sor to 8 ho der & 6 ho Archito 7 ho	l to pro ompor simu oper u hms a urs echnol urs c Deco urs ecture urs	op ner lat use und log odd

Classification of Real time system, Issu		0		duling schemes-
EDF-RMS & Hybrid techniques, eCOS	, POSIX, Pr	otothread	18.	
Module:6 Embedded Networking				5 hours
Inter Integrated Circuits (I2C), Contr RS232, Bluetooth, Zigbee, Wifi.	roller Area	Network	, Embedded Ethe	ernet Controller,
	- 1 9			4 1
Module:7 Applications of Embedd	•			4 hours
Introduction to embedded system appli			-	•
Automotive electronics, Consumer Elec	etronics, Ind	ustrial co	ntrols, Medical El	ectronics.
Module:8 Contemporary Issues				2 hours
		Tot	al Lecture hours:	45 hours
Text Book		100		
1. Marilyn Wolf, Computers as Comp	onents – Pri	nciples of	of Embedded Com	puting System
Design, Fourth Edition, Morgan Ka	ufman Publi	shers, 20	16.	
Reference Books				
1. Embedded Systems Architecture, Pr	rogramming	and Desi	gn, by Raj Kamal,	McGraw Hill
Education, 3e, 2015.	1 1 1 /		r , 1 ,• 1 17	1.105 1 1
2. Embedded System Design a Unified		Sofware I	Introduction, by Va	ahid G Frank and
Givargis Tony, John Wiley & Sons,	2009.			
Mode of Evaluation: CAT, written	assignment,	Quiz, F	AT.	
Recommended by Board of Studies	04-03-202	22		
Approved by Academic Council	No. 65	Date	17-03-2022	
	1	1		

Course Co	ode	Course Title		L	Т	P	C
BCSE306L	4	Artificial Intelligence		3	0	0	3
Pre-requisi	ite	NIL		Syll	abus	vers	ior
					1	.0	
Course Obje	ctives						
 To assess problem s To develo To develo Course Outco On completi Evaluate A Apply bas knowledge Demonstra world prob 	the ap solving op intel omes on of t Artificia sic prin e repres ate kno blems	tial intelligence principles, techniques, and its his plicability, strengths, and weaknesses of the basic , and learning methods in solving engineering pr ligent systems by assembling solutions to concre his course, student should be able to: al Intelligence (AI) methods and describe their fo ciples of AI in solutions that require problem-so sentation and learning. wledge of reasoning, uncertainty, and knowledge re- trate how search algorithms play a vital role in prob	c knowl roblems ete comp oundation olving, in epresenta	putati ns. nferen ation f	onal j	ercep	tio
Module:1	Introd	uction			6 ho	ours	
		I-Subfields of AI-Intelligent Agents- Structur	re of I	ntelli	gent	Age	nts
Introduction t Methods-Uni	s Proble to Prob form C	em Solving based on Searching lem Solving by searching Methods-State Space s lost Search, Breadth First Search- Depth First Sea	search, U	Uninf pth- li	6 ho	ours d Sea d sea	irc
Module:2 Introduction t Methods-Uni Iterative deep	s Proble to Prob form C pening	em Solving based on Searching lem Solving by searching Methods-State Space s lost Search, Breadth First Search- Depth First Sea depth-first, Informed Search Methods- Best First	search, U	Uninf pth- li	6 ho ormeo imiteo Searc	ours d Sea d sea h.	irc
Module:2 Introduction t Methods-Unit Iterative deep Module 3 Local Search Adversarial S	s Proble to Prob form C pening Local algor Search:	em Solving based on Searching lem Solving by searching Methods-State Space s lost Search, Breadth First Search- Depth First Sea	search, U arch-De t Search aling, C	Uninf pth- li , A* S	6 ho ormeo imiteo Searc 5 ho ic Al	d Sea d Sea d sea h. ours gorit	rcl
Module:2 Introduction t Methods-Unit Iterative deep Module 3 Local Search Adversarial S tac-toe, Minin Module:4 Introduction t	s Problet form C pening Local a algor Search: max with Logic to Logi	em Solving based on Searching lem Solving by searching Methods-State Space s lost Search, Breadth First Search- Depth First Sea depth-first, Informed Search Methods- Best First Search and Adversarial Search ithms – Hill-climbing search, Simulated anne Game Trees and Minimax Evaluation, Elementa	search, U arch-De t Search aling, C ary two-	Uninf pth- li , A* S Geneti playe c-Infe	6 ho ormeo imiteo Searc 5 ho ic Al ors gan	d Sea d sea h. ours gorith mes:	nrc nrc hn tio
Module:2 Introduction t Methods-Unit Iterative deep Module 3 Local Search Adversarial S tac-toe, Minin Module:4 Introduction t Order Logic-	s Proble form C pening Local algor Search: max wi Logic to Logi Unific	em Solving based on Searching lem Solving by searching Methods-State Space s lost Search, Breadth First Search- Depth First Sea depth-first, Informed Search Methods- Best First Search and Adversarial Search ithms – Hill-climbing search, Simulated anne Game Trees and Minimax Evaluation, Elementa th Alpha-Beta Pruning. and Reasoning c and Reasoning -Propositional Logic-First Ord	search, U arch-De t Search aling, C ary two-	Uninf pth- li , A* S Geneti playe c-Infe	6 ho ormeo imiteo Searc 5 ho ic Al ors gan 8 ho erence	d Sea d sea h. ours gorith mes:	nrc nrc hn tio
Module:2 Introduction t Methods-Unit Iterative deep Module 3 Local Search Adversarial S tac-toe, Minit Module:4 Introduction t Order Logic- Module:5	s Problet form C pening of Local algor Gearch: max with Logic to Logic Unific Uncert	em Solving based on Searching lem Solving by searching Methods-State Space s lost Search, Breadth First Search- Depth First Sea depth-first, Informed Search Methods- Best First Search and Adversarial Search ithms – Hill-climbing search, Simulated anne Game Trees and Minimax Evaluation, Elementa th Alpha-Beta Pruning. and Reasoning c and Reasoning -Propositional Logic-First Ord ation, Forward Chaining, Backward Chaining, R	search, I arch-Dej t Search aling, C ary two- ler Logie Resolutio	Uninf pth- li , A* S Geneti playe c-Infe	6 ho ormeo imited Searc 5 ho ic Al ors gan 8 ho erence 5 ho	d Sea d sea h. ours gorith mes: ours e in F	nrc rcl hn tio
Module:2 Introduction t Methods-Unit Iterative deep Module 3 Local Search Adversarial S tac-toe, Minit Module:4 Introduction t Order Logic- Module:5 Quantifying	s Proble to Prob form C bening of Local a algor Gearch: max with Logic to Logic Unific Uncert works	em Solving based on Searching lem Solving by searching Methods-State Space s cost Search, Breadth First Search- Depth First Sea depth-first, Informed Search Methods- Best First Search and Adversarial Search ithms – Hill-climbing search, Simulated anne Game Trees and Minimax Evaluation, Elementa th Alpha-Beta Pruning. and Reasoning c and Reasoning -Propositional Logic-First Ord ation, Forward Chaining, Backward Chaining, R tain Knowledge and Reasoning ainty - Bayes Rule -Bayesian Belief Network-	search, I arch-Dej t Search aling, C ary two- ler Logie Resolutio	Uninf pth- li , A* S Geneti playe c-Infe	6 ho ormed imited Search 5 ho ors gan 8 ho orence 5 ho e Infe	d Sea d sea h. ours gorith mes: ours e in F	nrc rcl hn tio
Module:2 Introduction to Methods-Unit Iterative deep Module 3 Local Search Adversarial S tac-toe, Minit Module:4 Introduction to Order Logic- Module:5 Quantifying V Bayesian netw Module:6 Classical plar	s Proble to Prob form C Dening Local algor Carch: max with Carch: Max with Cogic Unific Uncert works Planning, I archical	em Solving based on Searching lem Solving by searching Methods-State Space s ost Search, Breadth First Search- Depth First Sea depth-first, Informed Search Methods- Best First Search and Adversarial Search ithms – Hill-climbing search, Simulated anne Game Trees and Minimax Evaluation, Elementa th Alpha-Beta Pruning. and Reasoning c and Reasoning -Propositional Logic-First Ord ation, Forward Chaining, Backward Chaining, R tain Knowledge and Reasoning ainty - Bayes Rule -Bayesian Belief Network- ing Planning as State-space search, Forward search, Planning, Planning and acting in Nondetermini	search, I arch-Dej t Search aling, C ary two- ler Logio Resolutio Approx backwa	Uninf pth- li , A* S Geneti playe c-Infe on. imate	6 ho ormed imited Search ic Al ors gan 8 ho prence 5 ho e Infe 7 ho arch, j	d Sea d Sea d sea h. ours gorith mes: ours e in F ours rence ours	irc rcl hn tio

Comr	nunicat	tion-Fundamentals of Langu	1996 -Prohah	ilistic Langua	ore Processing	-Information
		formation Extraction-Percep	-	-	• •	
Mod	lule:8	Contemporary Issues				2 hours
				Total L	ecture hours:	45 hours
Text]	Book					
	Russell, Prentice	S. and Norvig, P. 2015. Art Hall.	ificial Intelli	gence - A Mo	dern Approach	, 3rd Edition,
Refer	ence B	ooks				
1. K.	R Cho	wdhary, Fundamentals of A	rtificial Intel	ligence, Sprir	nger, 2020.	
2 Al	lpaydin	, E. 2010. Introduction to M	achine Learr	ing. 2nd Edit	ion, MIT Press	
Mo	de of E	valuation: CAT, Assignme	ent, Quiz, FA	T		
Rec	omme	nded by Board of Studies	04-03-2022	}		
App	proved	by Academic Council	No. 65	Date	17-03-202	2
-						

Course Cod	le		Course '	Fitle		L	Τ	Р	С
BCSE307	L		Compiler	Design		3	0	0	3
Pre-requisite	e N	IL				Syl	labus	s vers	ion
								1.0	
Course Object	tives								
1. To provide	fundan	nental knowled	lge of variou	s language tr	anslators.				
		familiar with l	-	-					
		various action			-				
		nts get familia			-				
		principles of c	-	_		genera	ation.		
6. To provide	e founda	tion for study	of high-perfo	ormance com	piler design.				
Course Outco	mes								
		devising, sele	cting. and us	ing tools and	techniques to	oward	s com	piler	desi
		specifications	-	-	_			-1	
_		he techniques,	-	-		purpo	ose o	f dev	elopi
software sy		1	,	0 1		I I			- T
•		ol tables and g	generating int	ermediate co	ode.				
		compiler optin	-						
	C	1 1		U					
Module:1 In	ntroduo	ction To Com	pilation And	Lexical An	alysis	7 ho	ours		
Module:1 In Introduction to		ction To Com 1 - Structure a	-		÷			- Lex	keme
) LLVN	1 - Structure a	and Phases o	f a Compile	r-Design Issu	les-Pa	tterns		
Introduction to	D LLVN utes-Spe	1 - Structure a cification of T	nd Phases o Tokens-Exter	f a Compile ded Regular	r-Design Issu · Expression-	es-Pa Regu	tterns lar ex	xpress	
Introduction to Tokens-Attribu Deterministic I) LLVN utes-Spe Finite A	1 - Structure a ecification of T utomata (Dire	nd Phases o Tokens-Exter	f a Compile ded Regular	r-Design Issu · Expression-	es-Pa Regu	tterns lar ez ator.	xpress	
Introduction to Tokens-Attribu) LLVN utes-Spe Finite A yntax A	1 - Structure a ecification of T utomata (Direc Analysis	nd Phases o Fokens-Exter ct method) - 2	f a Compile ided Regular Lex - A Lexi	r-Design Issu · Expression- cal Analyzer	es-Par Regu Gener 8 ho	tterns lar ez ator.	kpress	sion
Introduction to Tokens-Attribu Deterministic I Module:2 S	D LLVM utes-Spe Finite A yntax A - Parse	1 - Structure a ecification of T utomata (Direc Analysis Tree - Elimina	ind Phases o Tokens-Exter ct method) - 2 ition of Amb	f a Compile aded Regular Lex - A Lexi iguity – Top	r-Design Issu • Expression- cal Analyzer -Down Parsir	es-Par Regu Gener 8 ho ng - Re	tterns lar ez ator. ours ecurs	kpress ive D	sion Desce
Introduction to Tokens-Attribu Deterministic I Module:2 S Role of Parser- Parsing - LL (D LLVN utes-Spe Finite A yntax A - Parse 1) Gran	A - Structure a ecification of T utomata (Direc Analysis Tree - Elimina nmars – Shift	ind Phases o Tokens-Exter ct method) - T tion of Amb Reduce Pars	f a Compile aded Regular Lex - A Lexi iguity – Top ers- Operato	r-Design Issu Expression- cal Analyzer -Down Parsir r Precedence	es-Par Regu Gener 8 ho ng - Ro Parsi	tterns lar ez ator. ours ecurs	kpress ive D	sion Desce
Introduction to Tokens-Attribu Deterministic I Module:2 S Role of Parser- Parsing - LL (Construction o	 LLVN utes-Spe Finite A yntax A Parse Gran f SLR F 	A - Structure a ecification of T utomata (Direc Analysis Tree - Elimina nmars – Shift	ind Phases o Tokens-Exter ct method) - T tion of Amb Reduce Pars	f a Compile aded Regular Lex - A Lexi iguity – Top ers- Operato	r-Design Issu Expression- cal Analyzer -Down Parsir r Precedence	es-Par Regu Gener 8 ho ng - Ro Parsi	tterns lar ex cator. ours ecurs ng -	kpress ive D	sion Desce
Introduction to Tokens-Attribu Deterministic I Module:2 S Role of Parser- Parsing - LL (Construction o	 LLVN utes-Spectrum Finite A yntax A Parse 1 Gran f SLR F Gemanti 	 A - Structure a cification of Tutomata (Director) Analysis Tree - Elimina Anars – Shift Parser Tables a Analysis 	ind Phases o Tokens-Exter ct method) - 1 ntion of Amb Reduce Pars nd Parsing- (f a Compile aded Regular Lex - A Lexi iguity – Top ers- Operato CLR Parsing	r-Design Issu Expression- cal Analyzer -Down Parsir r Precedence - LALR Parsi	es-Par Regu Gener 8 ho ng - Ro Parsi ng. 5 ho	tterns lar ez rator. ours ecurs ng -	ive D LR P	esce Pesce
Introduction to Tokens-Attribu Deterministic I Module:2 S Role of Parser- Parsing - LL (Construction o Module:3 S Syntax Directe	 LLVN utes-Spe Finite A yntax A Parse 1 Grand f SLR F emanting 	 A - Structure a ecification of Tutomata (Direction and the section of Tables) Analysis Tree - Elimination - Shift Parser Tables a cs Analysis hition - Evalue 	ind Phases o Fokens-Exter ct method) - 1 ition of Amb Reduce Pars nd Parsing- (ation Order -	f a Compile aded Regular Lex - A Lexi iguity – Top ers- Operato CLR Parsing - Application	r-Design Issu • Expression- cal Analyzer -Down Parsir r Precedence - LALR Parsi ns of Syntax	es-Par Regu Gener 8 ho ng - Ro Parsi ng. 5 ho Direc	tterns lar ez rator. ours ecurs ng - ours ted T	ive D LR P	esce esce
Introduction to Tokens-Attribu Deterministic I Module:2 S Role of Parser- Parsing - LL (Construction o Module:3 S Syntax Directe Syntax Directe	 LLVN utes-Spe Finite A yntax A Parse 1) Gran f SLR F emanti ed Defined Trans 	 A - Structure a ecification of Tutomata (Direction and the section of Tables) Analysis Tree - Elimination - Shift Parser Tables a cs Analysis hition - Evalue 	ind Phases o Fokens-Exter ct method) - 1 ition of Amb Reduce Pars nd Parsing- (ation Order s - Implemen	f a Compile aded Regular Lex - A Lexi iguity – Top ers- Operato CLR Parsing - Application	r-Design Issu • Expression- cal Analyzer -Down Parsir r Precedence - LALR Parsi ns of Syntax	es-Par Regu Gener 8 ho ng - Ro Parsi ng. 5 ho Direc	tterns lar ez cator. ours ecurs ng - ours ted T rected	ive D LR P	esce esce arse
Introduction to Tokens-Attribu Deterministic I Module:2 S Role of Parser- Parsing - LL (Construction o Module:3 S Syntax Directe Syntax Directe	 LLVN utes-Spectrum Finite A yntax A Parse 1 Gran f SLR F emanting d Trans nterme 	 A - Structure a contract of Technication of Technication of Technication and the contract of Technication and the contracti	and Phases o Fokens-Exter ct method) - T ation of Amb Reduce Pars nd Parsing- (ation Order s - Implemen eneration	f a Compile aded Regular Lex - A Lexi iguity – Top ers- Operato CLR Parsing - Application tation of L-at	r-Design Issu Expression- cal Analyzer -Down Parsir r Precedence - LALR Parsi ns of Syntax tributed Synt	es-Par Regu Gener 8 ho ng - Ro Parsi ng. 5 ho Direct ax Dir 5 ho	tterns lar ez rator. Purs ng - Purs ted T rected	ive D LR P	sion Desce Parser ation nitio
Introduction to Tokens-Attribu Deterministic I Module:2 S Role of Parser- Parsing - LL (Construction o Module:3 S Syntax Directe Syntax Directe Module:4 In	 LLVN utes-Spe Finite A Finite A Parse Parse Gran f SLR F Gemantie d Defined d Trans ntermeen ntax treen 	 A - Structure a ecification of Tutomata (Direction Analysis) Tree - Elimination of Tree - Elimination Shift Parser Tables a cs Analysis hition – Evalualition Schemes diate Code Getes - Three Addition 	and Phases o Fokens-Exter ct method) - 1 ntion of Amb Reduce Pars nd Parsing- (ation Order s - Implemen eneration dress Code- 1	f a Compile aded Regular Lex - A Lexi iguity – Top ers- Operato CLR Parsing - Application tation of L-at	r-Design Issu · Expression- cal Analyzer -Down Parsir r Precedence - LALR Parsi ns of Syntax tributed Synt larations - Pre-	es-Par Regu Gener 8 ho ng - Ro Parsi ng. 5 ho Direct ax Dir 5 ho ocedur	tterns lar ez rator. ours ecurs ng - ours ted T rected ours res -	ive D LR P Transla I Defi	esce arsen ation nitio
Introduction to Tokens-Attribu Deterministic I Module:2 S Role of Parser- Parsing - LL (Construction o Module:3 S Syntax Directe Syntax Directe Module:4 In Variants of Syn	 LLVN utes-Spectrum Finite A Finite A Finite A Parse 1) Gran f SLR F Gemanti d Defined d Trans ntermee ntax tre ranslation 	 A - Structure a ecification of Tutomata (Direction and the ecification of Tutomata (Direction and the ecification and	and Phases o Fokens-Exter ct method) - 1 ntion of Amb Reduce Pars nd Parsing- (ation Order s - Implemen eneration dress Code- 1	f a Compile aded Regular Lex - A Lexi iguity – Top ers- Operato CLR Parsing - Application tation of L-at	r-Design Issu · Expression- cal Analyzer -Down Parsir r Precedence - LALR Parsi ns of Syntax tributed Synt larations - Pre-	es-Par Regu Gener 8 ho ng - Ro Parsi ng. 5 ho Direct ax Dir 5 ho ocedur	tterns lar ez rator. ours ecurs ng - ours ted T rected res - Case	ive D LR P Transla I Defi	esce arser ation nitio
Introduction to Tokens-Attribu Deterministic I Module:2 S Role of Parser- Parsing - LL (Construction o Module:3 S Syntax Directe Syntax Directe Module:4 In Variants of Syntax	 LLVN utes-Spectrome Finite A Finite	 A - Structure a certification of Tutomata (Direction and the certification of Tables) Analysis Tree - Elimination Tree - Elimination Parser Tables a certification – Evalution Carser Tables a certification – Evalution Carser Tables a certification 	ind Phases o Fokens-Exter ct method) - 1 ition of Amb Reduce Pars nd Parsing- 0 ation Order - s - Implemen eneration dress Code- 1 ons - Control	f a Compile aded Regular Lex - A Lexi iguity – Top ers- Operato CLR Parsing - Application tation of L-at Flow - Back	r-Design Issu · Expression- cal Analyzer -Down Parsir r Precedence - LALR Parsi hs of Syntax tributed Syntax tributed Syntax ctributed Syntax	es-Par Regu Gener 8 ho ng - Ro Parsi ng. 5 ho Direct ax Dir 5 ho ocedur witch 6 ho	tterns lar ez rator. ours ecurs ng - ours ted T rected res - Case ours	ive D LR P ransla Defi Assig	ation ation nitio
Introduction to Tokens-Attribu Deterministic I Module:2 S Role of Parser- Parsing - LL (Construction o Module:3 S Syntax Directe Syntax Directe Syntax Directe Module:4 In Variants of Syn Statements - Th Module:5 C	 LLVN utes-Spectrum Finite A Finite A Finite A Parse 1) Gran f SLR F Gemanti Gemanti d Trans ntermee ntax tree ranslatio Code OI tions- P 	 A - Structure a cification of Tutomata (Direction and the construction of Tables a construction of Evaluation Schemes and the code Get of Expression of Expressio	and Phases o Fokens-Exter ct method) - 1 ntion of Amb Reduce Pars nd Parsing- (ation Order s - Implemen eneration dress Code- 1 ons - Control	f a Compile aded Regular Lex - A Lexi iguity – Top ers- Operato CLR Parsing - Application tation of L-at Flow - Back ation -Introd	r-Design Issu · Expression- cal Analyzer -Down Parsir r Precedence - LALR Parsi ns of Syntax tributed Synt larations - Precedence - Patching- Syntax	es-Par Regu Gener 8 ho ng - Ro Parsi ng. 5 ho Direct ax Dir 5 ho ocedur witch 6 ho a Flow	tterns lar ez rator. ours ecurs ng - ours ted T rectec ours Case ours Ana	ive D LR P ransla I Defi State	sion Desce Parser ation nitio
Introduction to Tokens-Attribu Deterministic I Module:2 S Role of Parser- Parsing - LL (Construction o Module:3 S Syntax Directe Syntax Directe Module:4 In Variants of Syn Statements - Tr Module:5 C Loop optimizat	 LLVN utes-Spectrum Finite A Finite A Finite A Parse Tarse Granting Granting	 A - Structure a certification of Tutomata (Direction and the certification of Tables) Analysis Tree - Elimination Tree - Elimination Parser Tables a certification Schemestication Analysis Analysis	and Phases o Fokens-Exter ct method) - 1 tion of Amb Reduce Pars nd Parsing- 0 ation Order - s - Implemen eneration dress Code- 1 ons - Control es of Optimiz as - Peephole	f a Compile aded Regular Lex - A Lexi iguity – Top ers- Operato CLR Parsing - Application tation of L-at Flow - Dec Flow - Back ation -Introd Optimization	r-Design Issu · Expression- cal Analyzer -Down Parsir r Precedence - LALR Parsi ns of Syntax tributed Syntax tributed Syntax ctributed Syntax tributed Syntax tributed Syntax tributed Syntax tributed Syntax	es-Par Regu Gener 8 ho ng - Ra Parsi ng. 5 ho Direct ax Dir 5 ho ocedur witch of 6 ho a Flow Repres	tterns lar ez rator. urs ecurs ng - urs ted T rectec urs res - Case urs Ana entat	ive D LR P ransla Defi Assig State	ation pesce arser ation nitio ment - Bas
Introduction to Tokens-Attribu Deterministic I Module:2 S Role of Parser- Parsing - LL (Construction o Module:3 S Syntax Directe Syntax Directe Syntax Directe Module:4 In Variants of Syn Statements - Th Module:5 C	 LLVN utes-Spectrum Finite A Finite A Finite A Parse 1) Gran f SLR F emanti ed Defined d Trans ntermed ntax tree ranslation code Op nization in Flow 	 A - Structure a contract of a contr	and Phases o Fokens-Exter ct method) - 1 ation of Amb Reduce Pars nd Parsing- (ation Order - s - Implemen eneration dress Code- 1 ons - Control es of Optimiz as - Peephole achine Indepe	f a Compile aded Regular Lex - A Lexi iguity – Top ers- Operato CLR Parsing - Application tation of L-at Flow - Back ation -Introd Optimization endent Optim	r-Design Issu - Expression- cal Analyzer -Down Parsir r Precedence - LALR Parsi ns of Syntax tributed Synt larations - Pro- c Patching- Syntax - The DAG H nization- Imp	es-Par Regu Gener 8 ho ng - Ro Parsi ng. 5 ho Direct ax Dir 5 ho Ocedur witch 6 ho a Flow Repres lemen	tterns lar ez rator. urs ecurs ng - urs ted T rectec urs res - Case urs Ana entat	ive D LR P ransla Defi Assig State	ation pesce arser ation nitio ment - Bas

Allocation a	e design of a code genera nd Assignment- Runtime O	e						
Module:7	Parallelism				7 hours			
Parallelizati	on-Automatic Parallelizatio	n- Optimiza	ations fo	r Cache Locali	ty and Vectorization-			
Domain Spe	cific Languages-Compilatio	n- Instructio	on Schedu	uling and Softw	are Pipelining- Impact			
of Language	e Design and Architecture Ev	volution on	Compile	rs- Static Single	e Assignment			
Module:8	Contemporary Issues				2 hours			
			Total I	Lecture hours:	45 hours			
	Aho, Monica S. Lam, Ra		•	· · ·	Compilers: Principles			
-	ues, & tools, 2007, Second E	contion, Pear	rson Edu	cation, Boston.				
 Reference Books 1. Watson, Des. A Practical Approach to Compiler Construction. Germany, Springer International Publishing, 2017. 								
	ing, 2017.							
Publish	iing, 2017. Evaluation: CAT, written a	ssignment,	Quiz, ai	nd FAT				
Publish Mode of I		<u> </u>	- /	nd FAT				

	Course Code		Course Tit	le		L	Т	P	С
	BCSE307P	C	ompiler Desig	n Lab		0	0	2	1
	Pre-requisite	NIL				Sy	llabu	s ver	sion
	•						-	1.0	
Coi	ırse Objectives								
1.	To provide fundam	iental knowledge	of various lan	guage trans	lators.				
	To make students f	-	-						
3.	To provide foundat	tion for study of h	nigh-performa	nce compile	er design.				
Cor	Irse Outcomes								
	Apply the skills or	n davising salast	ing and usin	a tools and	toohniqu	ns to	worde	. con	anil
	design.	i devising, select	ing, and using	g tools and	technique	28 10	warus		iipii
	Develop language	specifications usi	ng context fre	e grammars	(CFG).				
	Apply the ideas, th	*	0	U	,	irpos	e of c	level	opir
	software systems.	A	·		Ĩ	-			-
	Constructing symb	Ũ	U						
5.	Obtain insights on	compiler optimiz	ation and code	e generation	l.				
	icative Experimen								
1.	Implementation of	-							
2.	Implementation of	t handwritten pars	ser using LLV	M					
3.	Generating code w	vith the LLVM ba	ackend.						
4.	Defining a real pro	ogramming langu	age.						
5.	Write a recursive	descent parser fo	r the CFG la	nguage and	implemen	t it	using	LLV	/M.
6.	Write a LR parser	for the CFG lang	uage and imp	ement it in	the using	LLV	M.		
7.	Intro to Flex and H	Bison. Modify the	scanner and r	barser so that	at terminat	ing a	a state	ment	t wi
	"; b" instead of ";"	•	-			U			
8.	Using LLVM-styl	e RTTI for the AS	ST and Genera	ating IR from	m the AST	Γ.			
9.	Converting types 1	from an AST deso	cription to LL	VM types.					
10.	Emitting assemble	er text and object	code.						
	6			l Laborato	ory Hours		30	hou	rs
Tex	t Book(s)				•				
1		2: A beginner's	guide to lear	ming LLV	M compile	er to	ols a	nd co	ore
Def	libraries with C+	-+							
Kei 1.		Practical Approa	ch to Compile	r Constructi	on Germ	anv	Sprin	oer	
1.	International Pul		ch to Compile			ury,	Shui	gui	
Mo	de of assessment:								
Rec	commended by Bo	ard of Studies	04-03-2022						

Course Code	Course Title	L	Τ	P	С
BCSE308L	Computer Networks	3	0	0	
Pre-requisite	NIL	Syll	abus	versi	ion
				1.0	
Course Objectives	, ;				
	nderstanding among students about the fundamenta otocols, architectures, and applications.	l con	cepts	of c	ompu
	ts to acquire knowledge in design, implement and anal	lyze p	erforn	nance	e of (
	sed Architectures.				
•	e suitable application layer protocols for specifi	c app	olicati	ons	and
respective secu	rity mechanisms.				
Course Outcomes					
	his course, student should be able to:				
1	fferent building blocks of Communication network an	d its a	rchite	cture	
-	ent types of switching networks and analyze the performance of the per				
	alyze error and flow control mechanisms in data link				
-	tting and analyze the performance of network lay	-	h var	ious	rout
protocols.					
5. Compare vario	ous congestion control mechanisms and identify app	oropria	ate tra	anspo	ort la
-	al time applications with appropriate security mechani	-		1	
Module:1 Netw	orking Principles and Layered Architecture		6	hou	rs
	orking Principles and Layered Architecture ions and Networking: A Communications Model – I	Data (
Data Communicati	ions and Networking: A Communications Model – I		Comm	unica	ations
Data Communicati Evolution of netwo			Comm	unica	ations
Data Communicati Evolution of netwo Flow), Protocols ar	ions and Networking: A Communications Model – I rk, Requirements, Applications, Network Topology (I nd Standards, Network Models (OSI, TCP/IP)		Comm onfigu	unica ratio	ations n, Da
Data Communicati Evolution of netwo Flow), Protocols ar Module:2 Circu	ions and Networking: A Communications Model – I rk, Requirements, Applications, Network Topology (I nd Standards, Network Models (OSI, TCP/IP) nit and Packet Switching	Line co	Comm onfigu 7	unica ratio hou i	ations n, Da rs
Data Communicati Evolution of netwo Flow), Protocols ar Module:2 Circu Switched Commun	ions and Networking: A Communications Model – I rk, Requirements, Applications, Network Topology (I nd Standards, Network Models (OSI, TCP/IP) nit and Packet Switching nications Networks – Circuit Switching – Packet Swit	Line co	Comm onfigu 7 – Co	unica ratio hou n mpar	ations n, Da rs rison
Data CommunicatiEvolution of netwoFlow), Protocols arModule:2CircuSwitched CommunCircuitSwitching	ions and Networking: A Communications Model – I rk, Requirements, Applications, Network Topology (I nd Standards, Network Models (OSI, TCP/IP) nit and Packet Switching	Line co	Comm onfigu 7 – Co	unica ratio hou n mpar	ations n, Da rs rison
Data Communicati Evolution of netwo Flow), Protocols ar Module:2 Circu Switched Commun Circuit Switching Parameters(Transm	ions and Networking: A Communications Model – I rk, Requirements, Applications, Network Topology (I nd Standards, Network Models (OSI, TCP/IP) nit and Packet Switching nications Networks – Circuit Switching – Packet Swit and Packet Switching – Implementing Network nission Impairment, Data Rate and Performance)	Line co	Comm onfigu 7 – Co: vare,	unica tratio hou mpar Netw	ations n, Da rs ison vorkin
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Μ	lodule:7	Application layer				3 hours
Ap	plication	layer-Domain Name System	n-Case Study	: FTP-H	TTP-SMTP-SNMP	
Μ	lodule:8	Contemporary Issues				2 hours
				Т	otal Lecture hours:	45 hour
Te	xt Book					
1.	Behrouz Hill Edu	A. Forouzan, Data comm	unication an	d Netwo	orking, 5th Edition, 2	2017, McGraw
		ication.				
Re	ference B					
	ference B James 1		ss, Compute	r Netwo	rking: A Top-Down	Approach, 6t
1.	ference B James 1 Edition Willian	ooks F. Kurose and Keith W.Ro	· •			
1. 2.	ference B James I Edition Willian United	ooks F. Kurose and Keith W.Ro , 2017, Pearson Education. n Stallings, "Data and Con	nputer Com	municati	on", 10th Edition,	
1. 2.	ference B James J Edition Willian United Iode of F	ooks F. Kurose and Keith W.Ro , 2017, Pearson Education. In Stallings, "Data and Com Kingdom.	nputer Com	municati Quiz, ar	on", 10th Edition,	

Cou	rse Code	Course Title		L	Т	P	С	
BC	CSE308P	Computer Networks Lab		0	0	2	1	
Pre	e-requisite		Syllabus version					
					1	.0		
Course	e Objectives		-					
1. To	build an ur	derstanding among students about the fundamenta	al conc	cepts	of	comj	outer	
net	working, pro	tocols, architectures, and applications.						
2. To	help student	s to acquire knowledge in design, implement and ana	lyze p	erfor	man	ce of	OS]	
and	I TCP-IP bas	ed Architectures.						
3. To	identify the	suitable application layer protocols for specific applic	cations	s and	its r	espe	ctive	
sec	urity mechai	nisms						
Course	e Outcome							
On cor	npletion of t	nis course, student should be able to:						
1. Inte	erpret the dif	ferent building blocks of Communication network and	nd its a	archi	tectu	ıre.		
2. Co	ntrast differe	nt types of switching networks and analyze the perfo	ormano	ce of	netv	vork		
3. Ide	ntify and an	alyze error and flow control mechanisms in data link	1					
0. 100	,	aryze error and now control meenamisms in data mik	layer.	•				
	•	ting and analyze the performance of network lay	•		ariou	s roi	uting	
4. De	•	-	•		ariou	s roi	uting	
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Text book

W.Richard Stevens, Unix Network Programming, 2ndEdition, Pearson Education, 2015.									
Mode of assessment: Continuous asse	ssment, FAT								
Recommended by Board of Studies	04-03-2022								
Approved by Academic Council	No. 65	Date	17-03-2022						

Course Code	Course Title	L	Т	Р	
BCSE309L	Cryptography and Network Security	3	0	0	
Pre-requisite	NIL	Sy	llabu	s ver	si
-			1	l .0	
Course Objectives	l S				
2. To impart co authentication j	concepts of basic number theory and cryptographic techr oncept of Hash and Message Authentication, Digi protocols. basics of transport layer security, Web Security and vari	tal S	lignat		
Course Outcomes					
 To know the fu To understand of To apprehend the 	this course, students should be able to: ndamental mathematical concepts related to security. concept of various cryptographic techniques. he authentication and integrity process of data for various amentals of Transport layer security, web security, E-M				ıd
	amentals of Number Theory Jumber Theory: Modular arithmetic, Euclidian Algorithm		ours	Tost	
	s theorem, Chinese Reminder theorem, Discrete Logarith		lanty	1050	
Modulov2 Summ			01110		
	netric Encryption Algorithms	7 h	ours ciph	er: D	ΡĒ
Symmetric key cry		7 h		er: D	ΡĒ
Symmetric key cry AES,IDEA, Block	netric Encryption Algorithms yptographic techniques: Introduction to Stream cipher, I Cipher Operation, Random Bit Generation and RC4	7 h Block		er: D	Ē
Symmetric key cry AES,IDEA, Block Module:3 Asym Asymmetric key cryptography, Hor	netric Encryption Algorithms ptographic techniques: Introduction to Stream cipher, 1	7 h Block 8 h al, E tribut	ciph ours	c Cu	ır
Symmetric key cry AES,IDEA, Block Module:3 Asym Asymmetric key cryptography, Hor exchange protocols	netric Encryption Algorithms yptographic techniques: Introduction to Stream cipher, I Cipher Operation, Random Bit Generation and RC4 metric Encryption Algorithm and Key Exchange cryptographic techniques: principles, RSA, ElGam momorphic Encryption and Secret Sharing, Key dis s, Diffie-Hellman Key Exchange, Man-in-the-Meddle Att	7 h Block 8 h al, E tribut ack	ciph ours	c Cu	ır
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	Iail Security, Pretty Good I	•						
Consideration	ons, Secure Electronic Transa	action Proto	col Intruc	lers, Intrusion D	etection, Password			
Management, Firewalls: Firewall Design Principles, Trusted Systems.								
Module:8	Contemporary Issues				2 hours			
			Total	Lecture hours:	45 hours			
Text Book								
1. Cryptog	raphy and Network Security-	Principles a	nd Practic	e, 8th Edition, b	y Stallings William,			
publishe	ed by Pearson, 2020							
Reference B	Books							
1. Crypto	graphy and Network Securit	y, 3rd Editio	on, by Be	hrouz A Forouz	an and Depdeep			
Mukho	padhyay, published by McG	rawHill, 20	15					
Mode of H	Evaluation: CAT, written a	ssignment,	Quiz, ar	nd FAT				
Recomme	nded by Board of Studies	04-03-202	22					
Approved	by Academic Council	No. 65	Date	17-03-2022				

	Course Code		Course Title		L	Т	Р	С	
	BCSE309P	Cryptogra	ohy and Network Secu	rity Lab	0	0	2	1	
	Pre-requisite	NIL			Syllabus vers			sior	
	1.0								
Coι	Course Objectives								
1.	Understand vari	ous Private and Pu	iblic Key cryptographic	algorithms.					
	2. To learn about hash functions and digital signature algorithms								
3.	Acquire knowle	dge in various net	work security models						
Coi	urse Outcome								
Or	n completion of	his course, studen	ts should be able to:						
1.	Implement vario	ous cipher techniqu	ues without using stand		-	-			
			s and digital signature a	lgorithms for	diffe	rent ap	plica	tio	
3.	Develop various	s secured networki	ng-based application						
Ind	licative Experin	ients							
1. 1.	-		ho need to exchange da	ta confidenti	allyn	sing ev	vmm	etri	
1.			mplements DES encryp		•		•		
	key size and 64						5 ** 0		
2.	-		ho need to exchange da	ta confidenti	ally u	sing sy	ymm	etri	
		Consider a sender and receiver who need to exchange data confidentially using symmetric							
	encryption. Write program that implements AES encryption and decryption using a 64/128/256 bits key size and 64 bit block size.								
	64/128/256 bit		-	cryption and	decry	yption	usiı	ng	
3			oit block size.	cryption and	decry	yption	usir	ng	
	Develop an chi	s key size and 64 b pper scheme by u	oit block size.					ng	
4.	Develop an chi Develop a MD	s key size and 64 b pper scheme by u 5 hash algorithm t	bit block size. sing RSA	Authenticatio	n Cod	e (MA	LC)		
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SPECIALIZATION ELECTIVE

(2021-2022)

B.Tech. Computer Science and Engg with Spec. in Bioinformatics

Sl.No.	Course Code	Course Title	Page No.
1.	BBIT207L	Molecular Biology	166
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3.	BBIT208L	Biochemistry	169
4.	BBIT324L	Cell Biology and Genetics	171
5.	BBIT327L	Data Analytics in Bioinformatics	173
6.	BBIT401L	Molecular Modelling and Drug Design	175
7.	BBIT417L	Analytical Bioinformatics	177
8.	BBIT417P	Analytical Bioinformatics Lab	179
9.	BBIT418L	Biological Databases	180
10.	BBIT418P	Biological Databases Lab	182

BBIT207L		L	Т	Р	С			
	Molecular Biology	3	0	0	3			
Pre-requisite	BBIT202L, BBIT202P, BBIT204L, BBIT204P	Sy	llabu	s ver	sior			
1.0								
Course Objective								
10. Build a l	basic understanding of origin and development of molecul	lar b	iolog	у.				
	e fundamental concepts of molecular biology.							
12. Exempli	fy applications of molecular biology in other disciplines.							
Course Outcomes								
1. Formulate the	basic concepts of molecular biology.							
2. Describe the de	esign principles of molecular biology.							
3. Examine the fu	indamental molecular processes involved in central dogma	a.						
4. Identify the pro	oblems in nucleic acids and protein metabolism.							
	oncepts learnt in regulation of gene expression.							
6. Apply the tech	niques to relate biological macromolecules and their funct	ion.						
	ome Organization	• 1		ours	1			
	- Nucleotides, Nucleosides, Sugar, Bases, Bonds involved							
	rule; Genome organization in prokaryotes and eukaryo							
	rent types of histones and chromosome packing; Cent	tral	dogm	a of	life			
DNA and RNA as	genetic material; Differences between DNA and RNA.							
Module:2 DNA	Renlication							
	Replication		6 h	ours				
	ents to understand mechanism of DNA replication; Pro-	oteir			d i			
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Pro	moter, Repressor, Operator and Inducer;	Operon con	ncept - La	c and T	rp operor	n.
Μ	Iodule:7Recombination and Reverse	Transcrip	tion			5 hours
Rec	combination - Conjugation, Transform	nation, Tr	ansductio	on and	sexduc	tion; Reverse
trar	nscription - Classification and life cycl	e of retrov	rirus, Stru	icture a	nd funct	ion of reverse
trar	nscriptase, Mechanism of reverse transcrip	otion.				
Μ	lodule:8 Techniques in Molecular Bio	logy and A	Applicatio	ons		4 hours
Ele	ctrophoretic mobility-shift assay,	DNAse	footpr	inting	assay,	Chromatin
imr	munoprecipitation, CRISPR-Cas9, RNA	interference	e.			
			Total	Lectur	e hours:	45 hours
Tex	xt Book(s)					
1.	Molecular Biology, by David Freifeld	er, 2 nd Edit	tion, Rep	rint 202	20, Naros	sa Publishers
	New Delhi, India.					
2.	Lehninger Principles of Biochemistry,	by David	L Nelson	n and N	Michael	M Cox, 8 th
	Edition, 2021, W H Freeman publisher,	USA.				
Ref	ference Books					
1.	Molecular Cell Biology, by Harvey Loc	lish, Arnolo	l Berk, Cl	nris A K	Kaiser, M	lonty Krieger,
	Anthony Bretscher, Hidde Ploegh, Kels	•			, and An	gelika Amon,
	9 th Edition, 2020, WH Freeman Publish	er, New Yo	ork, USA.			
2.	Molecular Biology, by Michael M Co	x, Jennifer	Doudna	and M	ichael O	D'Donnell, 2 nd
	Edition, 2015, WH Freeman publisher,					
3.	Molecular Biology of the Cell, by Bruce	Alberts, A	lexander	Johnsor	n, Julian	Lewis, Martin
	Raff, Keith Roberts and Peter Walter, 7	th Edition, 2	2022, Gar	land Sc	ience, N	ew York.
N	Iode of Evaluation: CAT, Quiz, Assign	ment and	FAT			
		40.00.00				
R	ecommended by Board of Studies	18-02-202	22			

0	Course Code	Co	urse Title			L	Т	Р	С								
BI	BBIT207P Molecular Biology Lab		BIT207P Molecular Biolo		207P Molecular Biology Lab		7P Molecular Biology Lab		7P Molecular Biology Lab		7P Molecular Biology Lab			0	0	2	1
Pr	Pre-requisite BBIT202L, BBIT202P, BBIT204L, BBIT204P Syllabus						s vers	ion									
							1	.0									
	rse Objectives																
	Develop analy																
8.	Analyse bioma	cromolecules.															
Cou	Irse Outcomes																
4.	Demonstrate th	ne process of isolating bio	omacromolecu	ıles.													
		uality and quantity of bio															
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Indi	icative Experi	ments															
1.	Micropipette	usage and calibration															
2.	Preparation o	of buffers and reagents for	r molecular bi	ology													
2.	rieparation o	of burners and reagents to		ology													
3.	Spectrophoto	ometric analysis of DNA,	RNA and Pro	otein													
4.	Quality check	k and quantitation of DN	A by spectrop	hotomet	ry												
5.	Bacterial Ger	nomic DNA isolation															
6	Separation of	f DNA by agarose gel ele	ctrophoresis														
7	Plant Genom	ic DNA isolation															
8	Human Geno	omic DNA isolation															
9	Total cellular	RNA isolation by Trizol	l method.														
10	Isolation of p	rotein from different sou	rces														
11	Separation of	f proteins by SDS-PAGE															
			Т	otal Lab	oratory	hour	s:	30 h	ou								
		Aolecular Biology Techn	-			•											
		Miller, Melissa Srougi,	Scott Wither	row D,	4 th Edit	ion, 2	2019, 1	Elsevi	ier,								
	don, UK			10.1	•												
		ent: Continuous assessm			examina	tion											
		Board of Studies	18-02-2022		1												
Apr	proved by Aca	demic Council	No. 65 D	ate	17-03-2	2022											

	Course Title L	Т	Р	С
BBIT208L	Biochemistry 3	0	0	3
Pre-requisite	Nil	Syllabı	is vei	rsio
			1.0	
Course Objectiv	es			
1. Sketch the cl	hemical structure of biomolecules.			
-	d contrast the structure and function of macromolecules.			
3. Construct m	etabolic pathways and to analyze metabolism.			
Course Outcome				
-	behavior based on physical and chemical composition. nteraction with macromolecules in biological system.			
	ture and function of carbohydrates and proteins.			
•	ic reactions and its role in the cell.			
	s and nucleic acids based on its composition.			
• •	inctions of biological molecule based on their features.			
	-			
Module:1 For	undations of Biochemistry	5 ho	ırs	
	ing system- review on cellular, chemical, physical, genetic			ion
backgrounds to b	iochemistry.			
Module:2 Wa	ater and Buffers	6 ho	ırs	
Structure of wate	r, Solvent and ionization property of water and water as a reacta	nt, pH	and b	ouff
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and their importa	nce.	· 1		
		6 ho		
And their importantModule:3CaClassification, S		6 ho	urs	
and their importantModule:3Ca	rbohydrates	6 ho	urs	
Module:3CaModule:3CaClassification, Sglycolipids.Module:4Me	rbohydrates Structure and function, Glycoconjugates: Proteoglycans, C etabolism of Carbohydrates	6 hor	urs	s a
Module:3CaModule:3CaClassification, Sglycolipids.Module:4MeGlycolysis, TCA	rbohydrates Structure and function, Glycoconjugates: Proteoglycans, C etabolism of Carbohydrates A cycle, Oxidative phosphorylation, Gluconeogenesis and p	6 hor	urs	s a
Module:3CaModule:3CaClassification, Sglycolipids.Module:4Me	rbohydrates Structure and function, Glycoconjugates: Proteoglycans, C etabolism of Carbohydrates A cycle, Oxidative phosphorylation, Gluconeogenesis and p	6 hor	urs	s a
Module:3CaModule:3CaClassification, Sglycolipids.Module:4MeGlycolysis, TCApathway and theirModule:5An	rbohydrates Structure and function, Glycoconjugates: Proteoglycans, C etabolism of Carbohydrates A cycle, Oxidative phosphorylation, Gluconeogenesis and p r regulation.	6 hor blycopr 6 hor bentose 6 hor	urs otein urs pho	s a
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		Total Lectu	re hours	:	45 hours				
Tex	xt Book(s)								
1.	. Lehninger Principles of Biochemistry: International Edition, by David L. Nelson								
	Michael M. Cox., 8 th Edition, 2019	, W.H. Freema	un & Co I	Ltd., USA.					
Ref	ference Books								
1.	Biochemistry, by U. Satyanaraya	n and U. Chał	krapani, (5 th Edition, 2021	, Elsevier, India				
2.	Voet's Biochemistry, by Donald Vo	oet, Judith G. V	Voet, 4th	Edition, 2021, W	iley India.				
3.	Biochemistry, by Jeremy M. Berg,	Lubert Stryer,	John Tyr	noczko and Greg	ory Gatto,				
	9th Edition, 2019, Macmillan Inter	national Highe	r Educati	on, New York, U	SA.				
Мо	de of Evaluation: CAT, Assignmen	it, Quiz and F	AT						
Rec	commended by Board of Studies	18-02-2022							
An	proved by Academic Council	No. 65	Date	17-03-2022					

Course Code	Course Title	L	Т	P	С	
BBIT324L	Cell Biology and Genetics	3	0	0	3	
Pre-requisite Nil Syllabus ver						
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Course Objectives	5	1				
1. Recall the basic	cs of cell biology and genetics					
2. Summarize th	e concepts of membrane transport, signal transduc	ction	and	herit	tabl	
variations						
3. Describe Mend	lelian, it's deviations and role of population genetics					
Course Outcomes						
	e features of prokaryotic and eukaryotic cells, their com	positi	on, sp	oatial	an	
•	anization of cellular organelles					
	types of transport mechanisms and throw light on proces	ss of a	cell di	visio	n	
	echanisms of signal transduction					
_	ciples of Mendelian genetics and non-Mendelian variatio	ns				
	chanisms of sex determination					
	ne concepts of population genetics and human gene	etics	ın he	alth	an	
diseases						
	Types, their Structure and Function		5 ho			
Cell - Unit of life	e, Cell morphology, Difference between bacterial, Plan		Anir	nal c		
Cell - Unit of life Structure and funct	e, Cell morphology, Difference between bacterial, Plantion of membranes, Membrane organization and compo	sition	Anir , Stru	nal c cture	an	
Cell - Unit of life Structure and funct Sunctions of cel	e, Cell morphology, Difference between bacterial, Plan tion of membranes, Membrane organization and compo ll organelles - Nucleus, Mitochondria, Riboson	sition ne, (Anir , Stru	nal c cture	an	
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interactions, Epistasis, Pleiotropy, Penetrance and Expressivity, Multiple alleles.

	Heritable Variations			6 hours
Linkage, Cr	ossing over and Chromosom	e mapping, Crossin	ng over as phy	vsical basis of
recombinatio	n, Gene mapping and Reco	mbination frequence	ies, Coupling a	and Repulsion
-	lculating recombination freq		hanges in chro	omosomes -
Duplications	, Deletions, Inversions and Tran	nslocations.		
Module:7	Sex Determination Population	ion Genetics and H	uman Genetics	8 hours
	ation and Sex-linked character		•	•
	al sex determination, Sex-		*	e
	ncept of dosage compensation			
	-linked, Sex-influenced, and Se			
-	d Weinberg's equilibrium, Fac	-	-	-
-	l euthenics, Human Pedigree -			-
Prenatal diag	nosis, Epigenetics and Genom	ic imprinting, Role o	f genes in cance	r.
Module:8	Contemporary Issues:			2 hours
		Total	Lecture hours:	
Text Book(s)				45 hours
1. The Cell	: A Molecular Approach, by			45 hours
1. The Cell Universit	: A Molecular Approach, by y Press, New York.	y Geoffrey M Coo	per, 8 th Edition.	45 hours . 2019, Oxford
1. The Cell Universit	: A Molecular Approach, by	y Geoffrey M Coo	per, 8 th Edition.	45 hours . 2019, Oxford
1. The Cell Universit	: A Molecular Approach, by y Press, New York. , by Monroe W. Strickberger,	y Geoffrey M Coo	per, 8 th Edition.	45 hours . 2019, Oxford
 The Cell Universit Genetics Reference Be 	: A Molecular Approach, by y Press, New York. , by Monroe W. Strickberger,	y Geoffrey M Coop 3 rd Edition, 2015, I	per, 8 th Edition. Pearson Education	45 hours 2019, Oxforcon, Delhi, India
 The Cell Universit Genetics Reference Bo Cell And 	: A Molecular Approach, by y Press, New York. , by Monroe W. Strickberger, poks	y Geoffrey M Coop 3 rd Edition, 2015, I	per, 8 th Edition. Pearson Education	45 hours 2019, Oxforcon, Delhi, India
 The Cell Universit Genetics Reference Be Cell And & Wilkir 	: A Molecular Approach, by y Press, New York. by Monroe W. Strickberger, poks Molecular Biology, by De Ro	y Geoffrey M Coop 3 rd Edition, 2015, I obertis E D P, 8 th Edi	per, 8 th Edition. Pearson Education tion, 2011. Lipp	45 hours . 2019, Oxforc on, Delhi, India incott Williams
 The Cell Universit Genetics Reference Book Cell And & Wilkir Genetics 	: A Molecular Approach, by y Press, New York. by Monroe W. Strickberger, poks Molecular Biology, by De Ro as, New York, USA.	y Geoffrey M Coop 3 rd Edition, 2015, I obertis E D P, 8 th Edi	per, 8 th Edition. Pearson Education tion, 2011. Lipp	45 hours . 2019, Oxforc on, Delhi, India incott Williams
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	Course Title	L	Т	Р	C
BBIT327L	Data Analytics in Bioinformatics	3	0	0	3
Pre-requisite	Nil	Sy	llabus	vers	sioi
			1.	.0	
Course Objectives	\$				
	erview of the Machine Learning concepts and practices in	Bioi	nforma	atics	
-	e in applications and limitations of Machine Learning				
_	a broad range of approaches to data analysis across the	biolo	ogical		
sciences					
Course Outcomes		1-4-			
	preciation for what is involved in Learning models from c w to evaluate models generated from data	iata			
	domain biological datasets				
-	nics using decision trees, and random forests				
	sualize biological data sets using R packages for machine	e learr	ning		
	tational experiments for training and evaluating machine			etho	ds
	ormatics problems		6		-
<u>U</u>	•				
Module:1 Mach	nine Learning		7 hou	rs	
	ng - Learning process and its methodologies, Classific				/pe
-	pervised learning - Clustering in unsupervised lear			-	-
	pervised rearning - Crustering in unsupervised rear	mng,	Cius		Ц.
		ning,	Clus	term	9
Bioinformatics - G	enetic data				g .
Bioinformatics - G Module:2 Featu	enetic data are Selection and Genomic Technology		6 hou	rs	
Bioinformatics - G Module:2 Featu Dimensionality res	enetic data	tions	<mark>6 hou</mark> of di	rs mens	sio
Bioinformatics - G Module:2 Featu Dimensionality re- reduction methods,	enetic data ure Selection and Genomic Technology duction techniques - Principles, Benefits and Limita , Components of dimension reduction, Methods of dimen	tions nsiona	<mark>6 hou</mark> of di llity re	rs mens educt	sion
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Module:8 Contemporary Issues

2 hours

Total Lecture hours: 45 hours

Text Book

1 Data Analytics in Bioinformatics: A Machine Learning Perspective by Rabinarayan Satpathy, Xiaobo Zhang, Sachi Nandan Mohanty, Suneeta Satpathy, Tanupriya Choudhury, 2021, John Wiley & Sons.

Reference Book

 Hands-on machine learning with Scikit-Learn, Keras, and TensorFlow: Concepts, tools, and techniques to build intelligent systems, by Aurélien Géron, 2019, O'Reilly Media, Inc., 1005 Gravenstein Highway North, Sebastopol, CA 95472.

Recommended by Board of Studies	18-02-2022	2	
Approved by Academic Council	No. 65	Date	17-03-2022

	e Course Title	L	Т	Р	C
BBIT401L	Molecular Modelling and Drug Design	3	0	0	3
Pre-Requisite	BBIT205L, BBIT205P	Syllabus v			
			1	1.0	
Course Objectiv	ves				
	e methods in molecular mechanics and quantum mechanics				
	concept of molecular simulation and modelling technique	s.			
-	bus lead seeking methods and lead optimization.			• .	
	ne statistical modeling principles & optimization using cor	npute	r appl	1catio	ns.
Course Outcom					
	arious force fields and quantum mechanical equations.				
	concept of geometry optimization and molecular dynamics				
-	physicochemical properties and the techniques involved in	n QSA	4K.		
	diversity of drug targets.		F		
-	plications of computers in pharmaceutical product develop ous chemical, biochemical and pharmaceutical databases.	pmen	l.		
0. Use the value	bus chemical, biochemical and pharmaceutical databases.				
Module: 1	Quantum Mechanics	8	8 Hou	Irs	
	-				
CADUITINGINAL DA	asis of quantum physics. Computing of physical princ	iples.	Bohı	r's m	ode
-	asis of quantum physics, Computing of physical princ	-			
Schrodinger way	e equation, Born-Oppenheimer approximation, Quantum	mech	anica		
Schrodinger wav Molecular orbita	ve equation, Born-Oppenheimer approximation, Quantum al theory, Single point energy calculation, Bio-organic	mech	anica		
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Schrodinger way Molecular orbita nechanism, App Module: 2 M Dverview of Mo and hydrophilic	ve equation, Born-Oppenheimer approximation, Quantum al theory, Single point energy calculation, Bio-organic olications of quantum mechanics. Molecular Mechanics olecular mechanics, Principles of stereoisomerism, Conc	mech reacti	anica on 7 Hou f hydi	l meth urs ropho	hod
Schrodinger way Molecular orbita nechanism, App Module: 2 M Overview of Mo and hydrophilic Allosteric mecha	ve equation, Born-Oppenheimer approximation, Quantum al theory, Single point energy calculation, Bio-organic olications of quantum mechanics. Molecular Mechanics olecular mechanics, Principles of stereoisomerism, Conc interactions, Energy contribution and distance of non-	mech reacti	anica on 7 Hou f hydi	l meth urs ropho nterac	hod
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Schrodinger way Molecular orbita mechanism, App Module: 2 M Overview of Mo and hydrophilic Allosteric mecha Module: 3 M Geometry optin	 de equation, Born-Oppenheimer approximation, Quantum al theory, Single point energy calculation, Bio-organic olications of quantum mechanics. Molecular Mechanics Delecular mechanics, Principles of stereoisomerism, Concernism, Energy contribution and distance of non-anism, Force fields and types. Molecular Simulation 	mech reacti	anica ion 7 Hou f hydd lent in 7 Hou , Mo	l meth urs ropho nterac urs blecula	bic tio
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Schrodinger way Molecular orbita mechanism, App Module: 2 M Overview of Mo and hydrophilic Allosteric mecha Module: 3 M Geometry optin dynamics, Integra applications, Geo Module: 4 I Drug design p Pharmacogenom Module: 5 I Virtual screeni descriptors, QSA	 de equation, Born-Oppenheimer approximation, Quantum al theory, Single point energy calculation, Bio-organic olications of quantum mechanics. Molecular Mechanics Delecular mechanics, Principles of stereoisomerism, Concernism, Force fields and types. Molecular Simulation nization, Steepest descent and conjugate gradient mechanics of motion - Verlet algorithm, Monter ometric similarity of structures. Drug Discovery process, Drug targets, Properties of drugs, Overvie ics. Lead Based Drug Design ng, Pharmacophore mapping, Analog based drug 	mech reactive reactiv	anica ion 7 Hou f hydr lent in 7 Hou , Mo o simu 6 Hou 7 Clin	l meth	nod bic etio ar n a tria
Schrodinger way Molecular orbita mechanism, App Module: 2 N Overview of Mo and hydrophilic Allosteric mecha Module: 3 N Geometry optim dynamics, Intega applications, Geo Module: 4 I Drug design p Pharmacogenom Module: 5 I Virtual screeni descriptors, QSA Module: 6 1 Modeling of dru	 ve equation, Born-Oppenheimer approximation, Quantum al theory, Single point energy calculation, Bio-organic olications of quantum mechanics. Molecular Mechanics Delecular mechanics, Principles of stereoisomerism, Conceinteractions, Energy contribution and distance of non-anism, Force fields and types. Molecular Simulation nization, Steepest descent and conjugate gradient meration of equation of motion - Verlet algorithm, Monteometric similarity of structures. Drug Discovery process, Drug targets, Properties of drugs, Overvie ics. Lead Based Drug Design ng, Pharmacophore mapping, Analog based drug AR modelling, ADMET prediction, Peptidomimetics. 	mech reaction reactio	anica ion 7 Hou f hydr lent in 7 Hou , Mo 5 simu 6 Hou ign, 5 Hou	l meth urs ropho nterac urs blecula ulatio urs ical urs Type	bic tio
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	-	kills, and basics of che			
		sian coordinate system,			
		Computational resources	for molecular	modelling and d	lrug designing –
data	bases and	software.			
Mo	odule: 8	Contemporary Issues			2 hours
			T	otal Lecture hours	45 hours
Text	t books				
1.	In Silic Applicat USA,	co Drug Discovery ar ions, by Claudio N. Cava	e	heory, Methods, n, 2015, CRC Press	Challenges, and Florida,
2.	and Bio	ntional Methods to Study t molecular Processes: From a Liwo, 2 nd Edition, 2018, S	m Bioinformatic	es to Molecular Qu	
Refe	erence boo	oks			
1.		Medicinal Chemistry: Con Ilustrated Edition, 2015, R	-	•••••	Design, by Nathan
2.	-	s and Experimental Protoc kari, 1 st Edition, 2020, Aca		0	n Drug Design, by
	The Orga	anic Chemistry of Drug De	sign and Drug A	ction By Richard B	. Silverman, Mark
3.	W. Holla	aday, 3 rd Edition, 2014, Ac	ademic Press, El	sevier, CA, USA.	
Mod	le of Eval	uation: CAT, Assignment	t, Quiz, and FA'	Г	
Rec	ommende	d by Board of Studies	18-02-2022		
Арр	proved by	Academic Council	No. 65	Date	17-03-2022

Course Cod	e Course Title	L	Т	P	С
BBIT417L	Analytical Bioinformatics	3	0	0	3
Pre-requisit	e Nil	S	yllabı	us ve	rsion
				1.0	
Course Objec					
2. Analyze co sources, ar	c knowledge on various techniques and areas of applications in bio ommon problem in bioinformatics, alignment techniques, ethical i id evolutionary modelling he practical use of tools for specific bioinformatics areas				ta
Course Outco	mes				
 Develop th Build an scientificw Evaluate th Compare t information 	wledge of bioinformatics in a practical project e ability for critical assessment of scientific research publications in understanding of the research process in general, such as riting, and research ethics e main databases at the NCBI and EBI resources he databases, tools, repositories and be able to use each one te the selected tools at NCBI and EBI to run simple analyses on gen	resea to e	arch extrac	meth t spe	ods,
Module:1	Overview on Bioinformatics	31	iours		
Scope and app	plications of bioinformatics, Alignment of pairs of sequences; Int gnment, Methods Dot matrix sequence comparison.				ition
Module:2	Pairwise Sequence Alignment and Database Similarity Search	7 ł	iours	5	
the significant	ramming algorithm, Needleman-Wunsch, Smith-Waterman, Ga e of an alignment-Database searching for similar sequences, FA nparing database of sequences and patterns.		•		U
Module:3	Scoring Matrices	61	iours	5	
Similarity sear	ches, PAM and BIOSUM matrix, Dayhoff mutation matrix, cons rix; Differences between PAM & BLOSUM.				1 and
Module:4	Multiple Sequence Alignment	6 ł	iours	5	
	ramming, Progressive methods, Iterative methods, MSA using CLX, Purpose and applications of multiple sequence alignment.	LUST	TALW	V, PIL	EUP
Module:5	Phylogenetic Analysis	7 ł	iours	5	
Fundamental Phylogenetic o Substitution M	elements of phylogenetic models, Tree interpretation, Paral- lata Analysis, Alignment, Extraction of a Phylogenetic Data So Model, Tree-Building Methods - Distance, Parsimony, and Manne	ogs et, I	and Deteri	Ortho minin	g the
Module:6	DNA and Protein Sequence Predictions	6 ł	iours	5	
-	on, Prediction of protein secondary structure and Folding Cl actures or Features, Prediction of protein tertiary structure, Softwar	asses			on of
Module:7	Artificial Neural Network and Hidden Markov Model	8 ł	iours	5	
					177

Basics of artificial neural network, Applications of neural network for nucleotide and protein sequenceprediction; Hidden Markov modelIntroduction, Applications of HMMs – Generalaspects, Nucleotide and Protein applications.

Module:8 Contemporary Issues:

2 hours

Total Lecture hours: 45 hours

Text Book(s)

 Bioinformatics, by Andreas D Baxevanis, Gary D Bader, David S Wishart, 4th Edition, 2020, Wiley, USA.

2. Introduction to Bioinformatics, by Arthur Lesk, 5th Edition, 2019, Oxford University Press, UK.

Reference Books

 Bioinformatics: Methods and Applications, by Dev Bukhsh Singh, Rajesh Kumar Pathak, 1st Edition, 2021, Oxford, UK.

2. Bioinformatics, by Curran B G, Walker R J, 2017, CSB Publishers (P) Ltd., India.

Mode of Evaluation: CAT, Assignment, Quiz, and FAT

Recommended by Board of Studies 18-02-2022

Approved by Academic CouncilNo. 65Date17-03-2022

Course Code	(Course Title			L	Т	Р	C
BBIT417P	Analytica	al Bioinforma	atics Lab		0	0	2	1
Pre-requisite	e-requisite Nil Syllabus version							
	1.0							
Course Objective	S						•0	
•	the utility of various l	biological dat	tabases th	nat provide	e info	rmati	on a	bou
nucleic acids	=	U		1				
2. Explain the o	concept of pairwise se	quence aligni	nent, alg	orithms an	d too	ls for	pair	wis
alignment.								
Course Outcome	S							
	nd manage the different	7 1	U	ta.				
	ssess different sequence							
3. Predict and and	alyse biological macron	nolecular strue	ctures.					
Indicative Experi	ments							
1. Retrieval of	Data from Biological D	atabase						
2. Protein Sequ	ence Retrieval from Un	iprot						
3. Global and L	local Alignment							
4. Dot Plot Seq	uence alignment							
5. BLAST								
6. Multiple Seq	uence Alignment and P	hylogeny- Cl	ustal O					
7. Motif/Doma	in database search							
8. PDB databas	se							
9. Protein secon	ndary structure prediction	on						
10. Protein 3D s	tructure visualization							
		Total Lal	ooratory	hours:		30 ł	nours	5
Reference Books								
	atics: Concepts, Skills		•	-	, Nan	nita M	Iendi	ratt
	togi, 2 nd Edition, 2018,							
2 Introduction Press, UK	Introduction to Bioinformatics, by Arthur Lesk, 5th Edition, 2019, Oxford University							
	ent: Continuous assess	sment, FAT s	nd Oral	examinati	on			
	y Board of Studies	18-02-2022			~			

BI	Course Code	Course Title	L	Т	P	С
	BIT418L	Biological Databases	3	0	0	3
Pr	e-requisite	Nil	Syl	labus	s ver	sion
					l.0	
Cou	rse Objectives					
1.	Develop basic	knowledge on the available online biological databases				
2.	Create, integra	ate and mine of all kinds of nucleotide and protein databas	ses			
3.	Analyze latest	tools and technologies for biological data analysis and pr	ocess	sing		
Cou	irse Outcomes					
1.	Discuss conce	pts of biological data and database creations				
2.	*	ess of biological data integration and mining				
3.	-	nong biomolecular sequence databases and structural data				
4.	-	ous databases employed to determine protein function	s, in	teract	tions	an
_	pathways					
-	-	omic and transcriptomic databases with microarray data		.1		
6.		bus aspects of cloud based biological data processing data handling	ng te	ecnnie	ques	an
	biological big	data handiling				
		ence Submission Tools	. 1		hour	
		tional database, motivation of biological database; Cen				
		equences to the database, sequence formats, Interconve	ersion	n of	mole	ecul
sec	luences.					
		gical Data Integration and Mining			nour	
		ration; Major areas in biological data integration; Biological data integratin; Biological data integration; Biological data integra	ogica	l dat	a mi	nin
Gen	eral and biolog					
	-	gical data mining; Case study of biological pattern disco	overy	, Cas	e stu	
biol	ogical data min		overy	, Cas	e stu	
	ogical data min		overy		e stu	dy
Mo	ogical data min	ing.		71	hour	dy s
M o Euro	ogical data min odule:3 Nucle opean molecula	eotide and Protein Sequence Databases	Data	7 I Bank	hour: c of .	dy s Jap
Mo Euro (DD	ogical data min odule:3 Nucle opean molecula OBJ), Genes an	eotide and Protein Sequence Databases ar biology laboratory (EMBL), NCBI GenBank DNA	Data e (Db	7 I Banl SNP	hour c of .	dy s Jap
Mo Euro (DD Kno	ogical data min odule:3 Nucle opean molecula oBJ), Genes an owledgebase - S	eotide and Protein Sequence Databases ar biology laboratory (EMBL), NCBI GenBank DNA ad genetic disorders: COSMIC, Clinvar - SNP database	Data e (Db	7 I Bank SNP	hour c of .	dy s Jap niPr
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Ma Euro (DD Knoo Ma Prot struc struc Ma Pfar prof Prot netv Ma ENS	ogical data min odule:3 Nucle opean molecula DBJ), Genes an owledgebase - S odule:4 Prote ein data bank cture classificat odule:5 Prote n-protein fami iile, ENZYME- ein, Chemica vorks, DIP - Da odule:6 Geno SEMBL Huma	eotide and Protein Sequence Databases ar biology laboratory (EMBL), NCBI GenBank DNA I ad genetic disorders: COSMIC, Clinvar - SNP database SwissProt and TrEMBL - Protein Information Resource (1 ein Structure Databases (PDB), SCOP - Structural classification of proteins tion database. ein Function, Pathway and Interaction Databases ly database - GO-gene ontology, PROSITE-protein for Enzyme commission, KEGG Pathway database, BioG l, and Genetic Interactions; STRING- functional atabase of Interacting Proteins. ome and Microarray Databases n - UCSC Human Genome Browser Gateway and other	Data e (Db PIR). s, CA unctio RID- proto	7 I Bank SNP 6 I ATH 7 I on pata ein a ein a	hours c of .), Ur hours atterr abase associ	dy s Jap niPr s rote s a a e of iatio s nor
Ma Euro (DD Knoo Ma Prot strua Ma Pfar prof Prot netv <u>Ma</u> ENS data	ogical data min odule:3 Nucle opean molecula OBJ), Genes an owledgebase - S odule:4 Protection ein data bank cture classificat odule:5 Protection n-protein fami ile, ENZYME- ein, Chemical vorks, DIP - Da odule:6 Geno SEMBL Human bases. DNA m	eotide and Protein Sequence Databases ar biology laboratory (EMBL), NCBI GenBank DNA I ad genetic disorders: COSMIC, Clinvar - SNP database SwissProt and TrEMBL - Protein Information Resource (1 ein Structure Databases (PDB), SCOP - Structural classification of proteins tion database. Ein Function, Pathway and Interaction Databases ly database - GO-gene ontology, PROSITE-protein fr Enzyme commission, KEGG Pathway database, BioG l, and Genetic Interactions; STRING- functional atabase of Interacting Proteins.	Data e (Db PIR). s, CA unctio RID- proto	7 I Bank SNP 6 I ATH 7 I on pata ein a ein a	hours c of .), Ur hours atterr abase associ	dy s Japa Japa s rote s a a i a i a i a i a i a i a i a i a i a
Ma Euro (DD Knoo Ma Prot strua Ma Pfar prof Prot netv Ma ENS data	ogical data min odule:3 Nucle opean molecula OBJ), Genes an owledgebase - S odule:4 Protection ein data bank cture classificat odule:5 Protection n-protein fami file, ENZYME- ein, Chemical vorks, DIP - Da odule:6 Geno SEMBL Human bases. DNA m GE databases.	eotide and Protein Sequence Databases ar biology laboratory (EMBL), NCBI GenBank DNA I ad genetic disorders: COSMIC, Clinvar - SNP database SwissProt and TrEMBL - Protein Information Resource (1 ein Structure Databases (PDB), SCOP - Structural classification of proteins tion database. ein Function, Pathway and Interaction Databases ly database - GO-gene ontology, PROSITE-protein fr Enzyme commission, KEGG Pathway database, BioG 1, and Genetic Interactions; STRING- functional atabase of Interacting Proteins. me and Microarray Databases n - UCSC Human Genome Browser Gateway and othe dicroarray: database and basic tools, Gene Expression C	Data e (Db PIR). s, CA unctio RID- proto	7 I Bank SNP 6 I ATH 7 I Data ein a bata ein a	hours c of .), Ur hours attern abase issoci	dy s Jap niPr s rote s n an e of iatio s nor) an
Ma Euro (DD Knoo Ma Prot strua Ma Pfar prof Prot netv Ma ENS data	ogical data min odule:3 Nucle opean molecula OBJ), Genes an owledgebase - S odule:4 Protection ein data bank cture classificat odule:5 Protection n-protein fami file, ENZYME- ein, Chemical vorks, DIP - Da odule:6 Geno SEMBL Human bases. DNA m GE databases.	eotide and Protein Sequence Databases ar biology laboratory (EMBL), NCBI GenBank DNA I ad genetic disorders: COSMIC, Clinvar - SNP database SwissProt and TrEMBL - Protein Information Resource (1 ein Structure Databases (PDB), SCOP - Structural classification of proteins tion database. ein Function, Pathway and Interaction Databases ly database - GO-gene ontology, PROSITE-protein for Enzyme commission, KEGG Pathway database, BioG l, and Genetic Interactions; STRING- functional atabase of Interacting Proteins. ome and Microarray Databases n - UCSC Human Genome Browser Gateway and other	Data e (Db PIR). s, CA unctio RID- proto	7 I Bank SNP 6 I ATH 7 I Data ein a bata ein a	hours c of .), Ur hours atterr abase associ	dy s Jap niPr s rote s n an e of iatio s nor) an

Biological data processing in general, data processing in the cloud; Role of cloud computing in handling the huge biological data.

Module:8 Contemporary Issues

2 hours

Total Lecture hours: 45 hours

Text	Boo	ok(s))
ICAL	DUU	m(s)	,

 Bioinformatics Database Systems, By Kevin Byron, Katherine G. Herbert, Jason T. L. Wang, 2017, 1st Edition, CRC Press, USA.

Reference Books

- Biological Database Modeling 1st Edition, by Jake Chen, Amandeep S., Amandeep S, Sidhu, 2012, Artech House Publishers, UK.
- Bioinformatics: Methods and Applications, by Dev Bukhsh Singh, Rajesh Kumar Pathak, 1st Edition, 2021, Oxford, UK.

Mode of Evaluation: CAT, Assignment, Quiz, and FAT

Recommended by Board of Studies	18-02-2022				
Approved by Academic Council	No. 65	Date	17-03-2022		

(Course Code	Cou	ırse Title]	L	Т	P	C	
B	BIT418P	Biologica	l Database	s Lab		0 0 2				
P	re-requisite	Nil							on	
						e e		1.0		
Coι	urse Objective	I								
1.]	Provide students	s with the skills to integra	te the differ	ent types of	of biologic	al da	ita an	d datał	bases.	
Cor	Irse Outcome									
		nd analyse nucleotide and	d protein da	ta from va	arious data	hase	c			
1. 1	The to search a	nd analyse nucleotide and			unous data	Juse				
Ind	icative Experin	nents								
1.		ous types of sequence for	mats							
2.		nucleotide sequence dat								
3.	Investigate ma	ajor protein sequence dat	tabase							
4.	Access major of	database related to geneti	c disorders							
5.	Examine prote	in structural database								
6.	Compare vario	ous protein structural clas	sification da	atabase						
7.	Inspect the ma	jor metabolic pathway da	itabase							
8.	Compare vario	ous protein-protein interac	ction databa	se						
9.		ne major Genome databas	se							
10.	Evaluate Gene	expression database					-			
			Te	otal Labo	ratory hou	ırs:	30	hours	\$	
Tex	t Book:									
1		s Database Systems, By K	levin Byron	, Katherin	e G. Herbe	ert, J	ason '	T. L. V	Vang,	
		17, CRC Press, USA.								
Mo	de of assessme	nt: Continuous assessm	ent, FAT a	nd Oral e	examinatio	on			ĺ	
Rec	commended by	Board of Studies	18-02-202	2				_		
Apj	proved by Aca	demic Council	No. 65	Date	17-03-20	22				

PROJECTS AND INTERNSHIP

(2021-2022)

Sl.No.	Course Code	Course Title	Page No.
1.	BCSE399J	Summer Industrial Internship	185
2.	BCSE497J	Project - I	186
3.	BCSE498J	Project - II / Internship	187
4.	BCSE499J	One Semester Internship	

Cou	rse Code		Course Tit	le		L	Т	P	C
BCSE	E 399J	Summ	ner Industrial	Internship		0	0	0	1
Pre-r	-requisite NIL Syllabus						versi	on	
	1.0						.0		
Course	Objective								
1.		e is designed so as to assignment as train	*		dustry envi	ironm	ent ar	nd to	take
Course	Outcomes	,							
1.	Demonstr	ate professional and	l ethical respor	nsibility.					
	and societ	d the impact of eng al context. he ability to engage	C	U				ment	tal
4.	Comprehe	end contemporary is	sues.				<u></u>		
Module	e Content								
I	Four weeks	of work at industry	site.						
5	Supervised	by an expert at the i	ndustry.						
Mode	of Evalua	tion: Internship R	eport, Presen	tation and F	Project Rev	view			
Recon Studi		by Board of	09-03-2022						
Approved by Academic CouncilNo. 65Date17-03-2022									

Course Code	Course Title		L	Т	P	C
BCSE497J	Project - I		0	0	0	3
Pre-requisite	NIL Syllabus v		versi	on		
				1.	0	

Course Objectives

To provide sufficient hands-on learning experience related to the design, development and analysis of suitable product / process so as to enhance the technical skill sets in the chosen field.

Course Outcomes

- 1. Demonstrate professional and ethical responsibility.
- 2. Evaluate evidence to determine and implement best practice.
- 3. Mentor and support peers to achieve excellence in practice of the discipline.
- 4. Work in multi-disciplinary teams and provide solutions to problems that arise in multi- disciplinary work.

Module Content

Project may be a theoretical analysis, modeling & simulation, experimentation & analysis, prototype design, fabrication of new equipment, correlation and analysis of data, software development, applied research and any other related activities.

Can be individual work or a group project, with a maximum of 3 students.

In case of group projects, the individual project report of each student should specify the individual's contribution to the group project.

Carried out inside or outside the university, in any relevant industry or research institution.

Publications in the peer reviewed journals / International Conferences will be an added advantage.

Mode of Evaluation: Assessment on the project - project report to be submitted, presentation and project reviews

09-03-2022		
No. 65	Date	17-03-2022

Course Code	Course Title	L	Т	P	C
BCSE498J	Project – II / Internship	0	0	0	5
Pre-requisite	NIL		abus	versi	on
		1.0			

Course Objectives

To provide sufficient hands-on learning experience related to the design, development and analysis of suitable product / process so as to enhance the technical skill sets in the chosen field.

Course Outcomes

- 1. Formulate specific problem statements for well-defined real life problems with reasonable assumptions and constraints.
- 2. Perform literature search and / or patent search in the area of interest.
- 3. Conduct experiments / Design and Analysis / solution iterations and document the results.
- 4. Perform error analysis / benchmarking / costing.
- 5. Synthesize the results and arrive at scientific conclusions / products / solution. Document the results in the form of technical report / presentation.

Module Content

- 1. Project may be a theoretical analysis, modeling & simulation, experimentation & analysis, prototype design, fabrication of new equipment, correlation and analysis of data, software development, applied research and any other related activities.
- 2. Project can be for one or two semesters based on the completion of required number of credits as per the academic regulations.
- 3. Can be individual work or a group project, with a maximum of 3 students.
- 4. In case of group projects, the individual project report of each student should specify the individual's contribution to the group project.
- 5. Carried out inside or outside the university, in any relevant industry or research institution.
- 6. Publications in the peer reviewed journals / International Conferences will be an added advantage.

Mode of Evaluation: Assessment on the project - project report to be submitted, presentation and project reviews.

Recommended by Board of Studies	09-03-2022		
Approved by Academic Council	No. 65	Date	17-03-2022

OPEN ELECTIVE

(2021-2022)

Sl.No.	. Course Code	Course Title
1.	CFOC102M	Introduction to Cognitive Psychology
2.	CFOC103M	Introduction to Political Theory
3.	CFOC104M	Six Sigma
4.	CFOC105M	Emotional Intelligence
5.	CFOC109M	Design Thinking - A Primer
6.	CFOC118M	Practical Machine Learning with Tensorflow
7.	CFOC122M	Educational Leadership
8.	CFOC133M	E-Business
9.	CFOC152M	Pattern Recognition and Application
10.	CFOC165M	Software testing
11.	CFOC188M	Ethical Hacking
12.	CFOC190M	Positive Psychology
13.	CFOC191M	Forests and their Management
14.	CFOC193M	Bioengineering: An Interface with Biology and Medicine
15.	CFOC197M	Bio-Informatics: Algorithms and Applications
16.	CFOC203M	Natural Hazards
17.	CFOC207M	Electronic Waste Management - Issues And Challenges
18.	CFOC227M	GPU Architectures and Programming
19.	CFOC232M	Consumer Behaviour
20.	CFOC235M	Rocket Propulsion
21.	CFOC236M	Aircraft Maintenance
22.	CFOC253M	Plastic Waste Management
23.	CFOC258M	Introduction to Geographic Information Systems
24.	CFOC282M	Waste to Energy Conversion
25.	CFOC329M	Design, Technology and Innovation
26.	CFOC332M	Fundamentals of Automotive Systems
27.	CFOC356M	Analog Circuits
	1	189

28.	CFOC365M	Evolution of Air Interface towards 5G
29.	CFOC384M	Entrepreneurship Essentials
30.	CFOC388M	Energy Resources, Economics and Environment
31.	CFOC391M	Effective Writing
32.	CFOC395M	Speaking Effectively
33.	CFOC397M	Intellectual Property
34.	CFOC400M	Language and Mind
35.	CFOC401M	The Nineteenth - Century English Novel
36.	CFOC402M	Introduction to World Literature
37.	CFOC405M	Economic Growth & Development
38.	CFOC407M	Introduction to Modern Indian Political Thought
39.	CFOC408M	English Literature of the Romantic Period, 1798 – 1832
40.	CFOC416M	Feminism : Concepts and Theories
41.	CFOC419M	Basic Real Analysis
42.	CFOC442M	Robotics and Control : Theory and Practice
43.	CFOC475M	IC Engines and Gas Turbines
44.	CFOC488M	Business Analytics For Management Decision
45.	CFOC490M	Sales and Distribution Management
46.	CFOC493M	Management of Inventory Systems
47.	CFOC494M	Quality Design And Control
48.	CFOC495M	Foundation Course in Managerial Economics
49.	CFOC496M	Engineering Econometrics
50.	CFOC497M	Financial Statement Analysis and Reporting
51.	CFOC498M	Business Statistics
52.	CFOC499M	Global Marketing Management
53.	CFOC500M	Marketing Research and Analysis – II
54.	CFOC503M	Marketing Analytics

55.	CFOC505M	Management of Commercial Banking
56.	CFOC508M	Entrepreneurship
57.	CFOC550M	Numerical Analysis
58.	CFOC570M	Public Speaking
59.	CFOC591M	Principles Of Management
60.	CFOC593M	Corporate Finance
61.	CFOC594M	Customer Relationship Management

BRIDGE COURSE

(2021-2022)

Sl.No.	Course Code	Course Title	Page No.
1.	BBIT100N	Biology	194
2.	BENG101N	Effective English Communication	196
3.	BMAT100N	Mathematics	197

Course Code	Course Title	L	Τ	Р	C	
BBIT100N	Biology	3	0	0	3	
Pre-requisite	Nil	Syllabus				
				1.0		
Course Objectives	S	I				
	c understanding of origin and evolution of biological	-				
	indamental concepts of organization and principles of	living	syste	ms		
3. To demonstrate	e applications of biology in engineering disciplines					
Course Outcomes						
	asic concepts of biology including diversity, evolution	n, and o	ecolog	gy		
	ign principles of cell, its biochemistry, and biophysics					
3. Interpret and an	nalyze biological flow of information at molecular and	d hered	litary	level		
	ganismal complexities in animals and plants					
5. Identify the im	portance of biology in different engineering discipline	es				
	duction to biology and evolution nentals; diversification of life including viruses; Chem			ours		
Module:2 Cells	biotic factors in ecosystem. structure and functions al unit of life; prokaryotic cell structures; Eukaryotic c	ell stru	_	ours s; Nu		
transport; Endome	mbrane system; Dynamic cytoskeleton.					
Module:3 Cher	nistry and complexity of life		6 h	ours	}	
Structure and funct	tions of bio macromolecules - carbohydrates, proteins	, lipids	, and	nucle	eic	
Module:4 Meta	bolism and energy transformation		5 h	ours	}	
-	netabolic reactions, ATP energy-coupling; Electrocher ron transport chain.	mical p	proces	ses-A	ΥТ	
Module:5 Mole	ecular information		6 h	ours		
0	NA synthesis; Cell division- mitosis and meiosis; Cent tion, RNA processing, and translation; Post-translatio					
Module:6 Over	view of animal and plant systems		6 h	ours		
Plant forms and fu	nctions; Plant cells and tissue systems; Animal tissue	s, orga	ns, an	d sys	ten	
Animal forms and	functions; Animal homeostasis.					
Module:7 Gene	etics and genomics		5 h	ours		
Mendel's experim	ent-monohybrid cross and dihybrid cross; Linkag	ge and	l cros	ssing	-ov	
Mendel's rules and	human diseases; Gene sequencing and genomics.					
Module:8 Engi	neering in biology		5 h	ours	}	
0	eering needs; Bio-inspired design and bio-robotics; Bio	logy a	nd we	llness	s e.g	
					194	

retinal prosthetics and biosensor, bio-chips, bio-pesticides, nanoparticles.

Total Lecture hours: 45 hours

Text Book(s)

- 1. Biological Science. By Scott Freeman, Kim Quillin, Lizabeth Allison, Michael Black, Emily Taylor, 6th edition 2017, Prentice Hall, NJ, USA.
- Biology for Engineers, by G. K. Suraishkumar, 1st Edition, 2019, Oxford University Press, India.

Reference Books

- Campbell Biology. By Lisa A. Urry, Michael L. Cain, Steven A. Wasserman, Peter V. Minorsky, Rebecca Orr. 12th edition, 2021. Pearson publisher, USA
- Concepts in Biology. By Eldon D. Enger, Frederick C. Ross, David B. Bailey, Edition, 14th, 2017 (Indian Edition). Tata McGraw-Hill publication, India

Mode of Evaluation: CAT, Application oriented assignment, Quiz, and FAT

Recommended by Board of Studies	28-06-2021				
Approved by Academic Council	No. 63	Date	23-09-2021		

Cour	se Code	C	Course Title			L	Т	P	С	
BENG	G101N	Effective E	nglish Com	municatio	n	0 0				
Pre-requisite Nil Syl							Syllabus version			
							1.	0		
Course	Objectives	l								
1. To l	none LSRW	V skills for effective co	mmunication	n						
2. To e	enhance con	mmunication skills for	future career	r aspiratio	ns					
3. To g	gain critical	l communication skills	in writing a	nd public s	speaking					
Course	Outcomes									
1. Wri	te effective	sentences using appro	priate gramr	nar and vo	cabulary					
2 . Exp	ress clearly	in everyday conversat	tions with lu	cid pronun	ciation					
3. Ana	lyse the give	ven listening inputs for	effective co	mprehensi	on					
4. App	ly differen	t reading strategies to v	various texts	and use th	em approj	priate	y			
Indicati	ve Experiı	nents								
1. F u	Indamenta	ls of Grammar: Part	s of Speech	, Articles	, Tenses,	Sente	nce S	tructu	re,	
Ту	pes of Sen	tences, Subject-Verb	Agreement.	Activity:	Exercises	and	vorksl	neets		
2. S	peaking	for Self-Expression	Formal S	Self-Introd	luction,	Expre	essing	One	ese	
A	Activity: Se	elf-Introduction, Just a	a Minute (JA	M)						
3. B a	sic Listen	ing: Listening to Sim	ple Conversa	ations, Sho	ort Speech	nes/St	ories.			
A	c tivity: Ga	p fill exercises								
4. R	eading Ski	Ils: Reading Strategie	es, Skimmin	g and Scar	nning.					
Ac	ctivity: Gla	aze reading, Reading c	comprehensi	on, Readir	ng newspa	per a	rticles			
5. D i	afting Par	ragraphs: Keywords	Developmen	t, Writing	Paragraph	hs usi	ng Co	nnect	ive	
A	etivity: Pic	ture and poster interpr	retation							
6 V	ocabulary	Enrichment: Synor	nyms and A	ntonyms,	Prefixes	and	Suffix	tes, V	Vo	
F	Formation, One Word Substitution, Frequently used Idioms and Phrases, Homophone									
a	and Homonyms. Activity: Crossword puzzles and worksheets									
	0	o r Pronunciation: Intr				0		Speal	ker	
		Various Accents. Ac								
		Speaking: Everyda	y Conversa	ations, Te	am Inter	action	s, Si	mulat	ior	
	U	tuational role plays								
		Letter Writing: Types			s and Lett	ers.				
	-	ficial e-mails and lette	_							
	0	Comprehension: She		y Indian V	Vriters.					
A	ctivity: Su	mmarising, loud reading	ng							
					boratory			30 h	ou	
		nt: Continuous assess oup activity	sment/ FAT	Written	assignme	nts/ Q	Quiz/ C	ral		
Recom	nended by	Board of Studies	28-06-20	021						

	Course Title	L	Т	P	С	
BMAT100N	Mathematics	3	4			
Pre-requisite	Nil	Syllabus version				
			1	1.0		
Course Objectives						
mathematics co 2. Basic knowled	d relevant background to understand the other in					
Course Outcomes						
 Solve a system Apply the tech integration to e Understand the differential equ Have a clear un 	ourse the student should be able to of linear equations by matrix method. aniques of differentiation to find maxima and minim valuate areas and volumes of revolution. e concept of ordinary differential equations, and first ar nations. inderstanding of analytic geometry and vector algebra. s of mathematical logic and elementary probability to r	nd sec	ond o	rder l	inea	
Module:1 Matr	ices	5 hou	urs +	3 hou	ırs	
of a matrix - solu	f matrices - operations on matrices - determinants - adj ation of a system of linear equations by inversion n ank of a matrix - consistency and inconsistency of syst	netho	1 - el	emen	itary	
Module:2 Diffe	rential Calculus	6 hor	ırs +	2 hou	ırs	
	f functions of single variable - differentiation		-			
nterpretations - d	lifferentiation of implicit functions - higher order d - maxima and minima of functions of a single variable.		ives -	- Tay	lor's	
nterpretations - d	- maxima and minima of functions of a single variable.		ives - $\frac{1}{1}$			
nterpretations - d Maclaurin's series Module:3 Integ Techniques of int	- maxima and minima of functions of a single variable.	6 hou	urs +	2 hou	ırs	
nterpretations - d Maclaurin's series Module:3 Integ Fechniques of interpreteis- evaluat	- maxima and minima of functions of a single variable. gral Calculus tegration - integration by parts- Partial fractions -	6 hou defin	urs +	2 hou ntegra	irs ils -	
nterpretations- dMaclaurin's seriesModule:3IntegFechniquesof integproperties- evaluatModule:4LinesDifferentialequation	 maxima and minima of functions of a single variable. gral Calculus tegration - integration by parts- Partial fractions - ion of area and volume by integration. ar Ordinary Differential Equations tons-definition and examples- formation of differentions of first order - solving second order homogenous 	6 hou defin 6 hou ial eq	irs + ite in irs + juation	2 hou ntegra 2 hou n- so	ırs Ils - ırs Ivin	
nterpretations - d Maclaurin's series Module:3 Integ Techniques of integ properties- evaluat Module:4 Lines Differential equation	- maxima and minima of functions of a single variable. ral Calculus tegration - integration by parts- Partial fractions - ion of area and volume by integration. ar Ordinary Differential Equations tons-definition and examples- formation of different ons of first order - solving second order homogenous ficients.	6 hou defin 6 hou ial eq differ	irs + ite in irs + juation	2 hou ntegra 2 hou n- so equa	irs ils - irs ivin ition	
nterpretations- dMaclaurin's seriesModule:3IntegTechniquesof integproperties-evaluatModule:4LinesDifferentialequationdifferentialequationwith constantcoeffModule:5Analyticgeometry	- maxima and minima of functions of a single variable. ral Calculus tegration - integration by parts- Partial fractions - ion of area and volume by integration. ar Ordinary Differential Equations tons-definition and examples- formation of different ons of first order - solving second order homogenous ficients.	6 hou defin 6 hou ial eq differ 5 hou	Irs + ite in Irs + quation ential Irs +	2 hou ntegra 2 hou n- so equa 2 hou	IITS IIS - IVIN IVIN ITS	
nterpretations- dMaclaurin's seriesModule:3IntegTechniquesof integproperties-evaluatModule:4LinesDifferentialequationdifferentialequationwith constantcoeffModule:5Analyticgeometry	 maxima and minima of functions of a single variable. gral Calculus tegration - integration by parts- Partial fractions - ion of area and volume by integration. ar Ordinary Differential Equations tons-definition and examples- formation of different ons of first order - solving second order homogenous ficients. ytic Geometry of three dimensions - direction cosines and direction r stance between points, distance to a plane. 	6 hou defin 6 hou ial eq differ 5 hou atios	Irs + ite in Irs + quation ential Irs +	2 hou ntegra 2 hou n- so equa 2 hou e, .str	ırs lls - lvin ition urs aigh	

Module:7	Logic and Probability				8 hours + 2 hours
Permutation	al logic - propositions - tru s and combinations - probabili multiplicative law - Bayes' the	ity - classic	al approa	ch - addi	
Module:8	Contemporary Issues				2 hours
Industry Exp	pert Lecture and R& D lecture				
		Tot	al Lectur	e hours:	45 hours
		Tota	al Tutoria	al hours:	15 hours
Text Book (s					
1. Engine	ering Mathematics, K. A. St	troud and	Dexter J.	Booth,	ih Edition, Palgrave
Macmi	llan (2013).				
Reference B	ooks				
1. 1. Publishe	B.S. Grewal, Higher Engineers	eering Ma	thematics,	, 2020, 4	44th Edition, Khanna
2. S. Lipsc	hutz and M. Lipson, Discrete M	lathematics	s, 6th Editi	ion, Tata	McGraw -Hill (2017).
-	hutz and J. Schiller Introductio Graw -Hill (2017).	on to Probal	bility and	Statistics	s, , 3rd Indian Edition,
Mode of F FAT	Evaluation: Digital Assignmen	nts (Solutio	ns by usi	ng soft sl	kill), Quiz, CAT,
Recomme	nded by Board of Studies	24-06-20	21		
	by Academic Council	No. 63	Date	23-09-	

NON-GRADED CORE REQUIREMENT (2021-2022)

Sl.No.	Course Code	Course Title	Page No.
1.	BCHY102N	Environmental Sciences	
2.	BCSE101N	Introduction to Engineering	201
3.	BHUM101N	Ethics and Values	202
4.	BSSC101N	Essence of Traditional Knowledge	
5.	BSSC102N	Indian Constitution	204
6.	BEXC100N	Extracurricular Activities /	
		Co-Curricular Activities - B.Tech. Programmes	

Course Co	le	Course Title	L	Т	Р	C	
BCSE101N Introduction to Engineering			0	0	0	1	
Pre-requisite Ni		Nil	Syllabus version				
			1.0				
Course Objec							
campus.		student comfortable and get familiarized with the					
2. To make the student aware of the exciting opportunities and usefulness of engineering to society.							
society.3. To make the student understand the philosophy of engineering.							
Course Outco	mes						
1. To know	the in	nfrastructure facilities available on campus					
2. To ration	ally u	tilize the facilities during their term for their profess	ional gro	wth			
3. To apprec	iate	the engineering principles, involve in life-long learn	ing and t	ake up)		
engineeri	ng pr	actice as a service to society					
General Guid		s d observe and involve in the activities during the indu					
 Student during the website. Student a organized b involving re 4. Activitie Student specified for evaluation 	shou gener shoul oy th evers s unc shou orma	s and those which are discipline-specific should be in ld get familiarized with the infrastructure facilitie ral induction, school induction programme and also ld attend the lecture by industries, including those of the School and probably involve in 'Do-it-yoursel e-engineering. Her 'Do-it-Yourself' will be detailed by the School. Id prepare a report on the activities and observation t, and submit the same in institutional LMS, VT ion on formatting: Document to be prepared with turns with font size of 12 to be used, photography	s availab o from th on career f' projec ons, as OP for	ole on ne inst oppo ets or per th furthe	titutio rtunit proje er ven ir	ies ects	
-		type with font size of 12 to be used; photographs the requirement; 1.5 line spacing to be used.	s can be	inclu		1 tł	
students		tion: Evaluation of the submitted report and inter	raction v	vith th	ne		
		by Board of Studies 02.07.2021	2021				
A DOROVED b	v AC	ademic Council No. 63 Date 23.09	2021				

Course Code	Course Title	L	Т	Р	C
BHUM101N	Ethics and Values	0 0		0	2
Pre-requisite	Nil	Sy	llabu	is vei	rsio
				1.0	
Course Objectives	3		-		
and polity. 2. To understand	and appreciate the ethical issues faced by an individual the negative health impacts of certain unhealthy behave he need and importance of physical, emotional health a	ior.			
Course Outcomes					
Students will be ab					
 Understand the Identify ethical use and citation subjects. 	ious social problems and learn to act ethically. concept of addiction and how it will affect the physica concerns in research and intellectual contexts, includin n of sources, the objective presentation of data, and the in typologies, characteristics, activities, actors and form	ng aca e trea	demie tment	c inte of h	grit uma
	g Good and Responsible uch as truth and non-violence - Comparative analysis of	n lead	lers o	f past	t and
Gandhian values su present - Society's needy, charity and Module:2 Socia	ach as truth and non-violence - Comparative analysis of interests versus self-interests - Personal Social Respon serving the society.			-	
Gandhian values su present - Society's needy, charity and Module:2 Socia	inch as truth and non-violence - Comparative analysis of interests versus self-interests - Personal Social Respon serving the society.			-	
Gandhian values su present - Society's needy, charity and Module:2 Socia Harassment - Type Module:3 Socia Corruption: Ethica	ach as truth and non-violence - Comparative analysis of interests versus self-interests - Personal Social Respon serving the society. Il Issues 1 as - Prevention of harassment, Violence and Terrorism.	sibili	ty: He	elping	g the
Gandhian values su present - Society's needy, charity and Module:2 Socia Harassment - Type Module:3 Socia Corruption: Ethica collar crimes - Tax	 ach as truth and non-violence - Comparative analysis of interests versus self-interests - Personal Social Responserving the society. al Issues 1 as - Prevention of harassment, Violence and Terrorism. al Issues 2 al values, causes, impact, laws, prevention - Electoral 	sibili	ty: He	elping	g the
Gandhian values supresent - Society's needy, charity andModule:2SociaModule:3SociaCorruption:EthicaCollar crimes - TaxModule:4Module:4AddidPeer pressure - AlSmoking - Prevenpregnancy and SexModule:5Module:5Drug	 ach as truth and non-violence - Comparative analysis of interests versus self-interests - Personal Social Responserving the society. al Issues 1 as - Prevention of harassment, Violence and Terrorism. al Issues 2 al values, causes, impact, laws, prevention - Electoral evasions - Unfair trade practices. action and Health coholism: Ethical values, causes, impact, laws, prevention and imually Transmitted Diseases. abuse 	malpi malpi ntion	ty: He ractice	elping es; W effect re-ma	g the
Gandhian values su present - Society's needy, charity andModule:2SociaModule:3SociaHarassment - TypeModule:3SociaCorruption: Ethica collar crimes - TaxModule:4AddiPeer pressure - Al smoking - Preven pregnancy and SexModule:5DrugAbuse of different	 ach as truth and non-violence - Comparative analysis of interests versus self-interests - Personal Social Responserving the society. al Issues 1 as - Prevention of harassment, Violence and Terrorism. al Issues 2 al values, causes, impact, laws, prevention - Electoral evasions - Unfair trade practices. action and Health coholism: Ethical values, causes, impact, laws, prevention and imually Transmitted Diseases. 	malpi malpi ntion	ty: He ractice	elping es; W effect re-ma	g the
Gandhian values su present - Society's needy, charity and Module:2Module:2Socia SociaHarassment - TypeModule:3SociaCorruption: Ethica collar crimes - TaxModule:4Addi Peer pressure - Al smoking - Preven pregnancy and SexModule:5Drug Abuse of different prevention.Module:6Perso	 ach as truth and non-violence - Comparative analysis of interests versus self-interests - Personal Social Responserving the society. I Issues 1 I Issues 1 I Issues 2 I values, causes, impact, laws, prevention - Electoral evasions - Unfair trade practices. ction and Health coholism: Ethical values, causes, impact, laws, prevention and imually Transmitted Diseases. Abuse types of legal and illegal drugs: Ethical values, cause 	malpi malpi ntion	ty: He ractice	elping es; W effect re-ma	g the
Gandhian values su present - Society's needy, charity and Module:2Module:2Socia SociaHarassment - TypeModule:3SociaCorruption: Ethica collar crimes - TaxModule:4Addi Peer pressure - Al smoking - Preven pregnancy and SexModule:5Drug Abuse of different prevention.Module:6Perso	 ach as truth and non-violence - Comparative analysis of interests versus self-interests - Personal Social Responserving the society. al Issues 1 as - Prevention of harassment, Violence and Terrorism. al Issues 2 al values, causes, impact, laws, prevention - Electoral evasions - Unfair trade practices. action and Health coholism: Ethical values, causes, impact, laws, prevention and imually Transmitted Diseases. a Abuse a types of legal and illegal drugs: Ethical values, cause 	malpi malpi ntion	ty: He ractice	elping es; W effect re-ma	g the
Gandhian values su present - Society's needy, charity andModule:2SociaModule:3SociaHarassment - TypeModule:3Module:3SociaCorruption: Ethica collar crimes - TaxModule:4AddiPeer pressure - Al smoking - Preven pregnancy and SexModule:5DrugAbuse of different prevention.Module:6PersoDishonesty - Steali	 ach as truth and non-violence - Comparative analysis of interests versus self-interests - Personal Social Responserving the society. I Issues 1 I Issues 1 I Issues 2 I values, causes, impact, laws, prevention - Electoral evasions - Unfair trade practices. ction and Health coholism: Ethical values, causes, impact, laws, prevention and imually Transmitted Diseases. Abuse types of legal and illegal drugs: Ethical values, cause 	malpi malpi ntion	ty: He ractice	elping es; W effect re-ma	g the

			Total	Lecture hours:	60 hours			
Тех	xt Book(s)							
1.	R R Gaur, R Asthana, G P Bagaria,	"A Founda	tion Cou	rse in Human V	alues and			
	Professional Ethics", 2019, 2nd Revised Edition, Excel Books, New Delhi.							
2.	Hartmann, N., "Moral Values", 2017, United Kingdom: Taylor & Francis.							
Ref	ference Books							
1.	Rachels, James & Stuart Rachels, "The New York: McGraw-Hill Education.	Elements of	of Moral P	Philosophy", 9th	edition, 2019,			
2.	Blackburn, S. "Ethics: A Very Short In	ntroductior	n", 2001, C	Oxford Universit	y Press.			
3.	Dhaliwal, K.K, "Gandhian Philosophy Presupposition and Precepts", 2016, W				etween his			
4.	Ministry of Social Justice and Empow 2019, Government of India.	erment, "N	lagnitude	of Substance Us	e in India",			
5.	Ministry of Home Affairs, "Accidenta Government of India.	l Deaths ar	nd Suicide	s in India", 2019	,			
6.	Ministry of Home Affairs, "A Handbo 2018, Government of India.	Ministry of Home Affairs, "A Handbook for Adolescents/ Students on Cyber Safety", 2018, Government of India.						
N	Iode of Evaluation: Poster making, Qu	iz and Te	rm End -	Quiz				
R	Recommended by Board of Studies	27-10-20	21					
Α	pproved by Academic Council	No. 64	Date	16-12-2021				

	Course Title	L	Т	P	С
BSSC102N	Indian Constitution	0	0	0	2
Pre-requisite	Nil	Syllabus version			
Course Objectives					
	introduction of Indian Constitution and basic concept anding the Constitution of India.	ts hig	hligh	ted ir	n th
Course Outcomes					
 A basic underst The ability to un the course to cu 	burse, the student will acquire: tanding of Constitution of India. Inderstand the contemporary challenges and apply the kn urrent social contemporary legal issues. ling of constitutional remedies.	owlee	dge ga	ained	fro
	duction to Indian Constitution constitution of India and the Preamble - Sources of In			ours	
Principles of state		l Dut			
	n Government and its Administration Structure of		8 h	ours	
the li	ndian Union				
Federalism, Centre and Council of mi	ndian Union - State relationship - President: Role, Power and Positiv nisters - Cabinet and Central Secretariat - Lok Sabha High Court: Powers and Functions.				
Federalism, Centre and Council of mi Supreme Court and	- State relationship - President: Role, Power and Positionisters - Cabinet and Central Secretariat - Lok Sabha		ya Sa		
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