Your Dreams Our Goal

POORNIMA UNIVERSITY

Member of Association of Indian Universities & Approved by UGC (Govt. of India) under 2(f) & 12(B)

FACULTY OF COMPUTER SCIENCE & ENGINEERING

EPARTMENT OF COMPUTER SCIENCE & ENGINEERING

SCHEME & SYLLABUS BOOKLET

B.Tech. (General) BATCH 2022-2026

B. TECH CE

SCHEME & SYLLABUS

BATCH: 2022-26

INDEX

Disclaimer: The scheme, syllabus and other materials published in this booklet may be changed or modified as per the requirement after approval of competent authority. The decision taken by the management of Poornima University will be final and abiding to all.

Student Details

Name of Student:

Name of Program:

Semester: Year: Batch:

Faculty of:

Your Dreams Our Goal

POORNIMA UNIVERSITY

Member of Association of Indian Universities & Approved by UGC (Govt. of India) under 2(f) & 12(B)

VISION

To create knowledge based society with scientific temper, team spirit and dignity of labor to face global competitive challenges.

Mission

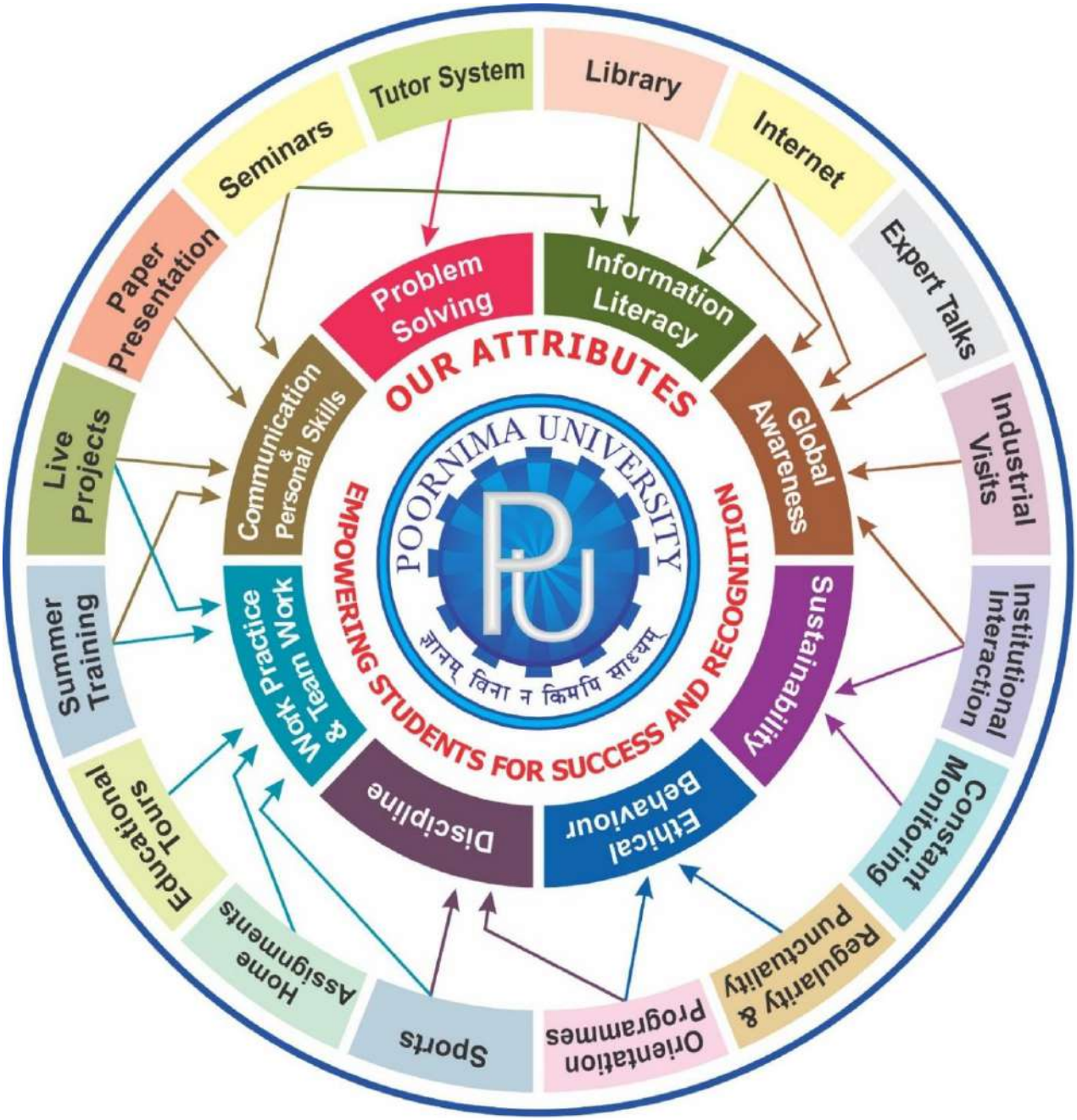
To evolve and develop skill based systems for effective delivery of knowledge so as to equip young professionals with dedication and commitment to excellence in all spheres of life.

Quality Policy

To provide Quality Education through Faculty development, updating of facilities and continual improvement meeting University norms and keeping stake holders satisfied.

Knowledge Wheel

At Poornima, the academic atmosphere is a rare blend of modern technical as well as soft skills and traditional systems of learning processes.



About Program and Program Outcomes (PO):

Title of the Programme: Bachelor of Technology (B. Tech.)

Nature of the Programme: B. Tech. is four-year full-time programme.

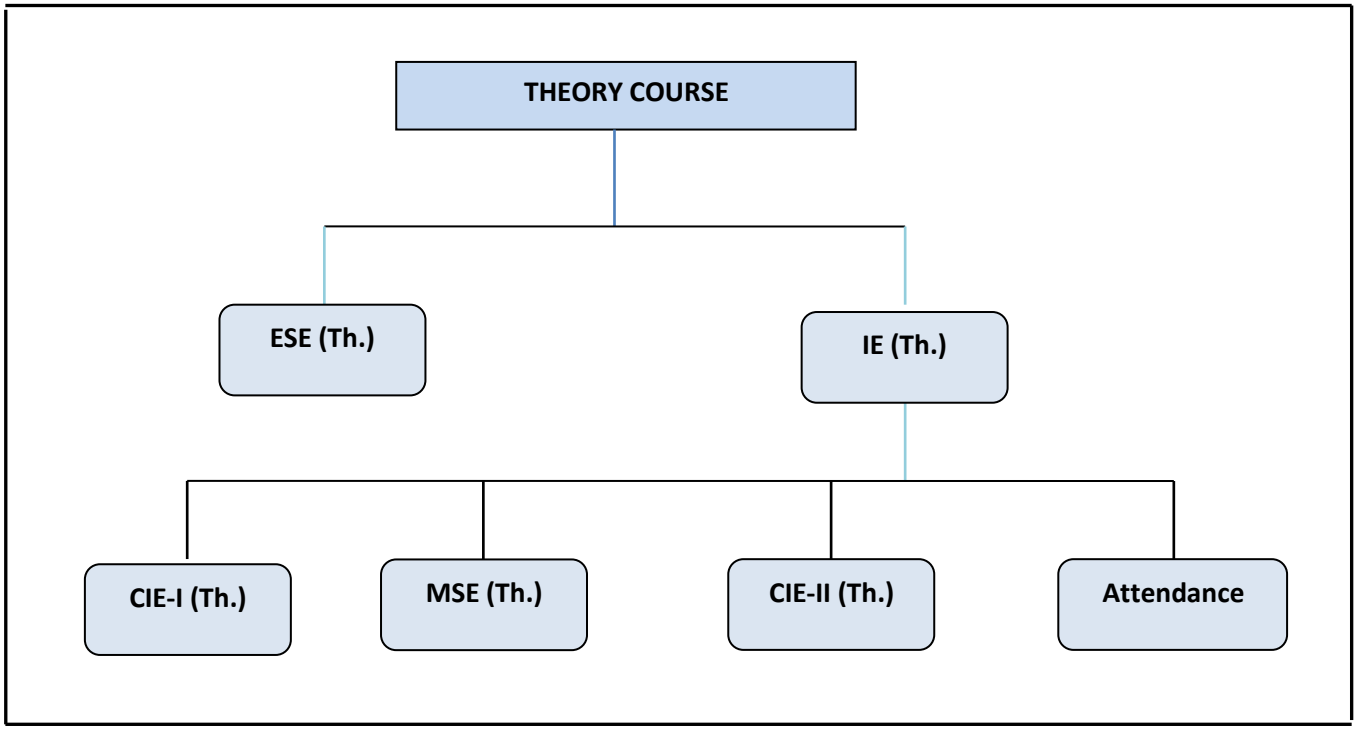
Program Outcomes (PO) :

Engineering Graduates will be able to:

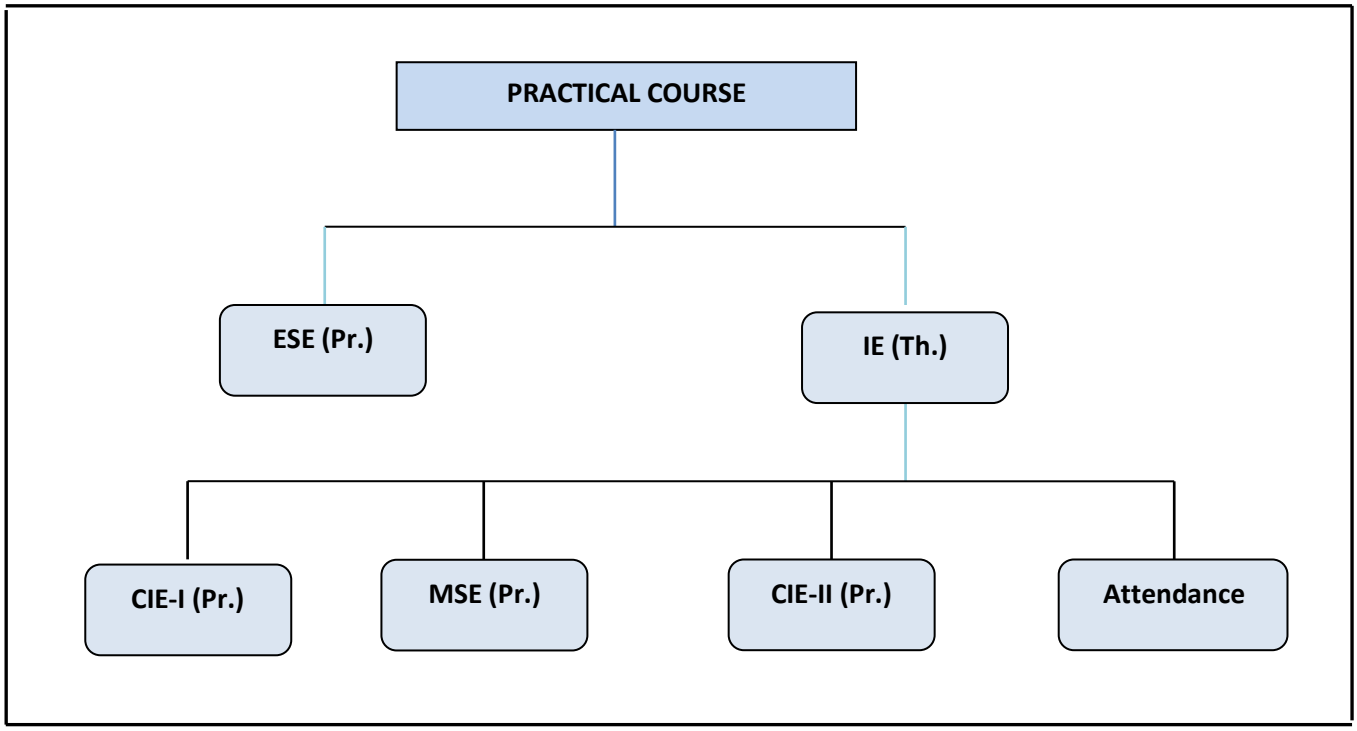
1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Examination System:

A. Marks Distribution of Theory Course:



B. Marks Distribution of Practical Course :



Th. : Theory, **Pr.** : Practical, **ESE:** End Semester Examination, **MSE:** Mid Semester Examination, **CIE:** Continuous Internal Evaluation.

Marks Distribution of Attendance:

Guidelines for Marks Distribution of Attendance Component		
S No.	**Total Course Attendance (TCA) range in Percentage**	**Marks allotted (out of 10)**
1	95% ≤ TCA	10
2	90% ≤ TCA < 95%	9
3	85% ≤ TCA < 90%	8
4	80% ≤ TCA < 85%	7
5	70% ≤ TCA < 80%	6
6	60% ≤ TCA < 70%	5
7	50% ≤ TCA < 60%	4
8	40% ≤ TCA < 50%	3
9	30% ≤ TCA < 40%	2
10	20% ≤ TCA < 30%	1
11	TCA < 20%	0

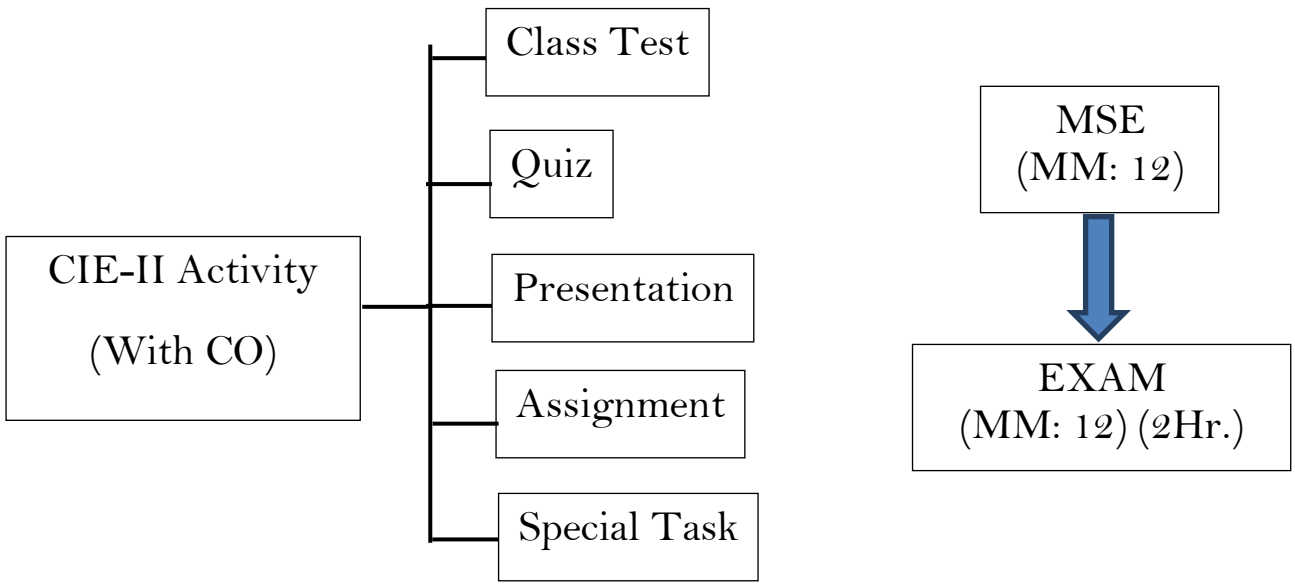
CO Wise Marks Distribution:

	Theory Subject		**Practical/ Studio Subject**	
	Maximum Marks	**CO to be Covered**	**CO to be Covered**	**Maximum Marks**
CIE-I (Class Test)	12 (6 + 6)	1 & 2	1 & 2	20 (10 + 10)
MSE	12 (6 + 6)	3 & 4	3 & 4	20 (10 + 10)
CIE-II (Activity/ Assignment)	6 (6)	5	5	10 (10)
Attendance	10	-	-	10
ESE	60	-	-	40
TOTAL	100	-	-	100

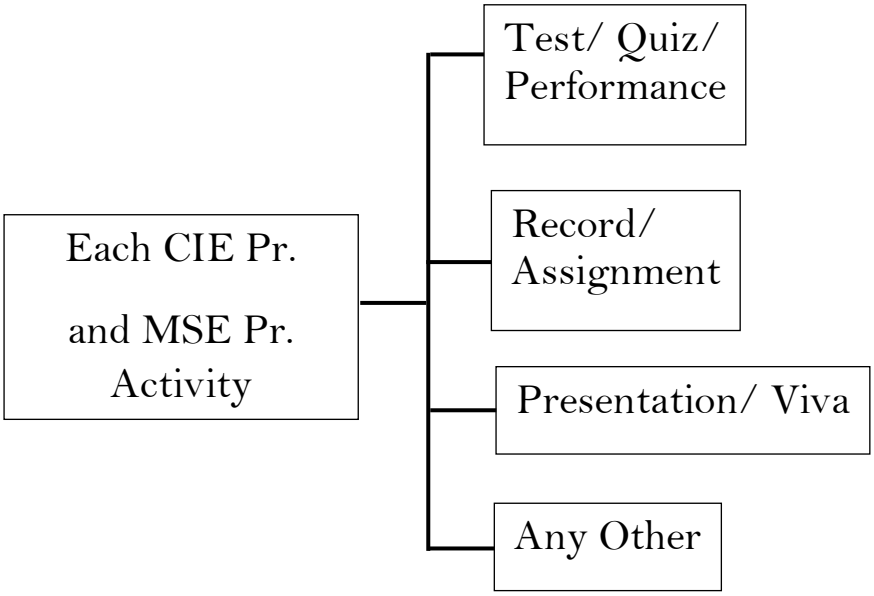
Minimum Passing Percentage in All Exams:

S. No.	Program	Minimum Passing Percentage in All Exam	
		ESE Component	Total Component
1	Course Work for Ph. D Registration	----------	**50 %**
2	B. Arch.	45 %	**50 %**
3	MBA, MHA, MPH, MCA, M. Tech., M. Plan. and M. Des.	40 %	40 %
4	B. Tech., B. Des., BCA, B.Sc., BVA, B. Voc., BBA, B.Com., B.A. and Diploma	35 %	40 %
5	B. Sc. (Hospitality & Hotel Administration)	35 %	40 % (Theory) & 50 % (Practical)

Break-up of Internal Exam (Theory):



Break-up of Internal Exam (Practical):



Assessment & Grade Point Average: SGPA, CGPA:

SGPA Calculation

$$\textbf{SGPA} = \frac{C_1G_1+C_2G_2+\cdots\ldots\ldots\ldots\ldots C_nG_n}{C_1+C_2+\cdots\ldots\ldots\ldots\ldots C_n}$$

$\textbf{SGPA} = \frac{\sum_i C_i \times G_i}{\sum_i C_i}$	Where (as per teaching Scheme & Syllabus) : C_i is the number of Credits of Courses i, G_i is the Grade Point for the Course i and i = 1, 2…….n n = number of courses in a programme in the Semester

CGPA Calculation

$$\textbf{CGPA} = \frac{C_1G_1+C_2G_2+\cdots\ldots\ldots\ldots\ldots C_nG_n}{C_1+C_2+\cdots\ldots\ldots\ldots\ldots C_n}$$

$\textbf{CGPA} = \frac{\sum_i C_i \times G_i}{\sum_i C_i}$	Where (as per teaching Scheme & Syllabus) : C_i is the number of Credits of Courses i, G_i is the Grade Point for the Course i and i = 1, 2…….n n = number of courses in a programme of all the Semester up to which CGPA is computed.

Grading Table:

Grading Table-A: For B.Arch. and course work for Ph.D. Registration

Academic Performance	Grade	Grade Point	Marks Range (in %)
Outstanding	A+	10	$90 \leq x \leq 100$
Excellent	A	9	$80 \leq x < 90$
Very good	B+	8	$70 \leq x < 80$
Good	B	7	$60 \leq x < 70$
Average	C	6	$50 \leq x < 60$
Fail	F	0	$x<50$

Grading Table-B: For all courses except B.Arch. and course work for Ph.D. Registration

Academic Performance	Grade	Grade Point	Marks Range (in %)
Outstanding	A+	10	$90 \leq x \leq 100$
Excellent	A	9	$80 \leq x < 90$
Very good	B+	8	$70 \leq x < 80$
Good	B	7	$60 \leq x < 70$
Average	C	6	$50 \leq x < 60$
Satisfactory	D	5	$40 \leq x < 50$
Fail	F	0	$x<40$

Calculation of SGPA

$$SGPA = \frac{\sum_i C_i \times G_i}{\sum_i C_i}$$

$$SGPA = \frac{C_1G_1 + C_2G_2 + \ldots\ldots\ldots + C_nG_n}{C_1 + C_2 + \ldots\ldots + C_n}$$

Calculation of CGPA

$$CGPA = \frac{\sum_i C_i \times G_i}{\sum_i C_i}$$

$$CGPA = \frac{C_1G_1 + C_2G_2 + \ldots\ldots\ldots + C_nG_n}{C_1 + C_2 + \ldots\ldots + C_n}$$

where (as per teaching scheme & syllabus): C_i is the number of credits of subject i, G_i is the Grade Point for the subject I and i = 1 to n, n = number of subjects in a course in the semester

Award of Class:

CGPA	Equivalent Division
7.50 ≤ CGPA	First Division with Distinction
6.50 ≤ CGPA < 7.50	First Division
5.50 ≤ CGPA < 6.50	Second Division
4.50 ≤ CGPA < 5.50	Pass Class

The multiplication factor for conversion of CGPA to percentage is Equivalent % of Marks = (CGPA-0.5) x 10.

For Example if CGPA = 5.5 then % is (5.5-0.5) x 10 = 50%.

Guidelines for MOOC COURSES:

1. Applicable from the session 2020 – 21 onwards, for students aspiring for HONOURS Degree.
2. The UGC has issued UGC (Credit Framework for Online Learning Courses) Regulation, 2016. These shall apply to all universities established or incorporated by or under a Central Act, a Provincial Act, or a State/Union Territory Act and all institutions recognized by or affiliated to such Universities and all institutions deemed to be universities under Section 3 of the UGC Act, 1956.
3. All India Council for Technical Education (AICTE) has introduced Model Curriculum for Bachelor programs of 4 years/ 3 Years, and additional credits will be required to be done for the degree of Bachelor program with Honors. These additional credits will have to be acquired with online courses (MOOCs) as per AICTE.
4. This creates an excellent opportunity for students to acquire the necessary skill set for employability through massive online courses where the rare expertise of world-famous experts from academics and industry are available.
5. Students are required to complete additional credits through MOOCs within 4 years/ 3years of time (whatever be applicable time for the completion of registered program) so as to become eligible for Honors degree as per norms.
6. It is necessary to complete minimum MOOCs credit course as mentioned below for becoming eligible for the Honors degree in the registered program.
7. MOOC Course Credits shall be calculated as per details given below:
8. Student are required to give the prior information about MOOCs courses to his respective HOD and COE, in which he/she wants to register for online certification.
9. After getting permission from respective HOD, a student can register for the MOOC certification courses.
10. After successful completion of the said MOOC course, the student shall submit the certificate of completion to the respective department. If he/ she fails to provide the certificates of MOOC courses before last teaching day of the semester then these certificates will not be considered later.

Required credits for Honors:

S. No	Program Duration	Required credits for Honors
1.	2- Year	10- Credits
2.	3- Year	15- Credits
3.	4-Year	20- Credits

S. No	NPTEL/ SWAYAM Course duration (in weeks)	Equivalent Credits
1	4	2
2	8	3
3	12	4

Attached Items:

Open Elective Booklet	Annexure-1
Soft Skills Booklet	Annexure-2
Value Added Course Booklet	Annexure-3

Bachelor of Technology in Computer Engineering

Scheme Batch 2022-26

POORNIMA UNIVERSITY

Faculty of Engineering & Technology

Faculty of Computer Science and Engineering

Department of First Year

Batch: 2022-26

Name of Programs

B.Tech. (ME/EE/Civil)	**B.Tech. (Electrical and Computer Engineering)**
B.Tech. ME/EE (spec. in Hybrid & Electric vehicles)	**B.Tech. (Computer Engineering)**

Teaching Scheme for Year I Semester I

Course Code	Course Name	Teaching Scheme (Hrs per Week)			Marks Distribution			Credits
		Lecture (L)	Tutorials (T)	Practical (P)	IE	ESE	Total	
A.	**University Core Courses**							
BULCSA1101	Environmental Studies	**2**	**-**	**-**	**40**	**60**	**100**	**2**
B.	**Department Core Courses**							
B.1	**Theory**							
BTXCSA1101 / BTXCSA1102	Engineering Mathematics / Engineering Physics	**3**	**1**	**-**	**40**	**60**	**100**	**3**
BTXCEE1103 / BTXCME1104	Electrical & Electronics Engineering / Engineering Mechanics	**3**	**1**	**-**	**40**	**60**	**100**	**3**
BTXCCE1105/ BTXCEE1106	Programming in C / Introduction to Futuristic Technologies	**3**	**-**	**-**	**40**	**60**	**100**	**3**
BTXCCE1107	Fundamentals of Computing	**3**	**-**	**-**	**40**	**60**	**100**	**3**
B.2	**Practical**							
BTXCME1201 / BTXCSA1202	Machine Drawing Lab / Engineering Physics Lab-1	**-**	**1**	**2**	**60**	**40**	**100**	**1**
BTXCEE1203 / BTXCME1204	Electrical &Electronics Engineering Lab / Workshop Practice	**-**	**1**	**2**	**60**	**40**	**100**	**1**
BTXCCE1205 / BTXCME1206	Programming in C Lab / Practical Geometry	**-**	**1**	**2**	**60**	**40**	**100**	**1**
BTXCHM1207/ BTXCHM1208	Foundation English / Language Lab	**-**	**-**	**2**	**60**	**40**	**100**	**1**
C.	**Department Elective**							
	NIL							
D.	**Open Elective**							
	NIL							
E.	**Humanities and Social Sciences including Management courses (AECC)**							
	NIL							
F.	**Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere**							
BTXCTX1301	Project	**-**	**-**	**4**	**60**	**40**	**100**	**2**
G.	**Discipline, Value Added Courses & Social Outreach**							
BTXCTX1601	Discipline, Value Added Courses & Social Outreach	**-**	**-**	**-**	**50**	**-**	**50**	**1**
BTXCTX1602	Talent Enrichment Programme (TEP)-I	**1**	**-**	**-**				
BTXCTX1603	Library / MOOC / NSP	**1**	**-**	**-**				
	Total	**16**	**05**	**12**				
	Total Teaching Hours	**33**						**21**

POORNIMA UNIVERSITY

Faculty of Engineering & Technology
Faculty of Computer Science and Engineering

Department of First Year

Batch: 2022-26

Name of Programs: B.Tech. (Computer Engineering)

Teaching Scheme for Year I Semester II

Course Code	Course Name	Teaching Scheme (Hrs per Week)			Marks Distribution			Credits
		Lecture (L)	Tutorials (T)	Practical (P)	IE	ESE	Total	
A.	**University Core Courses**							
B.	**Department Core Courses**							
B.1	**Theory**							
BTXCSA2101	Engineering Chemistry	**3**	**-**	**-**	**40**	**60**	**100**	**3**
BTXCSA2102 / BTXCSA2103	Engineering Mathematics / Engineering Physics	**3**	**1**	**-**	**40**	**60**	**100**	**3**
BTXCEE2104 / BTXCME2105	Electrical & Electronics Engineering / Engineering Mechanics	**3**	**1**	**-**	**40**	**60**	**100**	**3**
BTXCCE2106/ BTXCEE2107	Programming in C / Introduction to Futuristic Technologies	**3**	**-**	**-**	**40**	**60**	**100**	**3**
B.2	Practical							
BTXCSA2201	Engineering Chemistry Lab		**-**	**2**	**60**	**40**	**100**	**1**
BTXCME2202 / BTXCSA2203	Machine Drawing Lab / Engineering Physics Lab-1	**-**	**1**	**2**	**60**	**40**	**100**	**1**
BTXCEE2204 / BTXCME2205	Electrical &Electronics Engineering Lab / Workshop Practice	**-**	**1**	**2**	**60**	**40**	**100**	**1**
BTXCCE2206 / BTXCME2207	Programming in C Lab / Practical Geometry	**-**	**1**	**2**	**60**	**40**	**100**	**1**
BTXCHM2208/ BTXCHM2209	Foundation English / Language Lab	**-**	**-**	**2**	**60**	**40**	**100**	**1**
BCECCE2210	Introduction to Web Technology	**-**	**1**	**2**	**60**	**40**	**100**	**1**
C.	**Department Elective**							
	NIL							
D.	**Open Elective: Anyone**							
	As per Annexure-I	**2**	**-**	**-**	**40**	**60**	**100**	**2**
E.	**Humanities and Social Sciences including Management courses**							
	NIL							
F.	**Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere**							
	NIL							
G.	**Discipline, Value Added Courses & Social Outreach**							
BTXCTX2601	Discipline, Value Added Courses & Social Outreach	**-**	**-**	**-**	**50**	**-**	**50**	**1**
BTXCTX2602	Talent Enrichment Programme (TEP)-II	**-**	**-**	**-**				
BTXCTX2603	Library / MOOC / NSP	**1**	**-**	**-**		**-**		
	Total	**15**	**06**	**12**				
	Total Teaching Hours	**33**						**21**

POORNIMA UNIVERSITY								
Faculty of Computer Science & Engineering								
Department of Computer Science & Engineering								
Name of Program: B.Tech. in Computer Engineering								
Teaching Scheme for Year II Semester III							**Batch: 2022-26**	
Course Code	**Course Name**	**Teaching Scheme (Hrs per Week)**			**Marks Distribution**			**Credits**
		Lecture (L)	**Tutorials (T)**	**Practical (P)**	**IE**	**ESE**	**Total**	
A.	**University Core Courses**							
B.	**Department Core Courses**							
B.1	**Theory**							
BCECSA3101	Advanced Engineering Mathematics	**3**	**-**	**-**	**40**	**60**	**100**	**3**
BCECCE3102	Data Structures and Algorithms	**3**	**-**	**-**	**40**	**60**	**100**	**3**
BCECCE3103	OOPs with Java	**3**	**-**	**-**	**40**	**60**	**100**	**3**
BCECCE3104	Operating System	**3**	**-**	**-**	**40**	**60**	**100**	**3**
B.2	**Practical**							
BCECCE3201	Data Structures and Algorithms Lab	**-**	**-**	**2**	**60**	**40**	**100**	**1**
BCECCE3202	OOPs with Java Lab	**-**	**-**	**2**	**60**	**40**	**100**	**1**
BCECCE3203	Operating System Lab	**-**	**-**	**2**	**60**	**40**	**100**	**1**
BCECCE3204	Linux Lab	**-**	**-**	**2**	**60**	**40**	**100**	**1**
C.	**Department Elective: Anyone**							
BCEECE3111	Computer Graphics	**3**	**-**	**-**	**40**	**60**	**100**	**3**
BCEECE3112	Fundamental of Data Science							
BCEECE3113	Cyber Crime Law & IPR							
BCEECE3114	Introduction to UI/UX							
D.	**Open Elective: Anyone**							
	As Per Annexure-I	**2**	**-**	**-**	**40**	**60**	**100**	**2**
E.	**Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course (AECC)**							
BULCHU3201	Communication Skills-I		**-**	**2**	**60**	**40**	**100**	**1**
F.	**Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere**							
			-	**-**	**-**	**-**	**-**	
G.	**Discipline, VAC & Social Outreach**							
BCECCE3601	Talent Enrichment Programme (TEP)	**-**	**-**	**2**	**-**	**-**	**-**	**1**
	Library / MOOC / Online Certification Courses	**-**	**-**	**2**	**-**	**-**	**-**	
	Non-Syllabus Project / Industrial Visit / CRT	**-**	**-**	**2**	**-**	**-**	**-**	
	Total	**17**		**16**				**23**
	Total Teaching Hours	**33**						

POORNIMA UNIVERSITY

Faculty of Computer Science & Engineering

Department of Computer Science & Engineering

Name of Program: B.Tech. in Computer Engineering

Teaching Scheme for Year II Semester IV **Batch: 2022-26**

Course Code	Course Name	Teaching Scheme (Hrs per Week)			Marks Distribution			Credits
		Lecture (L)	Tutorials (T)	Practical (P)	IE	ESE	Total	
A.	**University Core Courses**							
B.	**Department Core Courses**							
B.1	**Theory**							
BCECCE4101	Computer Networks	**3**	**-**	**-**	**40**	**60**	**100**	**3**
BCECCE4102	Information System Security	**3**	**-**	**-**	**40**	**60**	**100**	**3**
BCECCE4103	Relational Database Management System	**3**	**-**	**-**	**40**	**60**	**100**	**3**
BCECCE4104	Fundamentals of Python	**3**	**-**	**-**	**40**	**60**	**100**	**3**
B.2	**Practical**							
BCECCE4201	Computer Networks Lab	**-**	**-**	**2**	**60**	**40**	**100**	**1**
BCECCE4202	Relational Database Management System Lab	**-**	**-**	**2**	**60**	**40**	**100**	**1**
BCECCE4203	Interactive Web application development lab	**-**	**-**	**2**	**60**	**40**	**100**	**1**
BCECCE4204	Fundamentals of Python Lab	**-**	**-**	**2**	**60**	**40**	**100**	**1**
C.	**Department Elective: Anyone**							
BCEECE4111	Theory of Computation	**3**	**-**	**-**	**40**	**60**	**100**	**3**
BCEECE4112	Fundamentals of Machine Learning							
BCEECE4113	Security Audit & Risk Management							
BCEECE4114	Fundamentals of Game Marketing							
BCEECE4115	Installation and Configuration of Server							
D.	**Open Elective: Anyone**							
	As Per Annexure-I	**2**	**-**	**-**	**40**	**60**	**100**	**2**
E.	**Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course (AECC)**							
BULCHU4201	Communication Skills-II		**-**	**2**	**60**	**40**	**100**	**1**
F.	**Skill Enhancement Courses (SEC)OR Project work, Seminar and Internship in Industry or Elsewhere**							
			-	**-**	**-**	**-**	**-**	
G.	**Discipline, VAC & Social Outreach**							
BCECCE4601	Talent Enrichment Programme (TEP)	**-**	**-**	**2**	**-**	**-**	**-**	**1**
	Library / MOOC / Online Certification Courses	**-**	**-**	**2**	**-**	**-**	**-**	
	Non-Syllabus Project / Industrial Visit / CRT	**-**	**-**	**2**	**-**	**-**	**-**	
	Total	**17**		**16**				**23**
	Total Teaching Hours	**33**						

POORNIMA UNIVERSITY

Faculty of Computer Science & Engineering

Department of Computer Science & Engineering

Name of Program: B.Tech. in Computer Engineering

Teaching Scheme for Year III Semester V **Batch: 2022-26**

Course Code	Course Name	Teaching Scheme (Hrs per Week)			Marks Distribution			Credits
		Lecture (L)	Tutorials (T)	Practical (P)	IE	ESE	Total	
A.	**University Core Courses**							
B.	**Department Core Courses**							
B.1	**Theory**							
BCECCE5101	Design & Analysis of Algorithms	**3**		**-**	**40**	**60**	**100**	**3**
BCECCE5102	Software Engineering	**3**	**-**	**-**	**40**	**60**	**100**	**3**
BCECCE5103	Artificial Intelligence	**3**	**-**	**-**	**40**	**60**	**100**	**3**
BCECCE5104	Advance Java	**3**		**-**	**40**	**60**	**100**	**3**
B.2	**Practical**							
BCECCE5201	Design & Analysis of Algorithms Lab	**-**	**-**	**2**	**60**	**40**	**100**	**1**
BCECCE5202	Software Engineering Lab	**-**	**-**	**2**	**60**	**40**	**100**	**1**
BCECCE5203	Artificial Intelligence Lab	**-**	**-**	**2**	**60**	**40**	**100**	**1**
BCECCE5204	Advance Java Lab	**-**	**-**	**2**	**60**	**40**	**100**	**1**
C.	**Department Elective: Anyone**							
BCEECE5111	Advance Cloud Computing	**3**	**-**	**-**	**40**	**60**	**100**	**3**
BCEECE5112	Advance Artificial Intelligence							
BCEECE5113	Cloud Migration & Deployment							
BCEECE5114	PHP & MySQL							
BCEECE5115	Introduction to 3D Animation & Modeling							
D.	**Open Elective: Anyone**							
	As Per Annexure-I	**2**	**-**	**-**	**40**	**60**	**100**	**2**
E.	**Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course (AECC)**							
BULCHU5201	Human Values & Professional Ethics		**-**	**2**	**60**	**40**	**100**	**1**
F.	**Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere**							
			-	**-**	**-**	**-**	**-**	
G.	**Discipline, VAC & Social Outreach**							
BCECCE5601	Talent Enrichment Programme (TEP)	**-**	**-**	**2**	**-**	**-**	**-**	**1**
	Library / MOOC / Online Certification Courses	**-**	**-**	**2**	**-**	**-**	**-**	
	Non-Syllabus Project / Industrial Visit / CRT	**-**	**-**	**2**	**-**	**-**	**-**	
	Total	**17**		**16**				**23**
	Total Teaching Hours	**33**						

POORNIMA UNIVERSITY								
Faculty of Computer Science & Engineering								
Department of Computer Science & Engineering								
Name of Program: B.Tech. in Computer Engineering								
Teaching Scheme for Year III Semester VI							**Batch: 2022-26**	
Course Code	**Course Name**	**Teaching Scheme (Hrs per Week)**			**Marks Distribution**			**Credits**
		Lecture (L)	**Tutorials (T)**	**Practical (P)**	**IE**	**ESE**	**Total**	
A.	**University Core Courses**							
B.	**Department Core Courses**							
B.1	**Theory**							
BCECCE6101	Computer Architecture	**3**	**-**	**-**	**40**	**60**	**100**	**3**
BCECCE6102	Big Data Analytics	**3**	**-**	**-**	**40**	**60**	**100**	**3**
BCECCE6103	Server-Side Scripting	**3**	**-**	**-**	**40**	**60**	**100**	**3**
BCECCE6104	Software Testing	**3**	**-**	**-**	**40**	**60**	**100**	**3**
B.2	**Practical**							
BCECCE6201	Big Data Analytics Lab	**-**	**-**	**2**	**60**	**40**	**100**	**1**
BCECCE6202	Server-Side Scripting Lab	**-**	**-**	**2**	**60**	**40**	**100**	**1**
BCECCE6203	Software Testing Lab	**-**	**-**	**2**	**60**	**40**	**100**	**1**
C.	**Department Elective: Anyone**							
BCEECE6111	Block Chain	**3**	**-**	**-**	**40**	**60**	**100**	**3**
BCEECE6112	Sampling Method							
BCEECE6113	Security Analysis & Protocols							
BCEECE6114	Advance Scripting: Flask and RoR							
BCEECE6115	Web Programming for Graphics & Gaming							
D.	**Open Elective: Anyone**							
	As Per Annexure-I	**2**	**-**	**-**	**40**	**60**	**100**	**2**
E.	**Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course (AECC)**							
BULCHU6201	Professional Skills-I		**-**	**2**	**60**	**40**	**100**	**1**
F.	**Skill Enhancement Courses (SEC)OR Project work, Seminar and Internship in Industry or Elsewhere**							
BCECCE6401	Industrial Training Seminar-I		**-**	**2**	**60**	**40**	**100**	**1**
G.	**Discipline, VAC & Social Outreach**							
BCECCE6601	Talent Enrichment Programme (TEP)	**-**	**-**	**2**	**-**	**-**	**-**	**1**
	Library / MOOC / Online Certification Courses	**-**	**-**	**2**	**-**	**-**	**-**	
	Non-Syllabus Project / Industrial Visit / CRT	**-**	**-**	**2**	**-**	**-**	**-**	
	Total	**17**	**0**	**16**				**23**
	Total Teaching Hours	**33**						

POORNIMA UNIVERSITY

Faculty of Computer Science & Engineering

Department of Computer Science & Engineering

Name of Program: B.Tech. in Computer Engineering

Teaching Scheme for Year IV Semester VII **Batch: 2022-26**

Course Code	Course Name	Teaching Scheme (Hrs per Week)			Marks Distribution			Credits
		Lecture (L)	Tutorials (T)	Practical (P)	IE	ESE	Total	
A.	**University Core Courses**							
B.	**Department Core Courses**							
B.1	**Theory**							
BCECCE7101	Internet of Things	**3**	**-**	**-**	**40**	**60**	**100**	**3**
BCECCE7102	Data Mining	**3**	**-**	**-**	**40**	**60**	**100**	**3**
BCECCE7103	Compiler Construction	**3**	**-**	**-**	**40**	**60**	**100**	**3**
B.2	**Practical**							
BCECCE7201	Data Mining Lab	**-**		**2**	**60**	**40**	**100**	**1**
BCECCE7202	Compiler Construction Lab	**-**	**-**	**2**	**60**	**40**	**100**	**1**
C.	**Department Elective: Anyone**							
BCEECE7111	Software Define Network	**3**	**-**	**-**	**40**	**60**	**100**	**3**
BCEECE7112	Time Series Analysis							
BCEECE7113	Cyber Threat intelligence & Bug Bounting							
BCEECE7114	Multiplayer Programming							
BCEECE7115	Fundamental of Exchange Server							
D.	**Open Elective: Anyone**							
	As Per Annexure-I	**2**	**-**	**-**	**40**	**60**	**100**	**2**
E.	**Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course (AECC)**							
BULCHU7201	Leadership & Management Skills		**-**	**2**	**60**	**40**	**100**	**1**
BULCHU7202	Professional Skills-II		**-**	**2**	**60**	**40**	**100**	**1**
F.	**Skill Enhancement Courses (SEC)OR Project work, Seminar and Internship in Industry or Elsewhere**							
BCECCE7301	Minor Project	**-**	**-**	**4**	**60**	**40**	**100**	**2**
BCECCE7401	Industrial Training Seminar-II	**-**	**-**	**2**	**60**	**40**	**100**	**1**
G.	**Discipline, VAC & Social Outreach**							
BCECCE7601	Talent Enrichment Programme (TEP)	**-**	**-**	**1**	**-**	**-**	**-**	**1**
	Library / MOOC / Online Certification Courses	**-**	**-**	**2**	**-**	**-**	**-**	
	Non-Syllabus Project / Industrial Visit / CRT	**-**	**-**	**2**	**-**	**-**	**-**	
	Total	**14**		**19**				**22**
	Total Teaching Hours	**33**						

POORNIMA UNIVERSITY								
Faculty of Computer Science & Engineering								
Department of Computer Science & Engineering								
Name of Program: B.Tech. in Computer Engineering								
Teaching Scheme for Year IV Semester VIII							Batch: 2022-26	
Course Code	Course Name	Teaching Scheme(Hrs per Week)			Marks Distribution			Credits
		Lecture(L)	Tutorials (T)	Practical(P)	IE	ESE	Total	
A.	University Core Courses							
B.	Department Core Courses							
B.1	Theory							
B.2	Practical							
C.	Department Elective: Anyone							
D.	Open Elective: Anyone							
	NIL							
E.	Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course (AECC)							
F.	Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere							
BCECCE8301	Major Project/Dissertation	-	-	22	60	40	100	11
G.	Discipline, VAC & Social Outreach							
BCECCE8601	Talent Enrichment Programme (TEP)	-	-	3	-	-	-	1
	Library / MOOC / Online Certification Courses	-	-	6	-	-	-	
	Non-Syllabus Project / Industrial Visit / CRT	-	-	2	-	-	-	
	Total		-	33				12
	Total Teaching Hours	33						

I SEMESTER

UNIVERSITY CORE COURSES

Code: BULCSA1101	ENVIRONMENTAL STUDIES	2.0 Credits [LTP: 2-0-0]

COURSE OUTCOME

Students will be able to:

- Explain the concept of ecology, ecosystem and biodiversity.
- Implement innovative ideas of controlling different categories of Environmental Pollution.
- Explain different environmental issues together with various Environmental Acts, regulations and International Agreements.
- Summarize social issues related to population, resettlement and rehabilitation of project affected persons and demonstrate disaster management with special reference to floods, earthquakes, cyclones, landslides.
- Determine the local environmental assets with simple ecosystems and identify local flora and fauna

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	**Introduction to environmental studies**	6
2.	**Environmental Pollution and its control**	5
3.	**Environmental Policies & Practices**	5
4.	**Human Communities and the Environment**	5
5.	**Field work**	5

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to environmental studies**
	• Introduction of Unit • Multidisciplinary nature of environmental studies • Concept of sustainability and sustainable development. • Ecosystem: Structure and function of ecosystem • Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies\ • Case studies of the following ecosystems: Forest ecosystem, Grassland ecosystem, Desert ecosystem Aquatic ecosystems • Biodiversity and Conservation • Conclusion of Unit including Real Life Application
2.	**Environmental Pollution and its control**
	• Introduction of Unit • Environmental pollution: types, causes, effects and controls; Air, water, soil and noise pollution • Nuclear hazards and human health risks • Solid waste management: Control measures of urban and industrial waste. • Pollution case studies

	• Conclusion of Unit including Real Life Application
3.	**Environmental Policies & Practices**
	• Introduction of Unit • Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture • Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies. • Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. • International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD) • Conclusion of Unit including Real Life Application
4.	**Human Communities and the Environment**
	• Introduction of Unit • Human population growth: Impacts on environment, human health and welfare. • Resettlement and rehabilitation of project affected persons; case studies. • Disaster management: floods, earthquake, cyclones and landslides. • Conclusion of Unit including Real Life Application
5.	**Field work**
	• Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc. • Visit to a local polluted site-Urban/Rural/Industrial/Agricultural. • Study of common plants, insects, birds and basic principles of identification. • Study of simple ecosystems-pond, river, Delhi Ridge, etc.

C. RECOMMENDED STUDY MATERIAL:

S. No	Text Books:	Author	Edition	Publication
1.	Environmental Studies	Erach Barucha	Latest	UGC
2.	Environmental Studies	Benny Joseph	Latest	Tata Mcgraw Hill
3.	Environmental Studies	R. Rajagopalan	Latest	Oxford University Press
Reference Books				
1.	Principles of Environmental Science and Engineering	P. Venugoplan Rao	Latest	Prentice Hall of India.
2.	Environmental Science and Engineering	Meenakshi	Latest	Prentice Hall India.
Online Resources				
1. 2. 3.	https://www.coursera.org/browse/physical-science-and-engineering/environmental-science-and-sustainability https://www.edx.org/learn/environmental-science https://nptel.ac.in/courses/127105018			

DEPARTMENT CORE COURSES

Code: BTXCSA1101 ENGINEERING MATHEMATICS 3 Credits [LTP: 3-1-0]

COURSE OUTCOME

The student would be able to:

- Analyze and prove relationships between matrices, rank of matrix and systems of equations, Inverses.
- Analyze the basic structure of differential equations, and order and degree of the first order and first degree and its simple applications
- Utilize methods of integration to evaluate volumes and surface of objects and lengths of curves.
- Apply vector differentiation, and integration in the scalar and vector fields
- Apply line, surface and volume integral with the help of green's theorem, Gauss's theorem and Stokes theorem.

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1	**Matrices**	7
2	**Integral Calculus**	8
3	**Ordinary Differential Equations**	8
4	**Introduction Vector Calculus**	8
5	**Application of Vector Calculus**	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Matrices**
	• Introduction of Unit • Rank of a Matrix, Normal form of a Matrix • Consistency of systems of linear equations • Eigen Values and Eigen Vectors • Cayley-Hamilton Theorem (without proof) • Conclusion of Unit
2.	**Ordinary Differential Equations**
	• Introduction of Unit • First order and first-degree differential equations-Separable Variables, • Linear Equation and reducible to linear form, Exact Equation • Linear differential equations with constant coefficients • Conclusion of Unit
3.	**Integral Calculus**
	• Introduction of Unit • Beta and Gamma functions and their properties • Surfaces and Volumes of Solids of Revolutions • Double integrals, Double integral by changing into polar form, Areas by Double Integration • Change of order of integration • Conclusion of Unit

4.	**Vector Calculus**
	• Introduction of Unit • Scalar and Vector field • Differentiation and Integration of Vector functions • Gradient, Divergence and Curl, Directional derivatives • Conclusion of Unit
5.	**Application of Vector Calculus**
	• Introduction of Unit • Line, Surface and Volume integral • Gauss, Stocks and Green theorem (without proof) and its applications • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL:

Sr. No	Reference Book	Author	Edition	Publication
1.	Higher Engineering Mathematics	B S Grewal	Latest	Khanna Publications, Delhi,
2.	Higher Engineering Mathematics	Ramana, B.V	Latest	Tata McGraw-Hill.
3	Engineering Mathematics: A Tutorial Approach	Ravish R Singh and M Bhatt	Latest	Tata McGraw-Hill
4	Calculus and Analytical Geometry	Thomas and Finney,	Latest	Narosa Publishing, New Delhi
5	Advanced Engineering Mathematics	Erwin Kreyszig	Latest	John Wiley and Sons
Important Web Links:				
1	https://nptel.ac.in/courses/111105134/			
2	https://nptel.ac.in/courses/122/101/122101001/			
3	https://www.classcentral.com/course/swayam-engineering-mathematics-i-13000			

Code: BTXCSA1102	ENGINEERING PHYSICS	3 Credits [LTP: 3-1-0]

COURSE OUTCOME

The student will be able to:

- Produce coherent sources and phenomenon of interference and diffraction
- Compare quantum mechanical history with experimental facts and its applications.
- Debates in laser and fibre optics and apply it for suitable applications.
- Point out the basic principles of relativity, twin paradox and energy-mass relations.
- Categorize different bonding in materials, band theory and semiconductor material.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1	**Wave Optics**	8
2	**Quantum Mechanics**	8
3	**Laser & Optical Fibre**	8
4	**Special Theory of Relativity**	7
5	**Elements of Material Science**	8

B. DETAILED SYLLABUS

Unit No.	Unit Details
1.	**Wave Optics**
	• **Introduction of Unit** • **Interference of light:** Types of interference, • Coherent source, methods to produce coherent sources with examples. • Newton's Rings: Principle, Construction, working & Applications • **Diffraction of light:** Fraunhofer Diffraction from a Single Slit • **Diffraction grating:** Introduction and its construction • Resolving power and Rayleigh criterion for limit of resolution • Conclusion of Unit
2.	**Quantum Mechanics**
	• Introduction of Unit • Black body radiation and Planck's hypothesis • Compton Effect, Compton shift • Wave function and its basic postulates • Physical interpretation of wave function and its properties • Time dependent and time independent Schrodinger's Wave Equation, • Applications of the Schrodinger's Equation: Particle in one dimensional box • Conclusion of Unit
3.	**Laser & Optical Fibre**
	• Introduction of Unit • Theory of laser action: Einstein's Coefficients, Components of laser, Threshold conditions for laser action • Theory, Design and Applications of He-Ne Laser • Optical Fibre: Construction and working principle of Optical fiber • Types of optical fibre (on the basis of modes and the refractive index of the medium) • Applications of optical fibre • Conclusion of Unit
4.	**Special Theory of Relativity**

	• Introduction of Unit • Inertial and non-inertial frames of Reference. • Postulates of special theory relativity • Galilean and Lorentz Transformations, Length contraction, Mass Variation and Time Dilation. • Relativistic Mass-Energy relation • Relativistic Energy and Momentum • Conclusion of Unit
5	**Elements of Material Science**
	• Introduction of Unit: Bonding in solids, Covalent bonding and Metallic bonding • Classification of Solids as Insulator, Semi-Conductor and Conductor • Semiconductors: Conductivity in Semiconductors • Determination of band gap of a semiconductor • Hall Effect: Theory, Hall Coefficients and application to determine the sign of charge carrier • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL:

Sr. No	Reference Books	Author	Edition	Publication
1.	Fundamental of Optics	Jenkins and While	**4th**	Tata McGraw-Hill
2.	Optics	Ajoy Ghatak	**3rd**	Tata McGraw-Hill
3.	A Text Book of optics	Brijlal & Subramanium	Latest	S.Chand and co. Ltd
4.	Quantum Mechanics	Schiff	3rd	Tata Mc Graw-Hill
5.	Concept of Modern Physics	Beiser	Latest	Tata McGraw-Hill
6.	Introduction to special Theory of Relativity	R. Resnick	Latest	Johan Willy Singapore
7.	Elements of Properties of Matter	D.S.Mathur	Latest	S.Chand& Co.
8.	Solid State Physics	S.O.Pillai	Latest	Wiley Eastern Ltd.
Important Web Links				
1.	https://nptel.ac.in/courses/122107035/			
2.	https://nptel.ac.in/courses/122103011/			
3.	https://www.khanacademy.org/science/physics			
4.	https://ocw.mit.edu/courses/physics/			

Code: BTXCEE1103 ELECTRICAL & ELECTRONICS ENGINEERING 3 Credits [LTP: 3-1-0]

COURSE OUTCOME

The student will be able to:

- Apply basic electrical concepts, including various circuit analysis techniques and fundamentals of theorem, in practical applications.
- Analyze the fundamentals of AC circuits such as the R.M.S value, average value, active power, reactive power, power factor, form factor, peak factor and their applications.
- Analyze the energy conversion process and fundamentals of rotating and stationary electrical machines with their application in real life.
- Analyze the working of semiconductor devices such as Diode, BJT, UJT, photovoltaic cells, filters and fundamentals of digital electronics.
- Illustrate the concepts of Communication systems and Instrumentation engineering in practical applications.

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	**Basic Concepts of Electrical Engineering**	8
2.	**Alternating Quantities and Electrical Installations**	8
3.	**Energy Conversion and Electrical Machines**	7
4.	**Basic Electronics**	8
5.	**Communication Systems and IoT**	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Basic Concepts of Electrical Engineering**
	• Introduction of Unit • Basic Concepts: Electric Current, Electromotive Force, Electric Power, Ohm's Law, Basic Circuit Components, Faraday's Law of Electromagnetic Induction. • DC Network Analysis & Theorems: Kirchhoff's Laws, Network Sources, Resistive Networks, Series-Parallel Circuits, Star-Delta Transformation, Node Voltage Method, Mesh Current Method, Super- Position, Thevenin's, Norton's and Maximum Power Transfer Theorems. • Conclusion of Unit
2.	**Alternating Quantities and Electrical Installations**
	• Introduction of Unit • Single Phase AC system: Introduction, Generation of AC Voltages, Root Mean Square and Average Value of Alternating Currents and Voltages, Form Factor, Peak Factor, Power Factor and Quality Factor, Phasor Diagram • Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Importance of earthing. Types of Batteries, Important characteristics for Batteries. Elementary calculations for energy consumption and savings, battery backup. • Conclusion of Unit
3.	**Energy Conversion and Electrical Machines**
	• Introduction of Unit • Introduction to Energy: Types of Energy, Introduction to Energy Conversion, Sources of Energy (Conventional& Non-Conventional), Energy Scenario in India & Rajasthan.

	• Rotating Machines: **DC Machines**: Principle of Operation of DC Machine as Motor and Generator, EMF Equation, Applications of DC Machines. **AC Machines:** Principle of Operation of 3-Phase Induction Motor, 3- Phase Synchronous Motor and 3- Phase Synchronous Generator (Alternator), Applications of AC Machines. **Electric Vehicle:** Introduction to Electric Vehicles: Types of EVs, Applications of EV, Charging of EV. Stationary Machines: Introduction, Construction and Principle of Working of Transformer, EMF Equation, • Conclusion of Unit
4.	**Basic Electronics**
	• Introduction of Unit • **Semiconductor Devices:** Conduction in Semiconductors, Conduction Properties of Semiconductor Diodes, Behavior of the PN Junction, PN Junction Diode, Zener Diode, LED, Photovoltaic Cell, Rectifiers, L, C, & L-C filters, BJT, UJT, Transistor as an Amplifier. • **Digital Electronics:** Boolean algebra, Binary System, Logic Gates and Their Truth Tables. • Conclusion of Unit
5.	**Communication Systems and IoT**
	• Introduction of Unit • **Basics of Communication: I**ntroduction, IEEE Spectrum for Communication Systems, Types ofCommunication, Amplitude and Frequency Modulation. • **Basics of Instrumentation:** Introduction to Transducers, Thermocouple, RTD, Strain Gauges, Load Celland Bimetallic Strip. • **An overview of Internet of Things-**Building blocks of IoT, IoT enabling technologies, Characteristics of IoT systems and IoT levels, Evolution of the Internet paradigm, Device-to-Device/ Machine-to-Machine Integration • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

Sr. No	Reference Book	Author	Edition	Publication
1	Electrical and Electronic Technology	Edward Hughes et al,	Latest	Pearson Publication
2	Basic Electrical & Electronics Engineering	V. Jagathesan, K. Vinod Kumar & R. Saravan Kumar	Latest	Wiley India
3	Basic Electrical & Electronics Engineering	Van Valkenburge	Latest	Cengage learning
4	Basic Electrical and Electronics Engineering	Muthusubrmaniam	Latest	TMH
5	Basic Electrical & Electronics Engineering	Ravish Singh	Latest	TMH
Important Web Links				
1	https://nptel.ac.in/courses/108108076/			
2	https://nptel.ac.in/courses/117103063/			
3	https://nptel.ac.in/courses/108/101/108101091/			

Code: BTXCME1104 ENGINEERING MECHANICS 3 Credits [LTP: 3-1-0]

COURSE OUTCOME

The student would be able to:

- Analyze the forces act on a component and method of resolution.
- Evaluate the centroid and center of gravity of an object and also analyze how to minimize the effort for lifting a load.
- Evaluate the effect of friction and also evaluate forces with the effect of friction.
- Analyze the conversion of linear motion into angular motion and vice versa.
- Analyze the effect of impact on elastic and non-elastic body.

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	**Fundamentals of Mechanics**	**8**
2.	**Machine & Moment of Inertia**	**8**
3.	**Friction & Belt Drive**	**7**
4.	**Dynamics of Particles**	**8**
5.	**Work, Power & Impact**	**8**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Fundamentals of Mechanics**
	• Introduction of Unit • Fundamental laws of mechanics, Principle of transmissibility. • System of forces, Resultant force, Resolution of force. • Moment and Couples, Varignon's Theorem, • Equilibrium, Conditions for equilibrium, Lami's theorem. • Conclusion of Unit
2.	**Machine & Moment of Inertia**
	• Introduction of Unit • **Lifting Machines**: Mechanical advantage, Velocity Ratio, Efficiency of machine, Ideal machine, Ideal effort and ideal load, Reversibility of machine, Law of machine, Lifting machines. • **Centroid & Moment of Inertia:** Location of centroid and center of gravity, Moment of inertia, Parallel axis and perpendicular axis theorem, Radius of gyration, M.I of composite section. • Conclusion of Unit
3.	**Friction & Belt Drive**
	• Introduction of Unit • **Friction**: Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder. • **Belt Drive**: Types of belts, Types of belt drives, Velocity ratio, Effect of slip on Velocity ratio, Length of belt, Ratio of tensions and power transmission by flat belt drives. • Conclusion of Unit
4.	**Dynamics of Particles**
	• Introduction of Unit • **Kinematics of Particles and Rigid Bodies**: Velocity, Acceleration, Types of Motion, Equations

	of Motion, Rectangular components of velocity and acceleration, Angular velocity and Angular acceleration. • **Kinetics of Particles and Rigid Bodies**: Newton's laws, Linear Momentum, Equation of motion in rectangular coordinate, Equation of motion in plane for a rigid body, D' Alembert principle. • Conclusion of Unit
5.	**Work, Power & Impact**
	• Introduction of Unit • **Work, Energy and Power**: Work of a force, weight, Power, Efficiency, Energy, Kinetic energy of rigid body, Principle of work and energy. • **Impact**: Collision of elastic bodies, types of impact, conservation of momentum, Newton's law of collision. • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

Sr. No	Reference Book	Author	Edition	Publication
1.	Vector Mechanics for Engineers	Beer and Johnston	Latest	Tata McGraw Hill
2.	Engineering Mechanics	D S Kumar	Latest	S K Kataria& Sons
3.	Engineering Mechanics Statics	Meriam, J. L. & Kraige, L. G	Latest	John Wiley & Son
4.	Engineering Mechanics	S. Ramamruthan	Latest	Dhanpat Rai Pub.
5.	Engineering Mechanics	Shames	Latest	Pearson Education
Important Web Links				
1.	https://nptel.ac.in/courses/112103109/			
2.	https://nptel.ac.in/courses/112106286/			
3.	https://freevideolectures.com/course/2264/engineering-mechanics			

Code: BTXCCE1105 PROGRAMMING IN C 3 Credits [LTP:3-0-0]

Course Outcomes: -

Students will be able to:

- Learn data types, loops, functions, array, pointers, string, structures and files.
- Develop conditional and iterative statements to write C programs.
- Implement concept of string using array.
- Allocate memory dynamically using pointers.
- Apply C Programming to solve real time problems.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	**Introduction to C Programming**	6
2.	**Decision Making & Looping**	6
3.	**Array and string**	8
4.	**Advance programming in C**	8
5.	**File handling & Additional features**	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to C Programming**
	• Introduction of Unit • Introduction to computer-based problem solving, Program design and implementation issues- Flowcharts & Algorithms. • Types of Languages – Machine language, assembly language, high level languages, Assemblers, Compilers, Interpreters. • Overview of C, Data Types, Constants & Variables, Literals, Operators & Expressions • Conclusion &Real Life Application
2.	**Decision Making & Looping**
	• Introduction of Unit • Decision making in C- if statement, if-else statement, Nested if statement, if else if Ladder, Switch case • Loop control in C – for loop, while loop, do-while loop • Control flow in C- break, continue and goto statement. • Conclusion &Real Life Application
3.	**Array and string**
	• Introduction of Unit • Array- 1D array, 2D array and dynamic array • Scope rules- Local & global variables. • Functions-parameter passing, call by value and call by reference, calling functions with arrays, command line argument, recursion- basic concepts. • String – String in-build functions. • Conclusion of the Unit

4.	**Advance programming in C**
	• Introduction of Unit • Pointers- The & and * operator, pointer expression, assignments, arithmetic, comparison, arrays of pointers, pointers to pointers, initializing pointers, pointers to functions, function retuning pointers. • Structures- Basics, declaring, referencing structure elements, array of structures, passing structures to functions, structure pointers, arrays and structures within structures, typedef. • Unions – Declaration, uses • Enumerated data-types • Conclusion of the Unit
5.	**File handling & Additional features**
	• Introduction of Unit • File Handling – The file pointer, file accessing functions-fopen, fclose, putc, getc, fprintf, reading and writing into a file • Advance features- storage classes and dynamic memory allocation • C Preprocessor- #define, #include, #undef, Conditional compilation directives. • C standard library and header files: Header files, string functions, mathematical functions, Date and Time functions. • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Letus C, 6th Edition	Yashwant Kanitkar	PBP Publication	Letus C ,6th Edition
2.	The C programming Language	Richie and Kenninghan	BPBPublication,2004	The C programming Language
3.	Programming in ANSI C3rd Edition, 2005	E.Balagurusamy	Tata McGraw Hill	Programming in ANSIC 3rd Edition, 2005
Reference Book				
1.	The C programming Language Richie and Kenninghan PBP Publication,2004			
2.	Programming in ANSI C 3rd Edition, 2005 Balaguruswmy Tata McGraw Hill			
Online Resources				
1.	https://www.programiz.com/c-programming/examples			
2.	https://www.w3resource.com/c-programming-exercises			

Code: BTXCME1106 INTRODUCTION TO FUTURISTIC TECHNOLOGIES 3 Credit [LTP: 3-0-0]

COURSE OUTCOME

The student would be able to:

- Analyze the design and working of Hybrid and Electric Vehicle.
- Analyze the need of Additive Manufacturing (AM) and Rapid Prototyping (RP).
- Create smart devices using Internet of Things (IoT).
- Analyze the future with AI, and AI in Action
- Analyze the Opportunities and Challenges in adoption of Industry 4.0.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time Required for the Unit (Hours)
1.	**Introduction to Hybrid and Electric Vehicle**	8
2.	**Introduction to Additive Manufacturing (AM) and Rapid Prototyping (RP)**	8
3.	**Introduction to Internet of Things (IoT)**	7
4.	**Introduction to Artificial Intelligence (AI) and Blockchain**	8
5.	**Introduction to Industry 4.0 and 5.0**	8

B. DETAILED SYLLABUS

Unit	Contents
1.	**Introduction to Hybrid and Electric Vehicle**
	• Introduction of Unit • Hybrid and Electric Vehicles (HEV): History Overview and Modern Applications • Power Flow and Power Management in HEV • Introduction to Electric Drives: Shunt Drives, Series Drives, Compound Drives • Types of Batteries and Energy Storages • Introduction to Power Electronics in Hybrid Electric Vehicles • Case Studies: Toyota Camry Hybrid, MG Hector Hybrid, Tata Nexon EV • Conclusion of Unit
2.	**Introduction to Additive Manufacturing (AM) and Rapid Prototyping (RP)**
	• Introduction of Unit • Introduction to reverse engineering Traditional manufacturing v/s AM • Computer aided design (CAD) and manufacturing (CAM) and AM • Different AM processes and relevant process physics AM process chain • Growth of RP industry, and classification of RP systems • Application level: Stereo Lithography Systems, Selective Laser Sintering Fusion, Deposition Modelling, Solid Ground Curing, 3-D Printing processes • Conclusion of Unit
3.	**Introduction to Internet of Things (IoT)**
	Introduction of Unit • Introduction to IoT • Sensing, Actuation, Basics of Networking • Interoperability in IoT, • Introduction to Arduino Programming: Sensors and Actuators with Arduino

	• Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi • Case Studies: Smart Cities and Smart Homes, Connected Vehicles, Healthcare, Conclusion of Unit
4.	**Introduction to Artificial Intelligence (AI) and Blockchain**
	Introduction of Unit What is AI? Applications and Examples of AI AI Concepts, Terminology, and Application Areas AI: Issues, Concerns and Ethical Considerations The Future with AI, and AI in Action Case Studies: Travel & Navigation, Social Media Feeds, Google Lens and OCR, Smart Cars, Security & surveillance Introduction to Blockchain Technology Conclusion of Unit
5.	**Introduction to Industry 4.0 and 5.0**
	• Introduction of Unit • Introduction to Industry 4.0 • Road to Industry 4.0: Smart Manufacturing, Smart Devices and Products, Smart Logistics, Smart Cities, Predictive Analytics • Technologies for enabling Industry 4.0 • Opportunities and Challenges • Future of Works and Skills for Workers in the Industry 4.0 Era • Industry 4.0 vs Industry 5.0 • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL:

Sr. No	Reference Book	Author	Edition	Publication
1	Electric and Hybrid Vehicles	A.K. Babu	Second Edition, 2022	Khanna Publishing
2	Artificial Intelligence: Concepts and Applications	Lavika Goel	2021	Wiley
3	Industry 4.0: Challenges, Trends, and Solutions in Management and Engineering	Carolina Machado	2021	CRC Press
4	Additive Manufacturing	C. P. Paul	2021	McGraw Hill
Important Web Links				
1	https://nptel.ac.in/courses/106105195			
2	https://www.linkedin.com/learning/foundations-of-the-fourth-industrial-revolution-industry-4-0			
3	https://nptel.ac.in/courses/108103009			
4	https://onlinecourses.nptel.ac.in/noc22_cs56/preview			

Code: BTXCCE1107	Fundamentals of Computer	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Compare and contrast various types of computers and converse in basic computer terminology
- Explore the purpose of ALU, CPU and possess the knowledge of basic hardware peripherals
- Describe how information is stored in memory
- Know and use different number systems and the basics of programming
- Work on various types of operating system using networking concepts

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to Computer**	7
2.	**Computer Memory and Language**	8
3.	**Structure of Computer and** Input**/ Output Devices**	8
4.	**Number System and Computer Codes**	7
5.	**Operating System and** Networking	7

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Computer**
	• Introduction to Computer • Computer Characteristics • Concept of Hardware, Software • Evolution of computer and Generations • Types of Computers – Analog and Digital computers • Hybrid Computers, General Purpose and Special Purpose Computer • Limitations of Computer Applications of Computer in Various Fields • Conclusion of Unit
2.	**Structure of Computer and** Input**/ Output Devices**
	• Introduction to Structure of Computer • Functional Block Diagram of Computer. CPU, ALU, Memory Unit, Bus Structure of Digital Computer – Address, Data and Control Bus. • Input Device – Keyboard, Mouse, Scanner, MICR, OMR. Output Devices – VDU, Printers – Dot Matrix, Daisy-wheel, Inkjet, Laser, Line Printers and Plotters. • Conclusion of Unit
3.	**Computer Memory and Language**
	• Introduction to Computer Memory • Memory Concept, Memory Hierarchy, Processor, Registers, Cache memory, primary memory, secondary storage devices, magnetic tapes, floppy disks, hard disks, optical drives, USB flash drivers, Memory cards, Mass storage devices • Semiconductor Memory – RAM, ROM, PROM, EPROM • Algorithm, Flowcharts, Machine Language, Assembly Language, High Level Language,

	Assembler, Compiler, Interpreter • Characteristics of Good Language. Software – System and Application Software. • Conclusion of Unit
4.	**Number System and Computer Codes**
	• Introduction to Number System • Binary number system, working with binary numbers • Octal number system, hexadecimal number system and their conversions • Binary addition and subtraction • Working with fractions, signed number • Representation in binary form, BCD code, and other codes. • Conclusion of Unit
5.	**Operating System and** Networking
	• Introduction to Operating System • Evolution of Operating System. Functions of Operating System. • Types of Operating Systems. Detailed Study of Windows Operating System. • Introduction and Features of LINUX OS. • Concept, Basic Elements of a Communication System, Data Transmission Media, Topologies, LAN, MAN, WAN, Internet • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Fundamentals of Computers	V.Rajaraman, NeeharikaAdabala	6th Edition	PHI Learning
2.	Computer Fundamentals	Anita Goel,	1st Edition	Pearson
Reference Book				
1.	Computer Fundamentals: Concepts, Systems & Applications, Priti Sinha, Pradeep K., Sinha, BPB Publications			
Online Resources				
1	https://www.tutorialspoint.com/basics_of_computers/index.htm			
2	https://www.youtube.com/watch?v=eEo_aacpwCw			

PRACTICAL

Code: BTXCME1201	MACHINE DRAWING LAB	1 Credit [LTP: 1-0-2]

COURSE OUTCOME

The student would be able to:

- Analyze the concepts sectioning, true section and apparent section and create the sectional views of the engineering components.
- Analyze the development of surface and analyze the sheet metal requirement for fabricating a surface.
- Analyze the curves produced due to intersections of different surfaces.
- Create isometric views of various engineering components.
- Create multi view drawings of simple and complex engineering components

A. LIST OF EXPERIMENT

1.	Introduction to machine drawing
2.	Dimensioning, locations and placing
3.	**Orthographic projections**: First & third angle methods Drawing Sheet 1: Orthographic Projections (3 Problems) Drawing Sheet 2: Sectional Views (3 Problems) Drawing Sheet 3: Riveted joints, lap joints, butt joints, chain riveting, zig-zag riveting Drawing Sheet 4: Screw fasteners, different threads, Nuts & bolts locking devices, set screws, foundation Drawing Sheet 5: Bearing, Plumber block
4.	Instructions on free hand sketches List of free hand sketches • Different type of lines • Conventional representation of materials • Screw fasteners • Bearing: Ball, roller, needle, foot step bearing • Coupling: Protected type, flange, and pin type flexible coupling • Welded joints
Virtual Labs	
1	http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/egraphics_lab/labs/index.php

Code: BTXCSA1202	ENGINEERING PHYSICS LAB	1 Credit[LTP: 1-0-2]

COURSE OUTCOME: -

Students will be able to:

- Analyze the concept of interference with the help of Newton's ring and dispersive power through prism.
- Evaluate the resolving power through diffraction grating and double slit arrangement.
- Apply the numerical aperture of optical fiber and Coherent length and time using He-Ne laser.
- Evaluate the height of the unknown object by Sextant.
- Analyze the mechanism of Ballistic Galvanometer and evaluate the specific resistance of wire through Carey's foster bridge.

A. LIST OF EXPERIMENTS:

1.	To determine the wave length of Sodium light by Newton's Ring
2.	To determine the dispersive power of material of a prism for violet, red and yellow color of mercury light with the help of spectrometer.
3.	To determine the wave length of prominent lines of mercury by plane diffraction grating with the help of spectrometer
4.	To verify the expression for the resolving power of Telescope
5.	To measure the numerical Aperture of an optical fibre by He-Ne laser
6.	To determine the coherent length and coherent time by using He-Ne laser
7.	To study the variation of a semiconductor resistance with temperature and hence determine the Band Gap of the semiconductor in the form of reverse biased P-N junction diode.
8.	To study the characteristics of semiconductor diode and determine forward and reverse bias resistance
9.	To Determine the height of a given line drawn on the wall by sextant
10.	To study the charging and discharging of a condenser and hence determine time constant (both current and voltage graphs are to be plotted)
11.	To determine the high resistance by method of leakage, using a ballistic galvanometer.
12.	To specify the specific resistance of a material of a wire by carey foster's bridge.
Virtual Labs	
1	http://vlab.amrita.edu/?sub=1&brch=282
2	http://vlabs.iitb.ac.in/vlab/labsps.html
3	https://praxilabs.com/en/virtual-labs.aspx?TAB=1#LOL

Code: BTXCEE1203 ELECTRICAL & ELECTRONICS ENGINEERING LAB 1 Credit [LTP: 1-0-2]

COURSE OUTCOMES: -

Students will be able to:

- Analyze the house wiring connections of various equipment's such as energy meter, ceiling fan, tube light etc.
- Create the connections of single phase and three phase induction motors.
- Create circuits and connects of various electrical components such as Resistors, Inductors, Capacitors, PN-Diode. Zenger Diode, LED, LCD, etc.
- Analyze the effect of L, C and L-C filters in single phase half wave and full wave bridge rectifier
- Analyze the effect of LC and LC filters in current and power rectifiers

A. LIST OF EXPERIMENTS:

1	Assemble house wiring including earthing for 1-phase energy meter, MCB, ceiling fan, tube light, three pin socket and a lamp operated from two different positions. Basic functional study of components used in house wiring.
2	Prepare the connection of ceiling fan along with the regulator and vary the speed.
3	Prepare the connection of single-phase induction motor through 1-Phase Auto-transformer and vary the speed.
4	Prepare the connection of three phase squirrel cage induction motor through 3-Phase Autotransformer and vary the speed.
5	Prepare the connection of Fluorescent Lamp, Sodium Vapour and Halogen Lamp and measure voltage, current and power in the circuit.
6	Identification, testing and application of Resistors, Inductors, Capacitors, PN-Diode. Zenger Diode, LED, LCD, BJT, Photo Diode, Photo Transistor, Analog/Digital Multi- Metres and Function/Signal Generator.
7	Measure the frequency, voltage, current with the help of CRO.
8	Assemble the single-phase half wave and full wave bridge rectifier & the analyse effect of L, C and L-C filters in rectifiers.
9	Study the BJT amplifier in common emitter configuration. Measure voltage gain plot gain frequency response and calculate its bandwidth.
10	Verify the truth table of AND, OR, NOT, NOR and NAND gates
11	Prepare the connection of sodium lamp and measure voltage
12	Analyze the effect of LC and LC filters in current and power rectifiers
Virtual Lab	
1	http://vlabs.iitkgp.ernet.in/be/
2	http://em-oep.vlabs.ac.in/List%20of%20experiments.html?domain=Electrical%20Engineering

Code: BTXCME1204	WORKSHOP PRACTICE	1 Credit[LTP:1-0-2]

COURSE OUTCOMES: -

Students will be able to

- Create a model of T Lap and T- Briddle Joint through carpentry shop
- Analyze the making of prototype model through foundry shop
- Analyze the difference between gas welding and arc welding and their applications
- Create a model on fitting shop through filling, slotting, drilling and tapping operation
- Analyze the difference between forging, moulding and casting

A. LIST OF EXPERIMENTS

1.	**Carpentry Shop** • Timber, definition, engineering applications, seasoning and preservation • Plywood and ply boards
2.	**Foundry Shop** • Moulding Sands, constituents and characteristics • Pattern, definition, materials types, core prints • Role of gate, runner, riser, core and chaplets • Causes and remedies of some common casting defects like blow holes, cavities, inclusions
3.	**Welding Shop** • Definition of welding, brazing and soldering processes and their applications • Oxyacetylene gas welding process, equipment and techniques, types of flames and their applications • Manual metal arc welding technique and equipment, AC and DC welding • Electrodes: Constituents and functions of electrode coating, welding positions • Types of welded joints, common welding defects such as cracks, undercutting, slag inclusion and boring
4.	**Fitting Shop** • Files, materials and classification.
5.	**Smithy Shop** • Forging, forging principle, materials • Operations like drawing, upsetting, bending and forge welding • Use of forged parts

List of Jobs to be made in the Workshop Practice

1.	**Carpentry Shop** 1. T – Lap joint 2. Bridle joint
2.	**Foundry Shop** Mould of any pattern
3.	**Welding Shop** 1. Square butt joint by MMA welding 2. Lap joint by MMA welding
4.	**Machine Shop Practice** 1. Job on lathe with facing operation 2. Job on lathe with one step turning and chamfering operations 3. Job on shaper for finishing two sides of a job
5.	**Fitting Shop** 1. Finishing of two sides of a square piece by filing 2. Drilling operation on fitted job (two holes) 3. Slotting operation on fitted job 4. Tapping operation on fitted job

Code: BTXCCE1205	PROGRAMMING IN C LAB	1 Credit [LTP: 1-0 -2]

COURSE OUTCOME: -

Students will be able to:

- Gain concept of functional hierarchical code organization.
- Work with textual information, characters and strings
- Implement file handling concepts
- Implement real time applications using the power of C language features.
- Overcome and solve possible errors during program execution.

A. LIST OF EXPERIMENTS:

1	Given the values of the variables x, y and z, write a program to rotate their values such that x has the value of y, y has the value of z, and z has the value of x
2	Write a program that reads a floating-point number and then displays the right-most digit of the integral part of the number.
3	Write a C program to calculate the sum of digits of given number.
4	Program to find largest and smallest number from four given number.
5	Program to find whether a year is leap or not
6	Write a C program in which enter any number by the user and perform the operation of Sum of digits of entered number.
7	Write a C Program to convert Decimal number to Binary number
8	Find the sum of this series upto n terms 1+2+3+4+5+6+…….
9	Program to print Armstrong's numbers from 1 to 100.
10	Write a program to convert years into Minute, Hours, Days, Months, Seconds using switch () statements
11	Write a C menu driven program
12	Write a program to generate the various pattern of numbers
13	Write a C Program to print the reverse of an integer number
14	Write a C program to perform the factorial of given number
15	Write a C program in which a function prime that returns 1 if its argument is a prime and return zero otherwise.
16	Write a C program to calculate factorial of a number using recursion.
17	Write a C program in which enter 10 elements by the user and perform the operation of sorting in ascending order
18	Write a C program to perform to perform Matrix addition and multiplication operations.
19	Write a program to determine the length of the string and find its equivalent ASCII codes.
20	Write a program to delete all the occurrences of the vowels in a given text. Assume that the text length will be of one line
21	Write a program to maintain the library record for 100 books with book name, author's name, and edition, year of publishing and price of the book.

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Let us C	Yashwant Kanetkar	6th Edition	PBP Publication
2.	The C programming Language	Richie and Kenninghan	2nd Edition 2004	PBP Publication,2004

3.	Programming in ANSI C	E Balaguruswamy	3rd Edition, 2005	Tata McGraw Hill
Reference Book				
1.	The C programming Language by Richie and Kenninghan, PBP Publication,2004			
2.	Programming in ANSI C 3rd Edition, 2005 by E.Balagurusamy, Tata McGraw Hill			
Online Resources				
1.	https://www.programiz.com/c-programming/examples			
2.	https://www.w3resource.com/c-programming-exercises			

Code: BTXCME1206	PRACTICAL GEOMETRY	1 Credit [LTP: 1-0-2]

COURSE OUTCOME: -

Students will be able to:

- Apply the concept of scale and their applications
- Analyze the different applications of conic section and engineering curves and also how to draw on sheet
- Analyze the use of projection and also analyze the difference between first and third angle projection method
- Apply the concept of sectioning and draw sheet on section of solid
- Analyze the use of development and their application

(Theory Concepts)

A. List of Experiments

1.	• Lines, Lettering and Dimension (Sketch Book) • Scales: Representative Fraction, plain scales, diagonal scales, (In drawing sheet)
2.	• Conic Sections: Construction of ellipse, parabola and hyperbola by different methods (in drawing sheet) Engineering Curves: Construction of Cycloid, Epicycloids, Hypo-cycloid (in drawing sheet)
3.	• Type of Projection, Orthographic projection: first angle and third angle projection (in drawing sheet) • Projection of Points • Projection of Straight lines • Projection of planes: Different positions of plane lamina like: regular polygon, circle of three planes (four problems in drawing sheet) • Projection of Solids: Projection of right and regular polyhedron, cone (four problem in drawing sheet)
4.	• Sections of Solids: Projection of Frustum of a cone and pyramid (in drawing sheet)
5.	• Development of Surfaces: Parallel line and radial line method for right solids, Regular Solids (in drawing sheet) • Isometric Projections: Isometric Scale, Isometric axes, Isometric View of geometrical shapes (in drawing sheet)

(Practical Concepts)

6.	• Introduction • Line (coordinate Methods) • Dimension • Scale
7.	• Rectangle • Conic Section • Construction of ellipse, Parabola & Hyperbola, Polygon • Circle
8.	• AutoCAD commands (copy, Mirror, Move, Array, Block, Group, Join, Hatch etc.)
9.	• Type of Projection, Orthographic projection: First Angle and Third Angle projection • Projection of Points • Projection of Straight lines, different positions of straight lines • Projection of planes • Projection of Solids: projection of right and regular polyhedron and cone
10.	• Section of solids: projection of frustum of a cone and pyramid • Isometric projections
Virtual Labs	
1	http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/egraphics_lab/labs/index.php

Code: BTXCHM1207 FOUNDATION ENGLISH 1 Credits [LTP: 0-0-2]

COURSE OUTCOME:
Students will be able to:

CO	Cognitive Abilities	Course Outcomes
CO-01	**Understanding/Applying/Creating**	Demonstrate the grammar skills involved in writing sentences and short paragraphs.
CO-02	**Understanding/Applying**	Build up a good command over English grammar and vocabulary to be able to ace error spotting.
CO-03	**Understanding/Applying/Creating**	Define unknown words in sentence level context using a picture dictionary or by creating a memory link for support.
CO-04	**Understanding / Applying**	Understand, analyze and effectively use the conventions of the English language.
CO-05	**Understanding/Applying**	Develop their interest in reading and enhance their oral and silent reading skills along with sharpen their critical and analytical thinking.

UNIT NO.	UNIT NAME	HOURS
1	**Basics of Grammar**	**8**
2	**Spotting the grammatical errors and rectification**	**2**
3	**Vocabulary Building**	**4**
4	**Basics of Writing Skills**	**2**
5	**Reading Comprehension**	**8**

LIST OF ACTIVITIES	
1.	Parts of Speech: Theory & Practice through various Exercises
2.	Sentence Structures: Theory & Practice through various Exercises
3.	Tenses: Theory & Practice through various Exercises
4.	Spotting the Errors: Applying the rules and Practice Questions
5.	Vocabulary Building-I: Practice by sentence formation
6.	Vocabulary Building-II: Practice by sentence formation
7.	Paragraph Writing
8.	Article Writing
9.	Précis Writing
10.	Formal & Informal Letter Writing
11.	Reading Comprehension- I: Beginner's level reading and Answering the Questions (Competitive Exams)
12.	Reading Comprehension- II: Intermediate's level reading and Answering the Questions (Competitive Exams)

Code: BTXCHM1208	LANGUAGE LAB	1 Credits [LTP: 0-0-2]

COURSE OUTCOME:
On successful completion of the course the learners will be able to

CO	Cognitive Abilities	Course Outcomes
CO-01	Understanding/Applying/Creating	Understand the nuances of language through audio- visual experience and group activities.
CO-02	Understanding/Applying	Neutralize the accent for intelligibility and develop confidence in speaking with clarity enhancing their employability skills.
CO-03	Understanding/Applying/Creating	Demonstrate an understanding of grammatical structures in conversations and discussions.
CO-04	Understanding/Applying	Utilize the knowledge of confidence building strategies to manage one's own thoughts and emotions.
CO-05	Understanding/Applying	Identify the requirements of skills development and apply their learning to sharpen the same.

UNIT NO.	UNIT NAME	HOURS
1	Introduction to Communication Skills on Learning Software	6
2	Concepts of Phonetics	4
3	Grammar Practice	2
4	Confidence Enhancement Activities	4
5	Skills Enhancement Activities	8

LIST OF LABS	
1.	**Listening Skills**
2.	**Reading Comprehension**
3.	**Writing Skills**
4.	**Phonetics I**
5.	**Phonetics II**
6.	**Grammar and Common Errors Usage**
7.	**Conversation**
8.	**Role Plays**
9.	**Presentation Skills I**
10.	**Presentation Skills II**
11.	**Group Discussion**
12.	**Interview Skills**

Software used in Language Lab: EL-Client

S. No.	Topics	Exercises
I	Listening Skills: Fourteen Lessons each containing five exercises	
II	Fundamental Language Skills: Introductory Lessons	5exercises 6exercises

	Basic Lessons (a) Reading Basic Lessons (a) Grammar Basic Lessons (a) Vocabulary Basic Lessons (a) Writing Basic Lessons (b)-(c) Reading Basic Lessons (b)-(c) Grammar Basic Lessons (b) Vocabulary Basic Lessons (b) Writing	3exercises 6exercises 5exercises 9exercises 9exercises 5exercises 3exercises
III	Communication Skills: Reading Comprehension Vocabulary Grammar Writing Exercises on Reading, Vocabulary, Grammar and Writing	
IV	Vocabulary: Word mentor: Various games based on the formation of words.	
V	Phonetics: Consonants Vowels Diphthongs Intonation Correct Pronunciation	
VI	English as Second Language	45exercises
VII	Conversations: Nine topics for conversations.	

- Neutralization of accent for intelligibility
- Speaking with clarity and confidence thereby enhancing employability skills of the students

Code: BTXCTX1601	Talent Enrichment Programme (TEP)-I	1 Credit [LTP: 1-0-0]

COURSEOUTCOME:

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students through active participate on in various activities falling in Technical and non-technical categories.

Social outreach, Discipline, TEP -I, VAC & Extra Curricular activities shall be evaluated on the basis of its sub constituent programme, as a complete one credit course. It shall be counted in calculation of SGPA but it is not a back log subject. However, the attendance of these classes shall be recorded and accounted in the total attendance.

Activities included in this category in this Semester are as follows:

Code	Activity	Hours	Credits
BTXCTX1601	Discipline, Value Added Courses & Social Outreach	-	1
	Talent Enrichment Programme (TEP)-I	1	
	Library / MOOC / NSP	1	

II SEMESTER

DEPARTMENT CORE COURSES

Code: BTXCSA2101 ENGINEERING CHEMISTRY 3 Credits [LTP: 3-0-0]

COURSE OUTCOME

The student would be able to:

- Develop innovative methods to produce soft water for industrial use and potable water at cheaper cost.
- Use their knowledge of polymers and glass and its use in industries and daily life.
- Identify practices for the prevention and remediation of corrosion
- Characterize the fuels and analyze the combustion mechanisms of various fuels.
- Learn about the manufacturing of cement and the chemistry involved in setting and hardening of it and also learn about the suitable use of lubricants.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	**Water Technology**	8
2.	**Polymer and Glass**	7
3.	**Corrosion and its control**	6
4.	**Fuel and Fuel Analysis**	8
5.	**Binding Materials and Lubricants**	7

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Water Technology**
	• Introduction of Unit **Water** • Sources of water, Impurities in water and effect of impurities • Municipal water supply: Requisites of drinking water, Steps involved in purification of water, Sedimentation, Coagulation, Filtration and Disinfection, Break Point Chlorination **Water Analysis** • Hardness of water; Type of hardness, Degree of hardness, Units of hardness, Disadvantages of hard water, Determination of hardness by Complexometric (EDTA) method, Numericals based on hardness by EDTA method • Boiler Troubles: Formation of solids (scale and sludge), Carry over (Priming and Foaming), Caustic Embrittlement, Disadvantages and Prevention • Treatment of hard water: Lime-soda method, Permutit (zeolite) method and Deionization or Demineralization method, Numerical problems based on Lime-soda and Zeolite softening methods • Desalination: Reverse osmosis, Electrodialysis • Conclusion of Unit
2.	**Polymer and Glass**

	• Introduction of Unit **Polymers** • Introduction to Polymer chemistry: Classification of Polymers and Types of polymerization • Plastics: Constituents of plastics, Thermosets and Thermoplastics, Preparation, Properties and Uses of Polyethylene, Bakelite, Teflon, Terylene and Nylon • Elastomers: Natural rubber, Vulcanization, Synthetic rubber- Preparation, Properties and Applications of SBR, Buna-N, Butyl and Neoprene rubber. **Glass** • Introduction • Definition of glass, its Properties, Manufacturing of glass, Importance of annealing in glass making, Types of silicate glasses and their commercial uses. • Conclusion of Unit
3.	**Corrosion and its control**
	• Introduction of Unit **Corrosion and its control** • Definition of corrosion and its Significance • Mechanisms of Corrosion: Chemical (Dry) corrosion and Electrochemical (Wet) corrosion • Types of corrosion: Galvanic corrosion, Concentration cell corrosion, Stress corrosion, Pitting corrosion • Factors affecting the rate of corrosion • Protection from corrosion: Material selection and design, Improvement of Environment, Coating of metallic surface, Cathodic protection, Anodic protection, Electroplating, Tinning, Galvanization and Modification in designs . Some practical examples of corrosion. • Conclusion of Unit
4.	**Fuel and Fuel Analysis**
	• Introduction of Unit • Classification and general aspects of fuel. • Solid fuel: Coal, Types of coal, Carbonization of coal • Liquid fuel: Processing of crude petroleum, Cracking, Thermal Cracking and Catalytic Cracking, Synthetic petrol (Coal to Liquid (CTL) Technology): Bergius and Fischer Tropsch process. Knocking, Octane number and Cetane number, Anti-knocking and Anti-knocking agents • Gaseous fuel: Advantages of gaseous fuel, Biogas, LPG, CNG • Analysis of Coal: Ultimate and Proximate analysis of coal • Calorific Value: Definition, Higher calorific value, Lower calorific value, Determination of higher & lower calorific value by Bomb Calorimeter • Fuel gas analysis by Orsat's apparatus and its significance • Numericals based on Bomb • Numericals based on combustion and requirement of oxygen/ air in combustion process • Conclusion of Unit
5.	**Binding Materials and Lubricant**
	• Introduction of Unit **Binding Materials** • Cement: Composition and Significance of cement • Manufacturing of Portland cement by Rotary Kiln Technology • Chemistry of setting and hardening of cement and role of gypsum **Lubricants** • Introduction of lubricants, Classification, Properties and Uses of lubricants

	• Mechanism of lubrication, Selection of lubricants • Properties of lubricants: Viscosity & Viscosity Index, Flash and Fire Point, Cloud and Pour Point, Carbon Residue, Oiliness, Aniline Point, Steam Emulsification Number, Precipitation Number and Neutralization Number • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL:

Sr. No	Reference Book	Author	Edition	Publication
1	Engineering Chemistry	P.C. Jain	Latest	Dhanpat Rai & Sons
2	Engineering Chemistry.	S. S. Dara	Latest	S. Chand & Co.
3	Chemistry in Engineering & Tech.	Rajaram, Kuriacose	Latest	Tata Mcgraw Hill
4	Physical Chemistry	P.W. Atkins	Latest	Oxford University Press.
Important Web Links:				
1.	https://civilengineersforum.com/cement-manufacturing-process/			
2.	https://www.explainthatstuff.com/lubricants.html			
3.	https://nptel.ac.in/courses/122/101/122101001/			

Code:BTXCSA2102	ENGINEERING MATHEMATICS	3 Credits [LTP: 3-1-0]

COURSE OUTCOME

The student would be able to:

- Analyze and prove relationships between matrices, rank of matrix and systems of equations, Inverses.
- Analyze the basic structure of differential equations, and order and degree of the first order and first degree and its simple applications
- Utilize methods of integration to evaluate volumes and surface of objects and lengths of curves.
- Apply vector differentiation, and integration in the scalar and vector fields
- Apply line, surface and volume integral with the help of green's theorem, Gauss's theorem and Stokes theorem.

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1	**Matrices**	7
2	**Integral Calculus**	8
3	**Ordinary Differential Equations**	8
4	**Introduction Vector Calculus**	8
5	**Application of Vector Calculus**	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Matrices**
	• Introduction of Unit • Rank of a Matrix, Normal form of a Matrix • Consistency of systems of linear equations • Eigen Values and Eigen Vectors • Cayley-Hamilton Theorem (without proof) • Conclusion of Unit
2.	**Ordinary Differential Equations**
	• Introduction of Unit • First order and first-degree differential equations-Separable Variables, • Linear Equation and reducible to linear form, Exact Equation • Linear differential equations with constant coefficients • Conclusion of Unit
3.	**Integral Calculus**
	• Introduction of Unit • Beta and Gamma functions and their properties • Surfaces and Volumes of Solids of Revolutions • Double integrals, Double integral by changing into polar form, Areas by Double Integration • Change of order of integration • Conclusion of Unit

4.	**Vector Calculus**
	• Introduction of Unit • Scalar and Vector field • Differentiation and Integration of Vector functions • Gradient, Divergence and Curl, Directional derivatives • Conclusion of Unit
5.	**Application of Vector Calculus**
	• Introduction of Unit • Line, Surface and Volume integral • Gauss, Stocks and Green theorem (without proof) and its applications • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL:

Sr. No	Reference Book	Author	Edition	Publication
1.	Higher Engineering Mathematics	B S Grewal	Latest	Khanna Publications, Delhi,
2.	Higher Engineering Mathematics	Ramana, B.V	Latest	Tata McGraw-Hill.
3	Engineering Mathematics: A Tutorial Approach	Ravish R Singh and M Bhatt	Latest	Tata McGraw-Hill
4	Calculus and Analytical Geometry	Thomas and Finney,	Latest	Narosa Publishing, New Delhi
5	Advanced Engineering Mathematics	Erwin Kreyszig	Latest	John Wiley and Sons
Important Web Links:				
1	https://nptel.ac.in/courses/111105134/			
2	https://nptel.ac.in/courses/122/101/122101001/			
3	https://www.classcentral.com/course/swayam-engineering-mathematics-i-13000			

Code: BTXCSA2103	ENGINEERING PHYSICS	3 Credits [LTP: 3-1-0]

COURSE OUTCOME

The student will be able to:

- Produce coherent sources and phenomenon of interference and diffraction
- Compare quantum mechanical history with experimental facts and its applications.
- Debates in laser and fibre optics and apply it for suitable applications.
- Point out the basic principles of relativity, twin paradox and energy-mass relations.
- Categorize different bonding in materials, band theory and semiconductor material.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1	**Wave Optics**	8
2	**Quantum Mechanics**	8
3	**Laser & Optical Fibre**	8
4	**Special Theory of Relativity**	7
5	**Elements of Material Science**	8

B. DETAILED SYLLABUS

Unit No.	Unit Details
1.	**Wave Optics**
	• **Introduction of Unit** • **Interference of light:** Types of interference, • Coherent source, methods to produce coherent sources with examples. • Newton's Rings: Principle, Construction, working & Applications • **Diffraction of light:** Fraunhofer Diffraction from a Single Slit • **Diffraction grating:** Introduction and its construction • Resolving power and Rayleigh criterion for limit of resolution • Conclusion of Unit
2.	**Quantum Mechanics**
	• Introduction of Unit • Black body radiation and Planck's hypothesis • Compton Effect, Compton shift • Wave function and its basic postulates • Physical interpretation of wave function and its properties • Time dependent and time independent Schrodinger's Wave Equation, • Applications of the Schrodinger's Equation: Particle in one dimensional box • Conclusion of Unit
3.	**Laser & Optical Fibre**
	• Introduction of Unit • Theory of laser action: Einstein's Coefficients, Components of laser, Threshold conditions for laser action • Theory, Design and Applications of He-Ne Laser • Optical Fibre: Construction and working principle of Optical fiber • Types of optical fibre (on the basis of modes and the refractive index of the medium) • Applications of optical fibre • Conclusion of Unit
4.	**Special Theory of Relativity**

	• Introduction of Unit • Inertial and non-inertial frames of Reference. • Postulates of special theory relativity • Galilean and Lorentz Transformations, Length contraction, Mass Variation and Time Dilation. • Relativistic Mass-Energy relation • Relativistic Energy and Momentum • Conclusion of Unit
5	**Elements of Material Science**
	• Introduction of Unit: Bonding in solids, Covalent bonding and Metallic bonding • Classification of Solids as Insulator, Semi-Conductor and Conductor • Semiconductors: Conductivity in Semiconductors • Determination of band gap of a semiconductor • Hall Effect: Theory, Hall Coefficients and application to determine the sign of charge carrier • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL:

Sr. No	Reference Books	Author	Edition	Publication
1.	Fundamental of Optics	Jenkins and While	**4th**	Tata McGraw-Hill
2.	Optics	Ajoy Ghatak	**3rd**	Tata McGraw-Hill
3.	A Text Book of optics	Brijlal & Subramanium	Latest	S.Chand and co. Ltd
4.	Quantum Mechanics	Schiff	3rd	Tata Mc Graw-Hill
5.	Concept of Modern Physics	Beiser	Latest	Tata McGraw-Hill
6.	Introduction to special Theory of Relativity	R. Resnick	Latest	Johan Willy Singapore
7.	Elements of Properties of Matter	D.S.Mathur	Latest	S.Chand& Co.
8.	Solid State Physics	S.O.Pillai	Latest	Wiley Eastern Ltd.
Important Web Links				
1	https://nptel.ac.in/courses/122107035/			
2	https://nptel.ac.in/courses/122103011/			
3	https://www.khanacademy.org/science/physics			
4	https://ocw.mit.edu/courses/physics/			

Code: BTXCEE2104 ELECTRICAL & ELECTRONICS ENGINEERING 3 Credits [LTP: 3-1-0]

COURSE OUTCOME

The student will be able to:

- Apply basic electrical concepts, including various circuit analysis techniques and fundamentals of theorem, in practical applications.
- Analyze the fundamentals of AC circuits such as the R.M.S value, average value, active power, reactive power, power factor, form factor, peak factor and their applications.
- Analyze the energy conversion process and fundamentals of rotating and stationary electrical machines with their application in real life.
- Analyze the working of semiconductor devices such as Diode, BJT, UJT, photovoltaic cells, filters and fundamentals of digital electronics.
- Illustrate the concepts of Communication systems and Instrumentation engineering in practical applications.

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	Basic Concepts of Electrical Engineering	8
2.	Alternating Quantities and Electrical Installations	8
3.	Energy Conversion and Electrical Machines	7
4.	Basic Electronics	8
5.	Communication Systems and IoT	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Basic Concepts of Electrical Engineering**
	• Introduction of Unit • Basic Concepts: Electric Current, Electromotive Force, Electric Power, Ohm's Law, Basic Circuit Components, Faraday's Law of Electromagnetic Induction. • DC Network Analysis & Theorems: Kirchhoff's Laws, Network Sources, Resistive Networks, Series-Parallel Circuits, Star-Delta Transformation, Node Voltage Method, Mesh Current Method, Super- Position, Thevenin's, Norton's and Maximum Power Transfer Theorems. • Conclusion of Unit
2.	**Alternating Quantities and Electrical Installations**
	• Introduction of Unit • Single Phase AC system: Introduction, Generation of AC Voltages, Root Mean Square and Average Value of Alternating Currents and Voltages, Form Factor, Peak Factor, Power Factor and Quality Factor, Phasor Diagram • Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Importance of earthing. Types of Batteries, Important characteristics for Batteries. Elementary calculations for energy consumption and savings, battery backup. • Conclusion of Unit
3.	**Energy Conversion and Electrical Machines**
	• Introduction of Unit • Introduction to Energy: Types of Energy, Introduction to Energy Conversion, Sources of Energy (Conventional& Non-Conventional), Energy Scenario in India & Rajasthan.

	• Rotating Machines: **DC Machines**: Principle of Operation of DC Machine as Motor and Generator, EMF Equation, Applications of DC Machines. **AC Machines:** Principle of Operation of 3-Phase Induction Motor, 3- Phase Synchronous Motor and 3- Phase Synchronous Generator (Alternator), Applications of AC Machines. **Electric Vehicle:** Introduction to Electric Vehicles: Types of EVs, Applications of EV, Charging of EV. Stationary Machines: Introduction, Construction and Principle of Working of Transformer, EMF Equation, • Conclusion of Unit
4.	**Basic Electronics**
	• Introduction of Unit • **Semiconductor Devices:** Conduction in Semiconductors, Conduction Properties of Semiconductor Diodes, Behavior of the PN Junction, PN Junction Diode, Zener Diode, LED, Photovoltaic Cell, Rectifiers, L, C, & L-C filters, BJT, UJT, Transistor as an Amplifier. • **Digital Electronics:** Boolean algebra, Binary System, Logic Gates and Their Truth Tables. • Conclusion of Unit
5.	**Communication Systems and IoT**
	• Introduction of Unit • **Basics of Communication: I**ntroduction, IEEE Spectrum for Communication Systems, Types ofCommunication, Amplitude and Frequency Modulation. • **Basics of Instrumentation:** Introduction to Transducers, Thermocouple, RTD, Strain Gauges, Load Celland Bimetallic Strip. • **An overview of Internet of Things-**Building blocks of IoT, IoT enabling technologies, Characteristics of IoT systems and IoT levels, Evolution of the Internet paradigm, Device-to-Device/ Machine-to-Machine Integration • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

Sr. No	Reference Book	Author	Edition	Publication
1	Electrical and Electronic Technology	Edward Hughes et al,	Latest	Pearson Publication
2	Basic Electrical & Electronics Engineering	V. Jagathesan, K. Vinod Kumar & R. Saravan Kumar	Latest	Wiley India
3	Basic Electrical & Electronics Engineering	Van Valkenburge	Latest	Cengage learning
4	Basic Electrical and Electronics Engineering	Muthusubrmaniam	Latest	TMH
5	Basic Electrical & Electronics Engineering	Ravish Singh	Latest	TMH
Important Web Links				
1	https://nptel.ac.in/courses/108108076/			
2	https://nptel.ac.in/courses/117103063/			
3	https://nptel.ac.in/courses/108/101/108101091/			

Code: BTXCME2105 ENGINEERING MECHANICS 3 Credits [LTP: 3-1-0]

COURSE OUTCOME

The student would be able to:

- Analyze the forces act on a component and method of resolution.
- Evaluate the centroid and center of gravity of an object and also analyze how to minimize the effort for lifting a load.
- Evaluate the effect of friction and also evaluate forces with the effect of friction.
- Analyze the conversion of linear motion into angular motion and vice versa.
- Analyze the effect of impact on elastic and non-elastic body.

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	**Fundamentals of Mechanics**	8
2.	**Machine & Moment of Inertia**	8
3.	**Friction & Belt Drive**	7
4.	**Dynamics of Particles**	8
5.	**Work, Power & Impact**	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Fundamentals of Mechanics**
	• Introduction of Unit • Fundamental laws of mechanics, Principle of transmissibility. • System of forces, Resultant force, Resolution of force. • Moment and Couples, Varignon's Theorem, • Equilibrium, Conditions for equilibrium, Lami's theorem. • Conclusion of Unit
2.	**Machine & Moment of Inertia**
	• Introduction of Unit • **Lifting Machines**: Mechanical advantage, Velocity Ratio, Efficiency of machine, Ideal machine, Ideal effort and ideal load, Reversibility of machine, Law of machine, Lifting machines. • **Centroid & Moment of Inertia:** Location of centroid and center of gravity, Moment of inertia, Parallel axis and perpendicular axis theorem, Radius of gyration, M.I of composite section. • Conclusion of Unit
3.	**Friction & Belt Drive**
	• Introduction of Unit • **Friction**: Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder. • **Belt Drive**: Types of belts, Types of belt drives, Velocity ratio, Effect of slip on Velocity ratio, Length of belt, Ratio of tensions and power transmission by flat belt drives. • Conclusion of Unit
4.	**Dynamics of Particles**

	• Introduction of Unit • **Kinematics of Particles and Rigid Bodies**: Velocity, Acceleration, Types of Motion, Equations of Motion, Rectangular components of velocity and acceleration, Angular velocity and Angular acceleration. • **Kinetics of Particles and Rigid Bodies**: Newton's laws, Linear Momentum, Equation of motion in rectangular coordinate, Equation of motion in plane for a rigid body, D' Alembert principle. • Conclusion of Unit
5.	**Work, Power & Impact**
	• Introduction of Unit • **Work, Energy and Power**: Work of a force, weight, Power, Efficiency, Energy, Kinetic energy of rigid body, Principle of work and energy. • **Impact**: Collision of elastic bodies, types of impact, conservation of momentum, Newton's law of collision. • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

Sr .No	Reference Book	Author	Edition	Publication
1.	Vector Mechanics for Engineers	Beer and Johnston	Latest	Tata McGraw Hill
2.	Engineering Mechanics	D S Kumar	Latest	S K Kataria& Sons
3.	Engineering Mechanics Statics	Meriam, J. L. & Kraige, L. G	Latest	John Wiley & Son
4.	Engineering Mechanics	S. Ramamruthan	Latest	Dhanpat Rai Pub.
5.	Engineering Mechanics	Shames	Latest	Pearson Education
Important Web Links				
1	https://nptel.ac.in/courses/112103109/			
2	https://nptel.ac.in/courses/112106286/			
3	https://freevideolectures.com/course/2264/engineering-mechanics			

Code: BTXCCE2106	PROGRAMMING IN C	3 Credits [LTP:3-0-0]

Course Outcomes: -
Students will be able to:

- Learn data types, loops, functions, array, pointers, string, structures and files.
- Develop conditional and iterative statements to write C programs.
- Implement concept of string using array.
- Allocate memory dynamically using pointers.
- Apply C Programming to solve real time problems.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	**Introduction to C Programming**	6
2.	**Decision Making & Looping**	6
3.	**Array and string**	8
4.	**Advance programming in C**	8
5.	**File handling & Additional features**	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to C Programming**
	• Introduction of Unit • Introduction to computer-based problem solving, Program design and implementation issues- Flowcharts & Algorithms. • Types of Languages – Machine language, assembly language, high level languages, Assemblers, Compilers, Interpreters. • Overview of C, Data Types, Constants & Variables, Literals, Operators & Expressions • Conclusion &Real Life Application
2.	**Decision Making & Looping**
	• Introduction of Unit • Decision making in C- if statement, if-else statement, Nested if statement, if else if Ladder, Switch case • Loop control in C – for loop, while loop, do-while loop • Control flow in C- break, continue and goto statement. • Conclusion &Real Life Application
3.	**Array and string**
	• Introduction of Unit • Array- 1D array, 2D array and dynamic array • Scope rules- Local & global variables. • Functions-parameter passing, call by value and call by reference, calling functions with arrays, command line argument, recursion- basic concepts. • String – String in-build functions. • Conclusion of the Unit

4.	**Advance programming in C**
	• Introduction of Unit • Pointers- The & and * operator, pointer expression, assignments, arithmetic, comparison, arrays of pointers, pointers to pointers, initializing pointers, pointers to functions, function retuning pointers. • Structures- Basics, declaring, referencing structure elements, array of structures, passing structures to functions, structure pointers, arrays and structures within structures, typedef. • Unions – Declaration, uses • Enumerated data-types • Conclusion of the Unit
5.	**File handling & Additional features**
	• Introduction of Unit • File Handling – The file pointer, file accessing functions-fopen, fclose, putc, getc, fprintf, reading and writing into a file • Advance features- storage classes and dynamic memory allocation • C Preprocessor- #define, #include, #undef, Conditional compilation directives. • C standard library and header files: Header files, string functions, mathematical functions, Date and Time functions. • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Letus C, 6th Edition	Yashwant Kanitkar	PBP Publication	Letus C ,6th Edition
2.	The C programming Language	Richie and Kenninghan	BPBPublication,2004	The C programming Language
3.	Programming in ANSI C3rd Edition, 2005	E.Balagurusamy	Tata McGraw Hill	Programming in ANSIC 3rd Edition, 2005
Reference Book				
1	The C programming Language Richie and Kenninghan PBP Publication,2004			
2	Programming in ANSI C 3rd Edition, 2005 Balaguruswmy Tata McGraw Hill			
Online Resources				
1	https://www.programiz.com/c-programming/examples			
2	https://www.w3resource.com/c-programming-exercises			

Code: BTXCME2107 INTRODUCTION TO FUTURISTIC TECHNOLOGIES 3 Credit [LTP: 3-0-0]

COURSE OUTCOME

The student would be able to:

- Analyze the design and working of Hybrid and Electric Vehicle.
- Analyze the need of Additive Manufacturing (AM) and Rapid Prototyping (RP).
- Create smart devices using Internet of Things (IoT).
- Analyze the future with AI, and AI in Action
- Analyze the Opportunities and Challenges in adoption of Industry 4.0.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time Required for the Unit (Hours)
1.	**Introduction to Hybrid and Electric Vehicle**	8
2.	**Introduction to Additive Manufacturing (AM) and Rapid Prototyping (RP)**	8
3.	**Introduction to Internet of Things (IoT)**	7
4.	**Introduction to Artificial Intelligence (AI) and Blockchain**	8
5.	**Introduction to Industry 4.0 and 5.0**	8

B. DETAILED SYLLABUS

Unit	Contents
1.	**Introduction to Hybrid and Electric Vehicle**
	• Introduction of Unit • Hybrid and Electric Vehicles (HEV): History Overview and Modern Applications • Power Flow and Power Management in HEV • Introduction to Electric Drives: Shunt Drives, Series Drives, Compound Drives • Types of Batteries and Energy Storages • Introduction to Power Electronics in Hybrid Electric Vehicles • Case Studies: Toyota Camry Hybrid, MG Hector Hybrid, Tata Nexon EV • Conclusion of Unit
2.	**Introduction to Additive Manufacturing (AM) and Rapid Prototyping (RP)**
	• Introduction of Unit • Introduction to reverse engineering Traditional manufacturing v/s AM • Computer aided design (CAD) and manufacturing (CAM) and AM • Different AM processes and relevant process physics AM process chain • Growth of RP industry, and classification of RP systems • Application level: Stereo Lithography Systems, Selective Laser Sintering Fusion, Deposition Modelling, Solid Ground Curing, 3-D Printing processes • Conclusion of Unit
3.	**Introduction to Internet of Things (IoT)**
	Introduction of Unit • Introduction to IoT • Sensing, Actuation, Basics of Networking • Interoperability in IoT,

	• Introduction to Arduino Programming: Sensors and Actuators with Arduino • Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi • Case Studies: Smart Cities and Smart Homes, Connected Vehicles, Healthcare, Conclusion of Unit
4.	**Introduction to Artificial Intelligence (AI) and Blockchain**
	Introduction of Unit What is AI? Applications and Examples of AI AI Concepts, Terminology, and Application Areas AI: Issues, Concerns and Ethical Considerations The Future with AI, and AI in Action Case Studies: Travel & Navigation, Social Media Feeds, Google Lens and OCR, Smart Cars, Security & surveillance Introduction to Blockchain Technology Conclusion of Unit
5.	**Introduction to Industry 4.0 and 5.0**
	• Introduction of Unit • Introduction to Industry 4.0 • Road to Industry 4.0: Smart Manufacturing, Smart Devices and Products, Smart Logistics, Smart Cities, Predictive Analytics • Technologies for enabling Industry 4.0 • Opportunities and Challenges • Future of Works and Skills for Workers in the Industry 4.0 Era • Industry 4.0 vs Industry 5.0 • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL:

Sr. No	Reference Book	Author	Edition	Publication
1	Electric and Hybrid Vehicles	A.K. Babu	Second Edition, 2022	Khanna Publishing
2	Artificial Intelligence: Concepts and Applications	Lavika Goel	2021	Wiley
3	Industry 4.0: Challenges, Trends, and Solutions in Management and Engineering	Carolina Machado	2021	CRC Press
4	Additive Manufacturing	C. P. Paul	2021	McGraw Hill
Important Web Links				
1	https://nptel.ac.in/courses/106105195			
2	https://www.linkedin.com/learning/foundations-of-the-fourth-industrial-revolution-industry-4-0			
3	https://nptel.ac.in/courses/108103009			
4	https://onlinecourses.nptel.ac.in/noc22_cs56/preview			

PRACTICAL

Code: BTXCSA2101	ENGINEERING CHEMISTRY LAB	1 Credit [LTP: 0-0-2]

COURSE OUTCOME

The student would be able to:

- Analyze hardness and fluoride content of water
- Analyze the strength of NaOH and Na2CO3 solutions.
- Analyze hardness strength of Ferrous Ammonium sulphate solution and CuSO4 solution
- Analyze different properties of lubricating oil.
- Handle different instruments & analytical techniques.

A. LIST OF EXPERIMENTS

EXPERIMENTS	
1.	To determine the hardness of water by EDTA method.
2.	To determine the amount of fluoride in drinking water
3.	To determine the strength of NaOH and Na_2CO_3 in a given alkali mixture.
4.	To determine the strength of Ferrous Ammonium sulphate solution with the help of $K_2Cr_2O_7$ solution using diphenyl amine as internal indicator.
5.	To determine the strength of $CuSO_4$ solution with the help of hypo solution.
6.	To determine the acid value of a given oil.
7.	To determine the viscosity of a given lubricating oil by Redwood viscometer.
8.	To determine the flash and fire point of a given lubricating oil.
9.	To determine the cloud and pour point of a given oil.
10.	Synthesis of Bakelite
11.	To determine the calorific value of a fuel by Bomb Calorimeter.
12.	To determine the Saponification No. of a given oil.
Virtual Labs	
1.	https://www.youtube.com/watch?v=RzAPQPWOlNI
2.	https://vlab.amrita.edu/?sub=3&brch=63&sim=688&cnt=1

Code: BTXCME2202	MACHINE DRAWING LAB	1 Credit [LTP: 1-0-2]

COURSE OUTCOME

The student would be able to:

- Analyze the concepts sectioning, true section and apparent section and create the sectional views of the engineering components.
- Analyze the development of surface and analyze the sheet metal requirement for fabricating a surface.
- Analyze the curves produced due to intersections of different surfaces.
- Create isometric views of various engineering components.
- Create multi view drawings of simple and complex engineering components

A. LIST OF EXPERIMENT

1.	Introduction to machine drawing
2.	Dimensioning, locations and placing
3.	**Orthographic projections**: First & third angle methods Drawing Sheet 1: Orthographic Projections (3 Problems) Drawing Sheet 2: Sectional Views (3 Problems) Drawing Sheet 3: Riveted joints, lap joints, butt joints, chain riveting, zig-zag riveting Drawing Sheet 4: Screw fasteners, different threads, Nuts & bolts locking devices, set screws, foundation Drawing Sheet 5: Bearing, Plumber block
4.	Instructions on free hand sketches List of free hand sketches • Different type of lines • Conventional representation of materials • Screw fasteners • Bearing: Ball, roller, needle, foot step bearing • Coupling: Protected type, flange, and pin type flexible coupling • Welded joints
Virtual Labs	
1	http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/egraphics_lab/labs/index.php

Code: BTXCSA2203	ENGINEERING PHYSICS LAB	1 Credit[LTP: 1-0-2]

COURSE OUTCOME: -

Students will be able to:

- Analyze the concept of interference with the help of Newton's ring and dispersive power through prism.
- Evaluate the resolving power through diffraction grating and double slit arrangement.
- Apply the numerical aperture of optical fiber and Coherent length and time using He-Ne laser.
- Evaluate the height of the unknown object by Sextant.
- Analyze the mechanism of Ballistic Galvanometer and evaluate the specific resistance of wire through Carey's foster bridge.

A. LIST OF EXPERIMENTS:

1.	To determine the wave length of Sodium light by Newton's Ring
2.	To determine the dispersive power of material of a prism for violet, red and yellow color of mercury light with the help of spectrometer.
3.	To determine the wave length of prominent lines of mercury by plane diffraction grating with the help of spectrometer
4.	To verify the expression for the resolving power of Telescope
5.	To measure the numerical Aperture of an optical fibre by He-Ne laser
6.	To determine the coherent length and coherent time by using He-Ne laser
7.	To study the variation of a semiconductor resistance with temperature and hence determine the Band Gap of the semiconductor in the form of reverse biased P-N junction diode.
8.	To study the characteristics of semiconductor diode and determine forward and reverse bias resistance
9.	To Determine the height of a given line drawn on the wall by sextant
10.	To study the charging and discharging of a condenser and hence determine time constant (both current and voltage graphs are to be plotted)
11.	To determine the high resistance by method of leakage, using a ballistic galvanometer.
12.	To specify the specific resistance of a material of a wire by carey foster's bridge.
Virtual Labs	
1.	http://vlab.amrita.edu/?sub=1&brch=282
2.	http://vlabs.iitb.ac.in/vlab/labsps.html
3.	https://praxilabs.com/en/virtual-labs.aspx?TAB=1#LOL

Code: BTXCEE2204 ELECTRICAL & ELECTRONICS ENGINEERING LAB 1 Credit [LTP: 1-0-2]

COURSE OUTCOMES: -

Students will be able to:

- Analyze the house wiring connections of various equipment's such as energy meter, ceiling fan, tube light etc.
- Create the connections of single phase and three phase induction motors.
- Create circuits and connects of various electrical components such as Resistors, Inductors, Capacitors, PN-Diode. Zenger Diode, LED, LCD, etc.
- Analyze the effect of L, C and L-C filters in single phase half wave and full wave bridge rectifier
- Analyze the effect of LC and LC filters in current and power rectifiers

A. LIST OF EXPERIMENTS:

1	Assemble house wiring including earthing for 1-phase energy meter, MCB, ceiling fan, tube light, three pin socket and a lamp operated from two different positions. Basic functional study of components used in house wiring.
2	Prepare the connection of ceiling fan along with the regulator and vary the speed.
3	Prepare the connection of single-phase induction motor through 1-Phase Auto-transformer and vary the speed.
4	Prepare the connection of three phase squirrel cage induction motor through 3-Phase Autotransformer and vary the speed.
5	Prepare the connection of Fluorescent Lamp, Sodium Vapour and Halogen Lamp and measure voltage, current and power in the circuit.
6	Identification, testing and application of Resistors, Inductors, Capacitors, PN-Diode. Zenger Diode, LED, LCD, BJT, Photo Diode, Photo Transistor, Analog/Digital Multi- Metres and Function/Signal Generator.
7	Measure the frequency, voltage, current with the help of CRO.
8	Assemble the single-phase half wave and full wave bridge rectifier & the analyse effect of L, C and L-C filters in rectifiers.
9	Study the BJT amplifier in common emitter configuration. Measure voltage gain plot gain frequency response and calculate its bandwidth.
10	Verify the truth table of AND, OR, NOT, NOR and NAND gates
11	Prepare the connection of sodium lamp and measure voltage
12	Analyze the effect of LC and LC filters in current and power rectifiers
Virtual Lab	
1	http://vlabs.iitkgp.ernet.in/be/
2	http://em-coep.vlabs.ac.in/List%20of%20experiments.html?domain=Electrical%20Engineering

Code: BTXCME2205	WORKSHOP PRACTICE	1 Credit [LTP:1-0-2]

COURSE OUTCOMES: -

Students will be able to

- Create a model of T Lap and T- Briddle Joint through carpentry shop
- Analyze the making of prototype model through foundry shop
- Analyze the difference between gas welding and arc welding and their applications
- Create a model on fitting shop through filling, slotting, drilling and tapping operation
- Analyze the difference between forging, moulding and casting

A. LIST OF EXPERIMENTS

1.	**Carpentry Shop** • Timber, definition, engineering applications, seasoning and preservation • Plywood and ply boards
2.	**Foundry Shop** • Moulding Sands, constituents and characteristics • Pattern, definition, materials types, core prints • Role of gate, runner, riser, core and chaplets • Causes and remedies of some common casting defects like blow holes, cavities, inclusions
3.	**Welding Shop** • Definition of welding, brazing and soldering processes and their applications • Oxyacetylene gas welding process, equipment and techniques, types of flames and their applications • Manual metal arc welding technique and equipment, AC and DC welding • Electrodes: Constituents and functions of electrode coating, welding positions • Types of welded joints, common welding defects such as cracks, undercutting, slag inclusion and boring
4.	**Fitting Shop** • Files, materials and classification.
5.	**Smithy Shop** • Forging, forging principle, materials • Operations like drawing, upsetting, bending and forge welding • Use of forged parts

List of Jobs to be made in the Workshop Practice

1.	**Carpentry Shop** 1. T – Lap joint 2. Bridle joint
2.	**Foundry Shop** 1. Mould of any pattern
3.	**Welding Shop** 1. Square butt joint by MMA welding 2. Lap joint by MMA welding
4.	**Machine Shop Practice** 1. Job on lathe with facing operation 2. Job on lathe with one step turning and chamfering operations 3. Job on shaper for finishing two sides of a job
5.	**Fitting Shop** 1. Finishing of two sides of a square piece by filing 2. Drilling operation on fitted job (two holes) 3. Slotting operation on fitted job 4. Tapping operation on fitted job

Code: BTXCCE2206 PROGRAMMING IN C LAB 1 Credit [LTP: 1-0 -2]

COURSE OUTCOME: -

Students will be able to:

- Gain concept of functional hierarchical code organization.
- Work with textual information, characters and strings
- Implement file handling concepts
- Implement real time applications using the power of C language features.
- Overcome and solve possible errors during program execution.

A. LIST OF EXPERIMENTS:

1	Given the values of the variables x, y and z, write a program to rotate their values such that x has the value of y, y has the value of z, and z has the value of x
2	Write a program that reads a floating-point number and then displays the right-most digit of the integral part of the number.
3	Write a C program to calculate the sum of digits of given number.
4	Program to find largest and smallest number from four given number.
5	Program to find whether a year is leap or not
6	Write a C program in which enter any number by the user and perform the operation of Sum of digits of entered number.
7	Write a C Program to convert Decimal number to Binary number
8	Find the sum of this series upto n terms 1+2+3+4+5+6+……..
9	Program to print Armstrong's numbers from 1 to 100.
10	Write a program to convert years into Minute, Hours, Days, Months, Seconds using switch () statements
11	Write a C menu driven program
12	Write a program to generate the various pattern of numbers
13	Write a C Program to print the reverse of an integer number
14	Write a C program to perform the factorial of given number
15	Write a C program in which a function prime that returns 1 if its argument is a prime and return zero otherwise.
16	Write a C program to calculate factorial of a number using recursion.
17	Write a C program in which enter 10 elements by the user and perform the operation of sorting in ascending order
18	Write a C program to perform to perform Matrix addition and multiplication operations.
19	Write a program to determine the length of the string and find its equivalent ASCII codes.
20	Write a program to delete all the occurrences of the vowels in a given text. Assume that the text length will be of one line
21	Write a program to maintain the library record for 100 books with book name, author's name, and edition, year of publishing and price of the book.

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Let us C	Yashwant Kanetkar	6th Edition	PBP Publication
2.	The C programming Language	Richie and Kenninghan	2nd Edition 2004	PBP Publication,2004
3.	Programming in ANSI C	E Balaguruswamy	3rd Edition, 2005	Tata McGraw Hill
Reference Book				
1.	The C programming Language by Richie and Kenninghan, PBP Publication,2004			
2.	Programming in ANSI C 3rd Edition, 2005 by E.Balagurusamy, Tata McGraw Hill			
Online Resources				
1.	https://www.programiz.com/c-programming/examples			
2.	https://www.w3resource.com/c-programming-exercises			

Code: BTXCME2207	PRACTICAL GEOMETRY	1 Credit [LTP: 1-0-2]

COURSE OUTCOME: -

Students will be able to:

- Apply the concept of scale and their applications
- Analyze the different applications of conic section and engineering curves and also how to draw on sheet
- Analyze the use of projection and also analyze the difference between first and third angle projection method
- Apply the concept of sectioning and draw sheet on section of solid
- Analyze the use of development and their application

(Theory Concepts)

A. List of Experiments

1.	• Lines, Lettering and Dimension (Sketch Book) • Scales: Representative Fraction, plain scales, diagonal scales, (In drawing sheet)
2.	• Conic Sections: Construction of ellipse, parabola and hyperbola by different methods(in drawing sheet) Engineering Curves: Construction of Cycloid, Epicycloids, Hypo-cycloid(in drawing sheet)
3.	• Type of Projection, Orthographic projection: first angle and third angle projection (in drawing sheet) • Projection of Points • Projection of Straight lines • Projection of planes: Different positions of plane lamina like: regular polygon, circle of three planes (four problems in drawing sheet) • Projection of Solids: Projection of right and regular polyhedron, cone (four problem in drawing sheet)
4.	• Sections of Solids: Projection of Frustum of a cone and pyramid (in drawing sheet)
5.	• Development of Surfaces: Parallel line and radial line method for right solids, Regular Solids (in drawing sheet) • Isometric Projections: Isometric Scale, Isometric axes, Isometric View of geometrical shapes (in drawing sheet)

(Practical Concepts)

6.	1. Introduction 2. Line (coordinate Methods) 3. Dimension 4. Scale
7.	1. Rectangle 2. Conic Section 3. Construction of ellipse, Parabola & Hyperbola, Polygon 4. Circle
8.	AutoCAD commands (copy, Mirror, Move, Array, Block, Group, Join, Hatch etc.)
9.	1. Type of Projection , Orthographic projection: First Angle and Third Angle projection 2. Projection of Points 3. Projection of Straight lines, different positions of straight lines 4. Projection of planes 5. Projection of Solids: projection of right and regular polyhedron and cone
10.	1. Section of solids: projection of frustum of a cone and pyramid 2. Isometric projections
Virtual Labs	
1	http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/egraphics_lab/labs/index.php

Code: BTXCHM2208 FOUNDATION ENGLISH 1 Credits [LTP: 0-0-2]

COURSE OUTCOME:
Students will be able to:

CO	Cognitive Abilities	Course Outcomes
CO-01	**Understanding/ Applying/Creating**	Demonstrate the grammar skills involved in writing sentences and short paragraphs.
CO-02	**Understanding/ Applying**	Build up a good command over English grammar and vocabulary to be able to ace error spotting.
CO-03	**Understanding/ Applying/Creating**	Define unknown words in sentence level context using a picture dictionary or by creating a memory link for support.
CO-04	**Understanding / Applying**	Understand, analyze and effectively use the conventions of the English language.
CO-05	**Understanding/Applying**	Develop their interest in reading and enhance their oral and silent reading skills along with sharpen their critical and analytical thinking.

UNIT NO.	UNIT NAME	HOURS
1	**Basics of Grammar**	**8**
2	**Spotting the grammatical errors and rectification**	**2**
3	**Vocabulary Building**	**4**
4	**Basics of Writing Skills**	**2**
5	**Reading Comprehension**	**8**

LIST OF ACTIVITIES	
1.	Parts of Speech: Theory & Practice through various Exercises
2.	Sentence Structures: Theory & Practice through various Exercises
3.	Tenses: Theory & Practice through various Exercises
4.	Spotting the Errors: Applying the rules and Practice Questions
5.	Vocabulary Building-I: Practice by sentence formation
6.	Vocabulary Building-II: Practice by sentence formation
7.	Paragraph Writing
8.	Article Writing
9.	Précis Writing
10.	Formal & Informal Letter Writing
11.	Reading Comprehension- I: Beginner's level reading and Answering the Questions (Competitive Exams)
12.	Reading Comprehension- II: Intermediate's level reading and Answering the Questions (Competitive Exams)

Code: BTXCHM2209	LANGUAGE LAB	1 Credits [LTP: 0-0-2]

COURSE OUTCOME:
On successful completion of the course the learners will be able to

CO	Cognitive Abilities	Course Outcomes
CO-01	**Understanding/ Applying/Creating**	Understand the nuances of language through audio- visual experience and group activities.
CO-02	**Understanding/ Applying**	Neutralize the accent for intelligibility and develop confidence in speaking with clarity enhancing their employability skills.
CO-03	**Understanding/ Applying/Creating**	Demonstrate an understanding of grammatical structures in conversations and discussions.
CO-04	**Understanding / Applying**	Utilize the knowledge of confidence building strategies to manage one's own thoughts and emotions.
CO-05	**Understanding/Applying**	Identify the requirements of skills development and apply their learning to sharpen the same.

UNIT NO.	UNIT NAME	HOURS
1	**Introduction to Communication Skills on Learning Software**	**6**
2	**Concepts of Phonetics**	**4**
3	**Grammar Practice**	**2**
4	**Confidence Enhancement Activities**	**4**
5	**Skills Enhancement Activities**	**8**

LIST OF LABS	
1.	**Listening Skills**
2.	**Reading Comprehension**
3.	**Writing Skills**
4.	**Phonetics I**
5.	**Phonetics II**
6.	**Grammar and Common Errors Usage**
7.	**Conversation**
8.	**Role Plays**
9.	**Presentation Skills I**
10.	**Presentation Skills II**
11.	**Group Discussion**
12.	**Interview Skills**

Software used in Language Lab: EL-Client

S. No.	Topics	Exercises
I	Listening Skills: Fourteen Lessons each containing five exercises	
II	Fundamental Language Skills: Introductory Lessons Basic Lessons (a) Reading	5exercises 6exercises 3exercises

	Basic Lessons (a) Grammar Basic Lessons (a) Vocabulary Basic Lessons (a) WritingBasic Lessons (b)-(c) Reading Basic Lessons (b)-(c) Grammar Basic Lessons (b) Vocabulary Basic Lessons (b) Writing	6exercises 5exercises 9exercises 9exercises 5exercises 3exercises
III	Communication Skills: Reading Comprehension Vocabulary Grammar Writing Exercises on Reading, Vocabulary, Grammar and Writing	
IV	Vocabulary: Word mentor: Various games based on the formation of words.	
V	Phonetics: Consonants Vowels Dipthongs Intonation Correct Pronunciation	
VI	English as Second Language	45exercises
VII	Conversations: Nine topics for conversations.	

- Neutralization of accent for intelligibility
- Speaking with clarity and confidence thereby enhancing employability skills of the students

Code: BCECCE2210	Introduction to Web Technology	1 Credits [LTP: 0-1-2]

COURSE OUTCOME:

Students will be able to:

- Create an effective web page, including an in-depth consideration of information architecture.
- Become familiar with graphic design principles that relate to web design and learn how to implement theories into practice.
- Develop skills in analyzing the usability of a web site.
- Plan and conduct user research related to web usability.
- Apply HTML & CSS to solve real time web problems.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	**Introduction to HTML And Internet**	8
2.	**HTML& CSS**	8
3.	**HTML5, CSS3**	8
4.	**XML**	6
5.	**Practical Website Development**	6

B. DETAILED SYLLABUS

1. Unit	Unit Details
1.	**Introduction to HTML And Internet**
	• Introduction, History of internet, Internet Design Principles, Internet Protocols - FTP,TCP/IP, SMTP, Telnet, etc., Client Server Communication, Web System architecture • Evolution of the Web, Web architectures, Web clients and servers, Static and Dynamic Web Applications, Front end and back-end web development. • HTML, CSS, JS, XML; HTTP, secure HTTP, etc; URL, Web Services – SOAP, REST • Conclusion of the Unit
2.	**HTML & CSS**
	• Introduction to Html, Html Document structure, Html Editors, Html element/tag & attributes, Designing simple page - Html tag, Head tag, Body tag; • More HTML Tags - Anchor tag, Image tag, Table tag, List tag, Frame tag, Div Html forms - Input type, Text area, Select , Button, Images. • Introduction to CSS, Syntax, Selectors, Embedding CSS to Html, Formatting fonts, Text & background colour, Inline styles, External and Internal Style Sheets, Borders & boxing • Conclusion of the Unit
3.	**HTML5, CSS3**
	• Introduction to HTML5. • Introduction to CSS3, New features, Local storage, Web Sockets, Server events, Canvas, Audio & Video, Geo location, Micro data, Drag and Drop. Browser life cycle and browser rendering stages. Service workers • Conclusion of the Unit
4.	**XML**

).	• Introduction to XML • Difference b/w Html & XML, XML editors. • XML Elements & Attributes XML DTD. • XML Schema, XML Parser. • Document Object Model (DOM), XML DOM. • Conclusion of the Unit
5	**. Practical web site development**
.	• Commonly used Web Servers and browsers, Setting up a server and domain name, website types and structures, • Web authoring tools, Web hosting, website maintenance, generating traffic to your website. • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

S. No	Text Books:	Author	Edition	Publication
1.	Practical Web Design for Absolute Beginners	AdrianW. West	2016	Apress 2016
2.	Introducing Web Development	Jorg Krause	2017	Apress 2017
3.	HTML &CSS: The Complete Reference	Thomas Powell	2010	McGrawHill, Fifth Edition.
Reference Book				
1.	HTML and CSS: Design and Build Websites – by Jon Duckett			
2.	Head First HTML and CSS: A Learner's Guide to Creating Standards-Based Web Pages – by Elisabeth Robson & Eric Freeman Publisher- ORELLY			
Online Resources				
1.	https://www.w3schools.com/html/html_links.asp			
2.	https://www.tutorialrepublic.com/html-tutorial/html-links.php			

Code: BTXCTX2601	Talent Enrichment Programme (TEP)-II	1 Credit [LTP: 1-0-0]

COURSEOUTCOME:

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students through active participate on in various activities falling in Technical and non-technical categories.

Social outreach, Discipline, TEP -I, VAC & Extra Curricular activities shall be evaluated on the basis of its sub constituent programme, as a complete one credit course. It shall be counted in calculation of SGPA but it is not a back log subject. However, the attendance of these classes shall be recorded and accounted in the total attendance.

Activities included in this category in this Semester are as follows:

Code	Activity	Hours	Credits
BTXCTX2601	Discipline, Value Added Courses & Social Outreach	-	1
	Talent Enrichment Programme (TEP)-II	-	
	Library / MOOC / NSP	1	

III SEMESTER

DEPARTMENT CORE COURSES

Code: BCECSA3101	Advanced Engineering Mathematics	3 Credits [LTP: 3-0-0]

COURSE OUTCOME
Students will be able to:

- Explain the basic concepts of probability and their properties.
- Determine the probability distribution for discrete and continuous random variable
- Analyze the correlation and regression.
- Develop mathematical arguments for Linear Programming
- Evaluate Linear Programming problem using simplex method

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Probability**	07
2.	**Probability Distribution**	07
3.	**Correlation and Regression**	08
4.	**Linear Programming**	07
5.	**Simplex Method**	07

B. DETAILED SYLLABUS

Unit	Unit Details
4.	**Probability**
	• Introduction of Unit • Random Experiment; Sample space; Random Events; Probability of events • Conditional probability • Bayes' theorem and related problems. • Conclusion of Unit
5.	**Probability Distribution**
	• Introduction of Unit • Random variable and its types • Distribution function, Probability mass function and Probability density function • Discrete probability distribution: Binomial and Poisson's distribution • Continuous probability distribution: Normal distribution • Conclusion of Unit
6.	**Correlation and Regression**
	• Introduction of Unit • Correlation, Types of correlation, • Karl Pearson Coefficient (r) of correlation, Properties,

	• Rank correlation coefficient, Regression, • Lines of Regression, Properties of regression coefficients • .Conclusion of Unit
7.	**Linear Programming**
	• Introduction of Unit • Concept of optimization, • Linear Programming: Introduction, Formulation of a Linear Programming Problem (LPP), • Requirements for an LPP, Advantages and limitations of LP. • Graphical solution, Multiple, unbounded and infeasible solutions. • Conclusion of Unit
8.	**Simplex Method**
	• Introduction of Unit • Principle of simplex method: standard form, basic solution, basic feasible solutions • Computational Aspect of Simplex Method: Cases of unique feasible solution, no feasible solution, • Multiple solution and unbounded solution and degeneracy • Two Phase method, Duality in LPP, primal-dual relationship • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Elements of Statistics, Schaum's outline series	Bernstein, S. & Bernstein, R	2001	McGraw-Hill.
2.	Introduction to Probability Models	Sheldon Ross	9th Ed	Academic Press, Indian Reprint
Reference Book				
1.	Introduction to the Theory of Statistics, Alexander M. Mood, Franklin A. Graybill and Duane C. Boes, 3rd Ed , Tata McGraw- Hill, Reprint 2007.			
2.	Operations Research, KantiSwarup,, P.K. Gupta and Manmohan, 2nd Ed, S. Chand publication Delhi			
3.	Operations Research, P.K. Gupta and D.S. Hira, 2016, S. Chand & Co. Delhi			
Online Resources				
1.	https://www.geeksforgeeks.org/engineering-mathematics-tutorials/			

Code: BCECCE3102 DATA STRUCTURE AND ALGORITHMS 3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Argue the correctness of algorithms using inductive proofs and invariants.
- Analyse worst-case running times of algorithms using asymptotic analysis.
- Analyse time complexities of various searching, sorting.
- Create various applications using stack, queue, tree and graph.
- Able to select relevant data structure to solve the problem.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to Data structures**	8
2.	**Searching and Sorting**	8
3.	**Stack and Queue**	8
4.	**Linked List**	9
5.	**Tree Graphs and their Applications**	7

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Data structures**
	• Introduction to Unit • Definition, • Classification of data structures: primitive and non-primitive • Elementary data organization • Time and space complexity of an algorithm (Examples), String processing. • Definition of dynamic memory allocation • Accessing the address of a variable • Declaring and initializing pointers - • Accessing a variable through its pointer, Meaning of static and dynamic memory allocation, Memory allocation functions: malloc(), calloc(), free() and realloc(). • Recursion – Definition, advantages, Writing Recursive programs – Binomial coefficient, Fibonacci, GCD. • Conclusion and Real Life Applications of unit
2.	**Searching and Sorting**
	• Introduction to Unit • Basic Search Techniques - Sequential search, Iterative and Recursive methods, Binary search: Iterative and Recursive methods, Comparison between sequential and binary search.

	• Sorting: General back ground and definition-Bubble sort, Selection sort, Insertion sort, Merge sort, Quicksort • Conclusion and Real-Life Applications of unit
3.	**Stack and Queue**
	• Introduction to Unit • Stack – Definition • Array representation of stack • Operations on stack: Infix, prefix and postfix notations • Conversion of an arithmetic expression from Infix to postfix • Applications of stacks. • Definition of queue • Array representation of queue • Types of queue: Simple queue, Circular queue, Double ended queue (deque), Priority queue, • Operations on all types of Queues • Conclusion and Real Life Applications of Unit
4.	**Linked List**
	• Introduction of Unit • Definition of linked list • Components of linked list • Representation of linked list • Advantages and Disadvantages of linked list • Types of linked list: Singly linked list, doubly linked list, Circular linked list • Operations on singly linked list: creation, insertion, deletion, search and display • Conclusion and Real Life Applications of Unit
5.	**Tree Graphs and their Applications**
	• Introduction to Unit • Definition : Tree • Binary tree, Complete binary tree, Binary search tree • Heap • Tree terminology: Root, Node, Degree of a node and tree, Terminal nodes, Non-terminal nodes, Siblings, Level, Edge, Path, depth, Parent node, ancestors of a node • Binary tree: Array representation of tree, Creation of binary tree. • Traversal of Binary Tree: Preorder, Inorder and postorder. • Graphs • Application of Graphs • Depth First search, Breadth First search. • Conclusion and Real Life Applications of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Schaum's outline series Data structures	Lips chutz	Latest	TMH.
2.	Data Structures and program designing using 'C'	Robert Kruse	Latest	Pearson Education

Reference Book	
1.	Introduction to Data Structures in C by- Kamthane Pearson Education2005
2.	Data Structures Using C by- Bandyo Padhyay Pearson Education
Online Resources	
1.	https://www.gatevidyalay.com/data-structures/
2.	https://www.youtube.com/watch?v=QBrDsG3MTkw
3.	https://www.tutorialspoint.com/data_structures_algorithms/index.htm

Code: BCECCE3103	OOPS with Java	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Acquire the concepts and features of object oriented programming
- Learn java's exception handling mechanism, multithreading, packages and interfaces.
- Implement object oriented programming concepts using java
- Apply object oriented programming features and concepts for solving given problem
- Implement the concept of class and objects with access control to represent real world entities.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to Java**	08
2.	**Working with classes, objects and Inheritance**	09
3.	**Packages, Interfaces & Exception Handling**	09
4.	**Multithreaded Programming & Applet**	07
5.	**JAVA Database Connectivity (JDBC) and Java 8 Features**	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Java**
	• Introduction to Unit • History and Overview of Java • Object Oriented Programming features. • Class Fundamentals • Declaring objects, Assigning object reference variables. • Literals, variables comments, separators, • Scope and Life Time of Variables • Data types - Integers, Floating point, characters, Boolean, • Type conversion and casting • Operators - Arithmetic operators, Bit wise operators, Relational Operators, Boolean Logical operators, Assignment Operator, Operator Precedence. • Conclusion of unit
2.	**Working with classes, objects and Inheritance**
	• Introduction to Unit • Control Statements – Selection Statements - if, Switch, Iteration Statements - While, Do-while, for Nested loops, Jump statements. • Methods - constructors, “this” keyword, finalize ( ) method A stack class, Over loading methods. Using objects as parameters, Argument passing, Returning objects. • Recursion, Access control, introducing final, understanding static. • Introducing Nested and Inner classes. • Command line arguments. • Inheritance – Basics, Using super, method overriding, and Dynamic method Dispatch, Using abstract classes and final with Inheritance. • Conclusion of Unit

3.	**Packages, Interfaces & Exception Handling**
	• Introduction to Unit • Definition and Implementation, Access protection importing packages. • Interfaces: Definition and implementation. • Exception Handling – Fundamentals, types, Using try and catch • Multiple catch clauses • Nested try Statements, Throw, finally. • User Defined Exception • Conclusion of Unit
4.	**Multithreaded Programming & Applet**
	• Introduction of Unit • Java thread model – main thread, creating single Multithreading • Is alive ( ) and join ( ) Methods • Thread – Priorities, Synchronization • Inter thread communication, suspending, resuming and stopping threads • Reading control input, writing control output, Reading and Writing files. • Applet Fundamentals – AWT package • AWT Event handling concepts. • Conclusion of Unit
5.	**JAVA Database Connectivity (JDBC) and Java 8 Features**
	• Introduction to Unit • Database connectivity – JDBC architecture and Drivers. • JDBC API - loading a driver, connecting to a database, creating and executing JDBC statements • Handling SQL exceptions. • Accessing result sets: types and methods. • JDBC application to query a database. • Introduction to java 8 features :-Functional Interfaces And Lambda Expressions • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	The complete reference Java –2	Herbert Schildt	V Edition,	TMH.
2.	SAMS teach yourself Java – 2	Rogers Cedenhead and Leura Lemay	3rd Edition,	Pearson Education
Reference Book				
1.	Object Oriented Programming with Java PUBLISHER PHI by M.T. Somashekara (Author), D.S. Guru (Author), K.S. Manjunatha (Author)			
2.	**"**Head First Java" by Kathy Sierra			
Online Resources				
1.	https://www.programiz.com/java-programming/online-compiler/			
2.	https://www.tutorialspoint.com/compile_java_online.php			
3.	https://onecompiler.com/java			

Code: BCECCE3104	Operating System	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Know structure and organization of the file system.
- Get concept what a process is and how processes are synchronized and scheduled.
- Acquire different approaches to memory management.
- Use system calls for managing processes, memory and the file system.
- Know the data structures and algorithms used to implement an OS.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Operating System Overview**	08
2.	**Process Management**	08
3.	**Process Deadlocks**	08
4.	**Memory Management**	09
5.	**File Management**	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Operating System Overview**
	• Introduction of Unit • Definition, Two views of operating system, Evolution of operating system, Types of OS. • System Call, Handling System Calls, System Programs, Operating System Structures, • The Shell, Open-Source Operating Systems • Conclusion of Unit
2.	**Process Management**
	• Introduction of Unit • Process v/s Program, Multi-programming, Process Model, Process States, Process Control Block. • Threads, Thread v/s Process, User and Kernel Space Threads. • Inter Process Communication, Race Condition, Critical Section • Implementing Mutual Exclusion: Mutual Exclusion with Busy Waiting • Interrupts, Lock Variables, Strict Alteration, Peterson's Solution, Test and Set Lock. • Sleep and Wake-up, Semaphore, Monitors, Message Passing. • Classical IPC problems: Producer Consumer, Sleeping Barber, Dining Philosopher Problem • Process Scheduling: Goals, Batch System Scheduling (First-Come First-Served, Shortest Job First, Shortest Remaining Time Next), Interactive System Scheduling (Round-Robin Scheduling, Priority Scheduling, Multiple Queues), Overview of Real Time System Scheduling • Conclusion of Unit
3.	**Process Deadlocks**

	• Introduction of Unit • Introduction, Deadlock Characterization, Preempt able and Non-preempt able Resources • Resource – Allocation Graph, Conditions for Deadlock. • Handling Deadlocks: Ostrich Algorithm, Deadlock prevention, Deadlock Avoidance. • Deadlock Detection (For Single and Multiple Resource Instances), Recovery From • Deadlock (Through Preemption and Rollback) • Conclusion of Unit
4.	**Memory Management**
	• Introduction of Unit • Introduction, Mono programming vs. Multi-programming, Modeling Multiprogramming, Multiprogramming with fixed and variable partitions, Relocation and Protection. • Memory management (Bitmaps & Linked-list), Memory Allocation Strategies • Virtual memory: Paging, Page Table, Page Table Structure, Handling Page Faults, TLB's • Page Replacement Algorithms: FIFO, Second Chance, LRU, Optimal, LFU, Clock, WS- Clock, Concept of Locality of Reference, Belady's Anomaly • Segmentation: Need of Segmentation, its Drawbacks, Segmentation with Paging(MULTICS) • Conclusion of Unit
5.	**File Management**
	• Introduction of Unit • File Overview: File Naming, File Structure, File Types, File Access, File Attributes, File Operations, Single Level, two Level and Hierarchical Directory Systems, File System Layout. • Implementing Files: Contiguous allocation, Linked List Allocation, Linked List • Allocation using Table in Memory, Inodes. • Directory Operations, Path Names, Directory Implementation, Shared Files • Free Space Management: Bitmaps, Linked List • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1	Operating system concepts	Silberschatz, Galvin, Gagne	8th edition	John Wiley and Sons
2	Modern Operating System	A.S.Tanenbaum	2nd Edition	Pearson
Reference Books				
1.	Operating Systems-S Halder, Alex A Aravind Pearson Education Second Edition 2016.			
Online Resources				
1.	https://www.coursera.org/courses?query=operating%20system			
2.	https://hackr.io › tutorials › learn-operating-systems			

PRACTICAL

Code : BCECCE3201 Data Structures and Algorithms Lab 1 Credits [LTP: 0-0-2]

COURSE OUTCOME

Students will be able to:
real

- Argue the correctness of algorithms using inductive proofs and invariants.
- Analyse worst-case running times of algorithms using asymptotic analysis.
- Implement various searching, sorting.
- Create various applications using stack, queue, tree and graph.
- Implement relevant data structure to solve the problem.

A. LIST OF EXPERIMENTS

1	Use a recursive function to find GCD of two numbers. Use a recursive function to find the Fibonacci series. Factorial Binomial Coefficient
2	Perform the following: Insert an integer into a given position in an array. Deleting an integer from an array.
3	Perform the following: Write a program for linear search Write a program for Binary search Write a program to sort N numbers using bubble sort.
4	Perform the following: Write a program to sort N numbers using insertion sort. Write a program to sort N numbers using selection sort. Write a program to sort N numbers using bubble sort.
5	Write a program to sort N numbers using quick sort.
6	Write a program to sort N numbers using merge sort.
7	Write a C program to create Stack using array.
8	Write a C program to create queue using array.
9	Write a program to create a linked list and to display it.
10	Inserting a node into a singly linked list on various position beginning, after given location and end.
11	Deleting a node into a singly linked list on various position beginning, after given location and end.
12	Write a C program to create stack and queue using linked list.
13	Creating a binary search tree and traversing it using inorder, preorder and postorder
14	Write a C program to implement graph.

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Data Structures and Algorithm Analysis in C	Weiss	2001	Pearson Education
2.	Schaum's outline series Data structures	Lipschutz		Tata McGraw-Hill
3.	Data Structures and program designing using 'C'	Robert Kruse		Pearson
4.	Data Structures Using C	Bandyopadhyay	1999	Pearson Education

Reference Book	
1.	Data Structures Using C, Pearson Education, Tenenbaum.
2.	Introduction to Data Structures in C, Pearson Education 2005, Kamthane
3.	Data Structures using C and C++, Pearson Education, Langsam, Ausenstein Maoshe & M. Tanenbaum Aaron.

Online Resources	
1.	https://www.programiz.com/dsa
2.	https://www.geeksforgeeks.org/data-structures/
3.	https://www.codechef.com/certification/data-structures-and-algorithms/prepare

Code: BCECCE3202	OOPs with Java Lab	1 Credits [LTP: 0-0-2]

COURSE OUTCOME

Students will be able to:

- To Implement object-oriented programming concepts to solve real world problems
- To implement the concept of class and objects with access control to represent real world entities.
- Illustrate different techniques on creating and accessing packages (fully qualified name and import statements).
- Create concepts on file streams and operations in java programming for a given application programs
- Create the backend connectivity process in java program by using JDBC drivers

A. LIST OF EXPERIMENTS:

1	A. Write a program to print "Hello World" in Java. B. Write a program to add two numbers C. Write a program to demonstrate the different access specifiers D. Write a program which uses different packages
2	A. Write a program to demonstrate inheritance, abstraction, encapsulation and Polymorphism. B. Write a program to find the factorial of n numbers C. Write a program to calculate Fibonacci series D. Write a program to add n numbers and series
3	A. Write a program to create an array and store elements into the array. B. Write a program to find the sum of elements in an array C. Write a program to demonstrate switch case, if, if-else and for loop
4	A. Write a program to demonstrate the working of methods. B. Write a program which has four methods – add(), subtract(), multiply() and divide() and demonstrate a simple console calculator. C. Write a program to accept command line arguments and display them to the user
5	A. Write a program to create a package. B. Write a program to handle different exceptions
6	A.Write a program to demonstrate try-catch, throw and throws. B. Write a program for user defined exception
7	A. Write a program to read a file Write a program to write into a file
8	Write a program to demonstrate client server communication (socket programming)
9	Write a program to create threads and manipulate them
10	Write a program to create a user interface to check user authentication.
11	Write a program to create a registration form and save the details into a file
12	Write a program to save and fetch the details from database

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1	The complete reference Java –2	Herbert Schildt	5th Edition,	TMH.
2	SAMS teach yourself Java – 2	Rogers Cedenhead and Leura Lemay	3rd Edition,	Pearson Education

Reference Book	
1	The complete reference Java –2
2	SAMS teach yourself Java – 2
Online Resources	
1	https://www.programiz.com/java-programming/online-compiler/
2	https://www.tutorialspoint.com/compile_java_online.php
3	https://onecompiler.com/java

Code: BCECCE3203	Operating System Lab	1 Credits [LTP: 0-0-2]

COURSE OUTCOME

Students will be able to:

- Implement basic services and functionalities of the operating system using system calls.
- Use modern operating system calls and synchronization libraries in software/ hardware interfaces.
- Know the benefits of thread over process and implement synchronized programs using multi-threading concepts.
- Analyze and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority.
- Implement memory management schemes and page replacement schemes.

A. LIST OF EXPERIMENTS:

1.	Write a C program to simulate the following non-preemptive CPU scheduling algorithms to find turnaround time and waiting time. a) FCFS b) SJF c) Round Robin d) Priority
2.	Write a C program to simulate the following file allocation strategies. a) Sequential b) Indexed c) Linked
3.	Write a C program to simulate multi-level queue scheduling algorithm considering the following scenario. All the processes in the system are divided into two categories – system processes and user processes. System processes are to be given higher priority than user processes. Use FCFS scheduling for the processes in each queue
4.	Write a C program to simulate the MVT and MFT memory management techniques.
5.	Write a C program to simulate the following contiguous memory allocation techniques a) Worst-fit b) Best-fit c) First-fit
6.	Write a C program to simulate paging technique of memory management
7.	Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance.
8.	Write a C program to simulate disk scheduling algorithms a) FCFS b) SCAN c) C-SCAN
9.	Write a C program to simulate page replacement algorithms a) FIFO b) LRU c) LFU
10.	Write a C program to simulate page replacement algorithms
11.	Write a C program to simulate producer-consumer problem using semaphores.
12.	Write a C program to simulate the concept of Dining-Philosophers problem.

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Operating system concepts	Silberschatz, Galvin, Gagne	8th edition	John Wiley and Sons
2.	Modern Operating System	A.S.Tanenbaum	Second Edition	Pearson
Reference Book				
1.	Operating Systems-S Halder, Alex A Aravind Pearson Education Second Edition 2016			
Online Resources				
1.	*https://www.coursera.org › courses › query=operating s...*			
2.	*https://www.javatpoint.com › best-courses-for-the-oper...*			
3.	*https://hackr.io › tutorials › learn-operating-systems*			

Code: BCECCE3204	Linux Lab	1 Credits [LTP: 0-0-2]

COURSE OUTCOME

Students will be able to:

- Implement and Use Linux Commands
- Apply Linux commands to create file and handle it.
- Study and use Vi editors
- Study and understand Shell Scripts
- make able to write Shell Scripts Program

A. LIST OF EXPERIMENTS:

1	Study and Use of Basic Linux Commands: man,history,clear,date,time,cal,who,ps,pwd
2	Study of various file management commands in Linux
3	Create a file called xyz.txt with some lines and display how many lines words and charecters are present in file
4	Explain ls command and directory management Command
5	Study and use of the commands for changing file permission
6	Study of Vi editor
7	Study of Linux shell and operators use in it
8	Write shell script to Explain If Command
9	Write shell script to add two numbers
10	Write shell script to find maximum in two numbers
11	Write shell scripts to swap two numbers
12	Write shell script to illustrate for loop

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1	Linux:the complete reference	Richard Petersen	6th Edition	McGraw Hill Education
2	How Linux Works	Brian Ward	2nd Edition	No Starch Press
Reference Book				
1	Linux Kernel Development: Linux Kernel Development, Robert Love, Addison-Wesley			
Online Resources				
1	https://www.tutorialspoint.com/unix/index.htm			
2	https://www.purdue.edu/postlab/resources/linux-tutorial/			

DEPARTMENT ELECTIVE

Code: BCEECE3111	Computer Graphics	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Gain knowledge about the concepts of computer graphics and its applications.
- Draw line and circle drawing algorithms
- Describe and analyze transformations and clipping.
- Analyze the concepts of curves and hidden surface rendering.
- Demonstrate and apply the concepts of illumination and coloring techniques.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to Computer Graphics**	7
2.	**Output Primitives**	7
3.	**Geometric transformations**	9
4.	**Curve, surfaces and hidden surface removal**	8
5.	**Illumination and color models:**	8

B. DETAILED SYLLABUS

Unit	Unit Details
	Unit Details
1	**Introduction to Computer Graphics**
	• Introduction to Computer Graphics • Definition of computer Graphics • Application of Computer Graphics • Graphics packages. • Graphics systems • Input devices • Output devices • Various image file formats • Conclusion of Unit
2	**Output Primitives**
	• Introduction to unit • Output primitives and their attributes: point, line, polygon, text, image, curve, their attributes. • Color lookup table • area filled attributes • text and characters

	• bundled attributes • Line drawing algorithms: DDA and Bresenham's line drawing algorithms • Mid point circle generating algorithm • Antialiasing • Fill area algorithms • Conclusion of Unit
3	**Geometric transformations**
	• Introduction to Geometric transformations • 2D Translation, 2D Rotation, 2D scaling • Shear and Reflection • Transformation between coordinates • 3D Translation, 3D Rotation, 3D scaling • Conclusion of Unit
4	**Viewing and hidden surface detections**
	• Introduction to unit • Window to viewport • Point clipping • Line clipping • Polygon clipping • z-buffer algorithm, Back face detection, BSP tree method • Hidden line elimination • Conclusion of Unit
5	**Illumination and color models:**
	• Introduction to Unit • Illumination model • Light sources • Ambient • Diffuse and specular lighting and calculation • Physics of colors • RGB • CMY • HSV • CIE standard • Color space • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Computer Graphics with OpenGL	Donald Hearn and M. Pauline Baker	Fourth Edition	Prentice Hall
2.	Procedural Elements for Computer Graphics	David F. Rogers	Latest	Tata McGraw Hill McGraw-Hill
Reference Book				

1.	Principles of Interactive Computer Graphics, Tata McGraw Hill, William Newman, Robert Sproull.
2.	Computer graphics : principles and practice, Tata McGraw Hill, Foley, Van Dam, Feiner and Hughes
3.	Computer Graphics: Theory Into Practice, Jones and Bartlett Publishers Jeffrey J. McConnell
Online Resources	
1.	https://nptel.ac.in/courses/106106090
2.	https://www.udemy.com/course/computer_graphics_subject/
3.	https://www.tutorialspoint.com/computer_graphics/index.htm

Code: BCEECE3112	Fundamental of Data Science	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Apply the skills of data inspecting and cleansing.
- Determine the relationship between data dependencies using statistics
- Select and implement machine learning techniques to data science applications.
- Utilize data visualization tools to Data Science applications.
- Identify the computing environments that are suitable for the Data Science applications.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to Data science**	7
2.	**Describing Data**	7
3.	**Machine Learning**	8
4.	**Data Visualizations**	8
5.	**Computing for Data Science**	9

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Data science**
	• Introduction of Unit • Definition of Data science • Need for data science • Benefits and uses • Facets of data • Data science process • Conclusion of the unit
2.	**Describing Data**
	• Introduction of Unit • Frequency distributions • Outliers • Relative frequency distributions • Cumulative frequency distributions • Frequency distributions for nominal data • Interpreting distributions :graphs, averages,mode, median, mean • Averages for qualitative and ranked data • Describing variability : range, variance, standard deviation, degrees of freedom, interquartile range • variability for qualitative and ranked data • Conclusion of the unit
3. 3	**Machine Learning**

	• Introduction of Unit • Machine learning techniques • Regression • Pearson's r value • Clustering • k-means algorithm • Classification • Types of classification algorithms • Decision tree classification • Conclusion of the unit
4. 4	**Data Visualizations**
•	• Introduction of Unit • Data Visualizations • The Big Three • Picking the Most Appropriate Design Style • Selecting the Appropriate Data Graphic Type • Web-Based Applications for Visualization Design • Designing Data Visualizations for Collaboration • Visualizing Spatial Data with Online Geographic Tools. • Conclusion of the unit
5. 5	**Computing for Data Science**
	• Introduction of Unit • Using Python for Data Science • Sorting Out the Python Data Types • Putting Loops to Good use in Python • Basics of Numpy arrays in Python • Data manipulation with Pandas • Using Open Source R for Data Science • R's Basic Vocabulary • Delving into Functions and Operators • Doing Data Science with Excel • Making Life Easier with Excel. • Conclusion of the unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Introducing Data Science	David Cielen, Arno D. B. Meysman, and Mohamed Ali	Fourth Edition	Manning
2.	Statistics	Robert S. Witte and John S. Witte	Eleventh Edition	Wiley
3.	Python Data Science Handbook	Jake VanderPlas		O'Reilly

4.	Data Science for Dummies	Lillian Pierson	2nd Edition	John Wiley & Sons publications, 2017
Reference Book				
1.	Think Stats: Exploratory Data Analysis in Python, Green Tea Press, Allen B. Downey.			
Online Resources				
1.	https://www.edx.org/learn/data-science			
2.	https://www.udemy.com/courses/development/data-science			
3.	https://www.coursera.org/browse/data-science			

Code: BCEECE3113	Cyber Crime Law & IPR	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Student will able to

- Get the knowledge about cyber crime and get awareness about cyber crime
- Differentiate the cyber crime and the provision for it
- Know about the cyber crime act law and the rules about copy right
- Get the knowledge about computer forensic and its requirement.
- Learn about the Indian cyber laws and its usage

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Cyber Crime Introduction**	07
2.	**Indian Cyber Laws-I**	08
3.	**Indian Cyber Laws-II**	08
4.	**Computer Forensics**	07
5.	**Copyright and Cyber law**	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Cyber Crime Introduction**
	• Introduction of Unit • Cyber Crime Introduction (Need for cyber law, Evolution of key terms and concepts) • Cyber Crimes and Jurisprudence of Cyber Law, What is cyber law and IPRs, Need for cyber law, Evolution of key terms and concepts • Need for cyber law, Evolution of key terms and concepts, Cyber Crimes and Jurisprudence of Cyber Law, What is cyber law and IPRs • Introduction of IT Act, Introduction Conventional Crime ,Cyber Crime,Reasons for Cyber Crime • Classification of Conventional and Cyber Crime, Difference between Conventional and Unconventional Cyber Crime • Cyber Criminal Mode and Manner of Committing Cyber Crime,Computer crime prevention measures • Conclusion of Unit
2.	**Indian Cyber Laws-I**
	• Introduction of Unit • Provisions in Indian Laws in dealing with Cyber Crimes and its critical analysis, Information Technology Act, 2000, Penalties and Offences under IT Act • Offences related with Digital Signature and Electronic Signature under IT Act, Statutory Provisions • Establishment of Authorities under IT Act and their functions, powers such as Controller, Certifying Authorities ,Cyber Regulation Appellate Tribunal, Adjudicating officer • Conclusion of Unit

3.	**Indian Cyber Laws-II**
	• Introduction of Unit • International Organizations and their roles such as ICANN,URDP,WTO and TRIPS • Evolution of IT Act ,Digital/ Electronic Signature- Analysis in the background of Indian Laws • E-Commerce; Issues and provisions in Indian Law • EGovernance; concept and practicality in India, ETaxation issues in Cyberspace • Conclusion of Unit
4.	**Computer Forensics**
	• Introduction of Unit • Introduction, Subdivisions, Steps of Computer Forensics, Analyzing the Suspected Computer • Incidence Response, Digital Forensic Science, The need for Computer Forensics • Cyber Forensics and Digital Evidence • Digital Forensics Life Cycle, Chain of custody concept and Challenges in Computer Forensics, Forensic Imaging • Conclusion of Unit
5.	**Copyright and Cyber law**
	• Introduction of Unit • Concept of Copyright and Patent in Cyberspace, Copyright in the Digital Medium • Copyright in Computer Programmes, Copyright and WIPO Treaties • Concept of Patent Right, Relevant provisions of Patent Act 1970 • Data Storage on a Hard Drive, Data Storage on a Hard Drive, Hard Disk Drive addressing • Hard Disk Drive addressing, File corruption and Recovery, Fundamentals of drive imaging • Cloning and Issues in Imaging • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Cyber security - understanding cybercrimes, computer forensics and legal perspectives	Nina godbole and sunit belapure	1st	WILEY
2.	Computer Forensics: Principles and Practices	Linda Volonino, Reynaldo Anzaldua And Jana Godwin	1st	PEARSON
Reference Book				
1.	System Forensics Ankit Fadia,Boonlia, Prince Komal, 1st Vikas Publication			
2.	Cyber law in India, Farooq Ahmad 1st Pioneer Publishers, New Delhi			
3.	Information technology law and practice, Sharma Vakul, Universal Law Publishing Co Ltd			
Online Resources				
1.	http://www.vjolt.net/vol12/issue3/v12i3_a1-Azam.pdf			
2.	https://www.wipo.int/export/sites/www/amc/en/docs/wipointaudrp.pdf			

Code: BCEECE3114	Introduction to UI/UX	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Student will able to

- Gain knowledge about the critical importance of user interface design
- Use learned skills to solve problems of various layouts of User Experience Design
- Apply the functionality of different design in web designing
- Properly select and utilize design thinking processes and UX/UI tools
- Develop ideas and various app designs and website pages.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction To HCI**	08
2.	**UX Introduction**	09
3.	**Mobile UI Design**	09
4.	**Best Practices In UI Design**	07
5.	**Prototype & Test**	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to HCI**
	• Introduction of Unit • Introduction to HCI • HCI and Software Engineering • Models of HCI — Cognitive, Interactive • Fitt's Law • Communication & Collaboration Models • Programming Interactive System • Task Analysis • Guidelines in HCI • Conclusion of unit
2.	**UX Introduction**
	• Introduction of Unit • User Interaction with the products, applications and services • Why User Experience Design • What is User Experience (UX) Design? • Core elements of User Experience. • How these elements work together. • Defining the UX Design Process and Methodology • Visual Design Principles • Information Design and Data Visualization • Conclusion of Unit
3.	**Mobile UI Design**

	• Introduction of Unit • Mobile Interaction Styles: Keypads, Touchpads, Gestures • Disruption & Innovation • Screen Design and Layouts • UX Tools for Wire framing and Prototyping • UX Tools for User Research and User Testing • UX Tools for Organizing Information • Conclusion of Unit
4.	**Best Practices in UI Design**
	• Introduction of Unit • Introduction to Perl • Mobile UI Best practices — HTML & CSS • HTML Tags and forms • CSS - Properties • Mobile UI Best practices —JS • Conclusion of Unit
5.	**PROTOTYPE & TEST**
	• Introduction of Unit • What is Usability Testing? • Types of Usability Testing • Usability Testing Process • How to prepare and plan for the Usability Tests? • Prototype your Design to Test? • Quality assurance • Alpha testing • Launching you project • Support • Post launch activities • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Human Computer Interaction	Alan Dix, Janet Finlay	3rd edition 2004	Pearson Education
2.	The Essential Guide to User Interface Design: An Introduction to GUI Design Principles and Techniques	Wilbert 0. Galitz	3rd edition 2007	Wiley
3.	Human Computer Interaction	Alan Dix, Janet Finlay	3rd edition 2004	Pearson Education
Reference Book				
1.	UX for Dummies, Donald Chesnut , Kevin P. Nichols , 2014,Wiley India Pvt. Ltd			
2.	UX for beginners, Mekkie Bansil,2016,O Really			
Online Resources				
1.	https://learnui.design/			

Code: BULCHU3201	Skills-Communication I	1 Credits [LTP: 2-0-0]

COURSE OUTCOME

Students will be able to:

- Demonstrate depth of understanding, observing complexity, improve insight and develop independent thought and persuasiveness.
- Determine the main ideas of the text by using key details and compare & contrast the most important points with the help of their perspective.
- Practice the qualities of writing style by applying the concepts of sentence conciseness, accuracy, readability, coherence and by avoiding wordiness or ambiguity.
- Distinguish words and phrases as per their intonation patterns and interpret the audios based on different situations
- Demonstrate the understanding of impactful conversational skills, presentation skills & telephonic conversation by considering the need of the audience.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Intrapersonal/Interpersonal Skills**	**6**
2.	**Reading Skills**	**4**
3.	**Writing Skills**	**6**
4.	**Listening Skills**	**4**
5.	**Speaking Skills**	**5**

B. DETAILED SYLLABUS

	LIST OF ACTIVITIES
1.	Self – Awareness & Self-Introduction
2.	Goal Setting: Ambition induced, interest induced or environment conditioned
3.	Cultivating Conversational Skills
4.	Role Plays : Selection of varied plots, characters & settings
5.	Reading skills I: Newspaper Reading & General Article Reading
6.	Writing Skills I: Story Making by jumbled words
7.	Understanding and Applying Vocabulary
8.	Listening Skills I: Types and practice by analyzing situational listening
9.	Speaking Skills I: JAM
10.	PowerPoint Presentation Skills-I
11.	Telephonic Etiquettes and Communication
12.	Recognizing, understanding and applying communication style (Verbal/Non-Verbal)

Code: BCECCE3601 Talent Enrichment Programme (TEP)-III 1 Credit [LTP: 0-0-6]

COURSEOUTCOME:

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students through active participate on in various activities falling in Technical and non-technical categories.

Social outreach, Discipline, TEP -I, VAC & Extra Curricular activities shall be evaluated on the basis of its sub constituent programme, as a complete one credit course. It shall be counted in calculation of SGPA but it is not a back log subject. However, the attendance of these classes shall be recorded and accounted in the total attendance.

Activities included in this category in this Semester are as follows:

Code	Activity	Hours	Credits
BCECCE3601	Discipline, Value Added Courses & Social Outreach	**2**	1
	Talent Enrichment Programme (TEP)-III	**2**	
	Library / MOOC / NSP	**2**	

IV SEMESTER

DEPARTMENT CORE COURSES

Code: BCECCE4101	Computer Networks	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Gain the knowledge of the basic computer network technology and become familiar with layered communication architectures (OSI and TCP/IP).
- Analyze the basics of Framing and Error detection including parity, checksums, and CRC.
- Gain the knowledge of the basic IP configuration used for Networking. Also clear the concept of Logical and Physical Addressing
- Analyze the concepts of reliable data transfer and how TCP implements these concepts.
- Learn the principles of WAN routing and the semantics.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Networking Fundamentals & Internet**	09
2.	**Basics Presentation & Application Layer**	07
3.	**Basics of Transport layer & Network, Layer**	08
4.	**Basics of Data Link Layer**	07
5.	**Basics of WAN Technology**	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Networking Fundamentals & Internet**
	• Basics of Network & Networking, Types of Networks: LAN, MAN, WAN, Peer-to-Peer & Client/Server, Workgroup Vs. Domain, Network Topologies. The Internet, Network Devices- NIC, Hub, Switch, Bridge, Router, Gateways, Firewall, Repeater, CSU/DSU, and modem, Introduction of OSI model, and TCP/IP Model, Comparison between OSI model & TCP/IP model. Physical Layer: Types of Transmission Media, Communication Modes, Wiring Standards and Cabling- straight through cable, crossover cable, rollover cable, Media connectors (Fibre optic, Coaxial, and TP etc.) Switching Methods (Circuit/Packet Switching) Uni-cast, Multicast, Broadcast • Conclusion & Real Life Application
2.	**Basics Presentation & Application Layer**
	• Presentation Layer protocols:-TLS, SSL, MIME • Application Layer: Functions and support, Application Layer Protocols: DHCP, DNS, HTTP/HTTPS, FTP, TFTP, SFTP, Telnet, Email: SMTP, POP3/IMAP, NTP. • Conclusion & Real Life Application
3.	**Basics of Transport layer & Network, Layer**
	• Transport Layer: Transmission Control Protocol(TCP), User Datagram Protocol (UDP), Overview of Ports & Sockets • Network Layer: Internet Protocol (IP), IP standards, versions, functions, The IPv4 Datagram

	Format, IPv4 addressing, IPv4 address Classes, IPv4 address types, Default Gateway, Public & Private IP Address, methods of assigning IP address, Subnet Mask and subneting, IPv6 address, types, assignment, Data encapsulation, Introduction to Routing and Switching concepts. • Conclusion &Real Life Application
4.	**Basics of Data Link Layer**
	• Application of Data Link Layer: Framing and Error detection and correction. Stop and Wait protocol, Sliding Window protocols Go-Back-N Protocol, Channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols. Wireless Networking, Types of Wireless Networks: Ad-hoc mode, Infrastructure mode, wireless LAN standards: IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, wireless security Protocols: WEP,WPA, 802.1X. • Conclusion & Real Life Application
5.	**Basics of WAN Technology**
	• What Is a WAN?, WAN Switching, WAN Switching techniques Circuit Switching, Packet Switching etc., Connecting to the Internet : PSTN, ISDN, DSL, CATV, Satellite-Based Services, Last Mile Fibre, Cellular Technologies • Connecting LANs: Leased Lines, SONET/SDH, Packet Switching, Remote Access: Dial-up Remote Access, Virtual LAN, Virtual Private Networking • Conclusion &Real Life Application

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Computer Network	AndrewS. Tanenbaum	2013	Pearson
2.	Computer Networking: Top Down Approach	Kurose. Ross	2017	Pearson
Reference Book				
3.	Networking All in One – Doug Lowe 7th edition Publisher- Wiley			
Online Resources				
4.	https://www.edx.org/learn/computer-networking			
5.	https://www.youtube.com/watch?v=VwN91x5i25g			

Code: BCECCE4102	Information System Security	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Identify and analyse security problems in computer systems and networks.
- Analyse and apply how standard security mechanisms work.
- Develop security mechanisms to protect computer systems and networks.
- Write programs that are more secure.
- Use cryptography algorithms and protocols to achieve computer security

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to Information Security**	07
2.	**Encryption and Authentication Techniques.**	08
3.	**Risk Management**	08
4.	**Internet Security.**	07
5.	**Network Security**	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Information Security**
	• Introduction to Information Security: Attacks, Vulnerability, Security Goals, Security Services and mechanisms, Conventional Cryptographic Techniques: Conventional substitution and transposition ciphers, One-time Pad, Block cipher and Stream Cipher, Steganography. • Conclusion of the Unit
2.	**Encryption and Authentication Techniques.**
	• Symmetric and Asymmetric Cryptographic Techniques: DES, AES, RSA algorithms, International Data Encryption Algorithm (IDEA), Digital Certificates, Private Key Management, The PKIX Model Authentication and Digital Signatures • Conclusion of the Unit
3.	**Risk Management**
	• Key management – Kerberos, Program Security: Nonmalicious Program errors – Buffer overflow, Incomplete mediation, Time-of-check to Time-of- use Errors, Viruses, Trapdoors, Salami attack, Man-in-the- middle attacks, Covert channels • Conclusion of the Unit
4.	**Internet Security.**
	• Internet Security Protocols: Introduction, Basic Concepts, Secure Socket Layer (SSL), Transport Layer Security (TLS), Secure Hyper Text Transfer Protocol (SHTTP), Time Stamping Protocol (TSP), Secure Electronic Transaction (SET), SSL Versus SET, 3D Secure Protocol, Electronic Money, Email Security Wireless Application Protocol (WAP) Security • Conclusion of the Unit
5.	**Network Security**
	• Security in Networks: Threats in networks, Network Security Controls – Architecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honeypots, Traffic flow security, Firewalls – Design and Types of Firewalls, Personal Firewalls, IDS, Email Security – PGP,S/MIME • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Information Security Risk Analysis	Thomas R. Peltier	Third Edition, Pub: Auerbach,2012	Information Security Risk Analysis
2.	Mark Stamp's Information Security: Principles and Practice (WIND)	Deven N.Shah, Wiley (2009)	2009	Mark Stamp's Information Security: Principles and Practice (WIND)
3.	Information Systems Security: Security Management, Metrics, Frameworks and Best Practices	Nina Godbole,	Wiley,1sted;2008	Information systems Security: Security Management, Metrics, Frameworks and Best Practices
Reference Book				
1.	Security in Computing, Fourth Edition, by Charles P. P fleeger, Pearson Education			
2.	Cryptography And Network Security Principles And Practice, Fourth or Fifth Edition, William Stallings, Pearson			
3	Modern Cryptography: Theory and Practice, by Wenbo Mao, Prentice Hall.			
Online Resources				
1.	https://www.sans.org/cyber-security-courses/introduction-cyber-security/			
2.	https://nptel.ac.in/courses/106106129			

Code: BCECCE4103	Relational Database Management System	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Describe DBMS architecture, physical and logical database designs, database modeling, relational, hierarchical and network models.
- Identify basic database storage structures and access techniques such as file organizations, indexing methods including B-tree, and hashing.
- Learn and apply structured query language (SQL) for database definition and database manipulation.
- Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
- Analyze various transaction processing, concurrency control mechanisms and database protection

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Introduction to Database Management System	7
2.	RDBMS	7
3.	SQL	7
4.	PL/SQL	8
5.	Oracle, Trigger and wrapping	7

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Database Management System**
	• Introduction to Database Management System • Characteristics of database approach • Advantages of DBMS • Schemas: Three schema architecture - The external level, the conceptual level and the internal level. • Data Independence • Database languages and Interfaces • Roles of Database Administrator • Introduction to Data Models (Hierarchical, Network and Relation) • Entity type, Entity sets, Attributes and keys. • The ER Model: ER Diagram & Database design with the ER Model • Conclusion of the Unit
2.	**RDBMS**
	• Introduction to Distributed Database • Classification of DBMS • Introduction to RDBMS • Relational Model –Concepts • Relational operations (Insert, delete, update, select, project, rename, union, intersection, minus, Join, division) • Transactions and ER mapping Examples • Normalization of RDBMS (1NF, 2NF, 3NF and 4NF) and inference rules. • Conclusion of the Unit

3.	**SQL**
	• Introduction to Unit • DBMS v/s RDBMS • Introduction to SQL: Data types, Constraints • Commands in SQL: Create table, Drop command, Alter Queries in SQL • Statements in SQL (Insert, delete and update) • Features of SQL • Manipulation of data • Tables in SQL • Conclusion of the Unit
4.	**PL/SQL**
	• Introduction to PL/SQL • Approaches to database programming: with function calls, Embedded SQL using CURSORs, Dynamic SQL, SQL commands in Java, retrieving multiple triples using Iterators • Advantages of PL/SQL • Features of PL/SQL: Blocks structure, Error handling, Input and output designing, variables and constant, data abstraction, control structures and subprogram • Fundamentals of PL/SQL : character sets, lexical, delimeters, identifiers, declarations, scope and visibility, Static and dynamic and static SQL, Implicit and explicit locking • Conclusion of the Unit
5.	**Oracle, Trigger and wrapping**
	• Introduction to Oracle, Trigger and wrapping • Functions/responsibilities of DBA • Oracle product details • Oracle files, System and User process • Oracle Memory • Protecting data: Oracle backup & recovery • Triggers - types, uses, data access for triggers • PL/SQL Packages and Wrapping • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Database System Concepts	S. Sudarshan, Henry F. Korth, Avi Silberschatz	6th Edition	McGraw Hill
2.	SQL, PL/SQL	Ivan Bayross		Bpb
3.	Oracle Complete Reference	Kevin Loney		Bpb
Reference Book				
1.	PL/SQL, best practices, Bpb Publications, Steven Feuerstein			
2.	The Oracle Cook Book, Bpb Publications, Liebschuty			
3.	Oracle A Beginners Guide, TMH Publication, Michael Abbey, Michael J.Corey			
Online Resources				
1.	https://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm			
2.	https://nptel.ac.in/courses/106106093			
3.	https://www.coursera.org/learn/introduction-to-relational-databases			

Code: BCECCE4104	Fundamentals of Python	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Analyze the basic terminology used in computer programming to write, compile and debug programs in Python programming language.
- Use different data types to design programs involving decisions, loops, and functions for problem solving
- Apply various object-oriented programming
- Handle the exceptions which are raised during the execution of Python scripts
- Implement files and classes in the Python programming environment

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to Python Programming**	07
2.	**Python Operators and Control Flow statements**	07
3.	**Data Structures, Python Functions and Packages**	08
4.	**Object Oriented Programming**	08
5.	**File I/O Handling and Exception Handling**	09

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Python Programming**
	• Introduction to Unit • What is Python, • Uses of Python Programming Language / Python Applications • Features of Python Programming Language • Python-2 and Python-3 differences • Python environment setup — Installation and working of IDE • Running Simple Python scripts to display 'welcome' message. • Python Data Types: Numbers, String, Tuples, Lists, Dictionary. Declaration and use of data types • Python building blocks — Identifiers, Keywords, Indention, Variables, Comments • Conclusion of unit
2.	**Python Operators and Control Flow statements**
	• Introduction to Unit • Basic Operators: Arithmetic, Comparison/ Relational, Assignment, Logical, Bitwise, Membership, Identity operators, Python Operator Precedence • Control Flow: • Conditional Statements (if, if ... else, nested if) • Looping in python (while loop, for loop, nested loops) • loop manipulation using continue, pass, break, else. • .Conclusion of Unit

3.	**Data Structures, Python Functions and Packages**
	• Introduction to Unit • Lists, Tuple, Sets, Dictionaries • String and Slicing • Use of Python built • User defined functions and its types • Command-line Arguments • Python Packages: Introduction, Writing Python packages • Using standard packages (e.g. math, scipy, Numpy, matplotlib, pandas etc.) • user defined packages • Conclusion of Unit
4.	**Object Oriented Programming**
	• Introduction of Unit • Creating Classes and Objects • Inheritance • Method Overloading and Overriding • Data Hiding • Data abstraction, Abstract classes • Types of Methods : Instance Methods , Static Methods , Class Methods • Accessing attributes , Built-In Class Attributes • Destroying Objects • Conclusion of Unit
5.	**File I/O Handling and Exception Handling**
	• Introduction of Unit • Types of File • File Objects, File Built-in Function, File Built-in Methods • File Built-in Attributes • Read/write operations Reading Text • Moving cursor in file inbuilt -functions • Errors in Python : Compile-Time Errors ,Runtime Errors , Logical Errors • What is Exception? • try….except…else, try-finally clause regular expressions • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Core Python Programming	Chun, J Wesley	2007	Pearson,
2.	Head First Python	Barry, Paul	2010	O Rielly,
Reference Book				
1.	Learning Python, Lutz, Mark, O Rielly, 2009			
Online Resources				
1.	https://www.learnpython.org/			
2.	https://realpython.com/start-here/			
3.	https://www.programiz.com/python-programming			

PRACTICAL

Code: BCECCE4201	Computer Networks Lab	1 Credit [LTP: 0-0-2]

Course Outcome: -

Students will be able to:

- Use the clamping tool for making Cross and Straight cable and identify network IP
- Create local area network and do file sharing activity
- Configure switch and routers
- Configure WEP and Ethernet.
- Recognize static and dynamic routing.

A. LIST OF EXPERIMENTS:

1	Implementation of TCP/IP protocol – I
2	Implementation of TCP/IP protocol – II
3	Troubleshooting Scenarios Network – I
4	Troubleshooting Scenarios Network – II
5	Router – Configuration – I
6	Router – Configuration – II
7	Router – Configuration – III
8	Configuration of IP Address for a Router – I
9	Configuration of IP Address for a Router – II
10	Setting up of Passwords – I
11	Setting up of Passwords – II
12	Setting up of Passwords – III

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Data Communications and Networking,	Behrouza A. Forouzan	Fourth Edition	TMH.
2.	Computer Networks	A.S.Tanenbaum	Fourth Edition	Pearson
Reference Book				
1.	Data Communications and Networking, TATA McGraw Hill, Ferouzan, Behrouz A.			
2.	Data and Computer Communication, Pearson Education , Stallings William			
3.	Computer Networks, PHI, Tanenbaum, Andrew S,			
Online Resources				
1.	https://www.edx.org/learn/computer-networking			
2.	https://www.udemy.com/topic/computer-network/			
3.	https://www.coursera.org/computer_network			

Code: BCECCE4202 Relational Database Management System Lab 1 Credit [LTP: 0-0-2]

Course Outcome: -

Students will be able to:

- Analyze, appreciate and effectively explain the underlying concepts of database technologies.
- Design and implement a database schema for a given problem-domain.
- Populate and query a database using SQL DML/DDL commands.
- Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS.
- Programming PL/SQL including stored procedures, stored functions, cursors, packages.

A. LIST OF EXPERIMENTS:

1.	To setup and removal phases of a Student database using the basic Data Definition Language (DDL) commands: 1. CREATE 2. ALTER 3. DROP 4. RENAME 5. TRUNCATE
2.	The routine operation of the Employee database like retrieve, insert and modify by basic Data Manipulation Language (DML) commands: 1. INSERT 2. UPDATE 3. DELETE
3.	To Retrieve data from one or more tables using DATA RETRIEVAL LANGUAGE (DRL) commands SELECT FROM SELECT - FROM –WHERE SELECT - FROM -GROUP BY SELECT - FROM -ORDER BY JOIN using SELECT - FROM - ORDER BY JOIN using SELECT - FROM - GROUP BY UNION INTERSET MINUS
4.	DATA CONTROL LANGUAGE (DCL) and TRANSATIONAL CONTROL LANGUAGE (TCL) commands. Creating objects: tables, views, users, sequences, Collections etc. Privilege management through the Grant and Revoke commands Transaction processing using Commit and Rollback Save points.
5.	Queries for following functions Conversion functions (to_char, to_number and to_date) string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)
6.	Simple queries: selection, projection, sorting on a simple table for employee database Small-large number of attributes, Distinct output values, Renaming attributes, Computed attributes Simple-complex conditions (AND, OR, NOT) Partial Matching operators (LIKE, %, _, *, ?) ASC-DESC ordering combinations Checking for Nulls

7.	To manipulate data items and returning the results using Group functions or Aggregate functions and Single Row or scalar functions: Group functions or Aggregate functions: Sum(), Avg(), Min(), Max() and Count() Single Row or scalar function: Abs(), Power(), Sqrt(), Round(), Exp(), Greastest(), Least(), Mod(), Floor(), Sign() and Log().
8.	Multi-table queries (JOIN OPERATIONS) Simple joins (no INNER JOIN) Aliasing tables – Full/Partial name qualification Inner-joins (two and more (different) tables) Inner-recursive-joins (joining to itself) Outer-joins (restrictions as part of the WHERE and ON clauses) Using where & having clauses
9.	Write Nested queries to retrieve the name of each employee who has a dependent with the same first name and same sex as the employee using following Nested queries. In, Not In Exists, Not Exists Dynamic relations (as part of SELECT, FROM, and WHERE clauses)
10	Write a query to make a list of all project numbers for projects that involve an employee whose last name is 'Smith', either as a worker or as a manager of the department that controls the project using the following Set Oriented Operations Union, Difference, Intersection, Division
11	PL/SQL Programming using the following Programs using named and unnamed blocks Programs using Cursors, Cursor loops and records
12	PL/SQL Programming using Creating stored procedures, functions and packages Error handling and Exception Triggers and auditing triggers

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Database System Concepts	S. Sudarshan, Henry F. Korth, Avi Silberschatz	6th Edition	McGraw Hill
2.	SQL, PL/SQL	Ivan Bayross		Bpb
3.	Oracle Complete Reference	Kevin Loney		Bpb
Reference Book				
1.	PL/SQL, best practices, Bpb Publications, Steven Feuerstein			
2.	The Oracle Cook Book, Bpb Publications, Liebschuty			
3.	Oracle A Beginners Guide, TMH Publication, Michael Abbey, Michael J.Corey			
Online Resources				
1.	https://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm			
2.	https://nptel.ac.in/courses/106106093			
3.	https://www.coursera.org/learn/introduction-to-relational-databases			

Code: BCECCE4203 Interactive Web Application Development Lab 1 Credit [LTP: 0-0-1]

Course Outcome: -

Students will be able to:

- Identify popular JavaScript Libraries and create dynamic styles using various libraries
- Analyzing the mapping HTML using the DOM - Document Object Model.
- Explain basic JavaScript function and call it using an on Click event.
- Summarize various operators, variables, arrays, control structures, functions and objects used in JavaScript.
- Implement a webpage using following specifications:
- (i)Create animation on a web page.
- (ii)Use regular expressions for form validation. (iii)Debug using firebug.
- (iv)Create an XMLHttp Request Object

A. LIST OF EXPERIMENTS:

1.	Grades App - Getting familiar with JS JavaScript program to compute the average marks of a list of students and use this to determine the corresponding grade of each student Use inline and external Javascript functions to modify HTML content and attributes Use event handlers Use for loop
2.	Form Validation Students will learn how to Use JS for client-side HTML form validation
3.	My Profile page with comments Students will learn how to Install and configure JavaScript on the Server side Use server side JavaScript to create a dynamic web page with forms Use document. getElementByID, document. getElementsByTagName
4.	Clock App Students will learn how to Use JS objects
5.	Getting started with jQuery Students will learn how to Install jQuery Use jQuery to hide or show specific table rows. Use jQuery to retrieve and update HTML content and attributes
6.	jQuery Students will learn how to determine when the DOM or whole page is loaded Use jQuery to traverse the DOM tree add pull quotes
7.	Windows, Frames & Overlays Students will learn how to Use Window objects, frames and overlays
8.	My Profile Page with AJAX Expand sections of the page upon user clicking on the section Students will learn how to Make use of AJAX to refresh sections of your page
9.	Attendance Page Page for updating student attendance, transferring attendance data to the server using JSON and querying any student's attendance. Students will learn how to Create appropriate web page design

	Transfer data to/from the server as JSON objects

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	JavaScript and JQuery Interactive Front-End Web Development	Jon Duckett	Wiley 2014.	JavaScript and JQuery Interactive Front-End Web Development
Reference Book				
1.	Learning Web App Development, Semmy Purewal. O'Reilly 2014.			
2.	JavaScript & JQuery The Missing Manual, David Sawyer McFarland. O'Reilly 2014			
Online Resources				
1.	https://careerfoundry.com/en/tutorials/web-development-for-beginners/introduction-to-web-development/			
2.	https://www.tutorialspoint.com/internet_technologies/websites_development.htm			

Code: BCECCE4204 Fundamentals of Python Lab 1 Credit [LTP: 0-0-1]

Course Outcome: -

Students will be able to:

- Able to understand Python code, develop medium-difficulty applications in Python
- Implement Python programs with conditionals and loops
- Apply the concept of List and Dictionary.
- Implement Read and write data from/to files in Python
- Develop Python programs step-wise by defining functions

A. LIST OF EXPERIMENTS:

1	Write a python program to compute the GCD and LCM of two numbers.
2	Write python program to perform following operations on Lists: Create list Access list Update list (Add item, Remove item) Delete list
3	Write a Python program to remove the "i" th occurrence of the given word in a list where words repeat
4	Write a Python program to count the frequency of words appearing in a string using a dictionary.
5	Write Python program to create a dictionary with key as first character and value as words starting With that character.
6	Write a Python program to check if a substring is present in a given string.
7	Write a Python program to find the intersection and union of two lists.
8	Write a Python program to find the length of a list using recursion.
9	Writer a Python program to read a file and capitalize the first letter of every word in the file.
10	Write a Python program to read the contents of a file in reverse order
11	Write a python program to create a package (Engg), sub -package(years),modules (sem) and create staff and student function to module
12	Write a python program to read 3 subject marks and display pass or failed using class and object

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Core Python Programming	Chun, J Wesley	2007	Pearson,
2.	Head First Python	Barry, Paul	2010	O Rielly,
Reference Book				
1	Learning Python Lutz, Mark O Rielly, 2009			
Online Resources				
1	https://www.learnpython.org/			
2	https://realpython.com/start-here/			
3	https://www.programiz.com/python-programming			

DEPARTMENT ELECTIVE

Code: BCEECE4111	Theory of Computation	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Use the concepts and techniques of discrete mathematics for theoretical computer science.
- Identify different formal languages and their relationship.
- Classify and construct grammars for different languages and vice-versa.
- Build finite automata, push down automata and Turing machine.
- Analyze various concepts of undecidability and Computable Function
- Discuss analytically and intuitively for problem-solving situation.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Review of Mathematical Theory	07
2.	Regular Languages and Finite Automata	08
3.	Context free grammar (CFG)	08
4.	Pushdown Automata, CFL And NCFL	07
5.	Turing Machine (TM)	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Review of Mathematical Theory**
	• Introduction of Unit • Sets, Functions, Logical statements, Proofs, Relations, • Languages, Principal of Mathematical Induction, • Strong Principle, Recursive Definitions, • Structural Induction. • Conclusion of Unit
2.	**Regular Languages and Finite Automata**
	• Introduction of Unit • Regular Expressions, Regular Languages, Application of Finite Automata, • Automata with output - Moore machine & Mealy machine, • Finite Automata, Memory requirement in a recognizer, • Definitions, union- intersection and complement of regular languages, Non Deterministic Finite Automata, • Conversion from NFA to FA, ??- Non Deterministic Finite Automata, Conversion of NFA-? to NFA • Kleene's Theorem, Minimization of Finite automata, Regular And Non Regular Languages – pumping lemma.? • Conclusion of Unit
3.	**Context free grammar (CFG)**

	• Introduction of Unit • Definitions and Examples, Unions Concatenations And Kleene's of Context free language, • Regular Grammar for Regular Language, Derivations and Ambiguity , • Unambiguous CFG and Algebraic Expressions, BacosNaur Form (BNF), Normal Form – CNF. • Conclusion of Unit
4.	**Pushdown Automata, CFL And NCFL**
	• Introduction of Unit • Definitions, Deterministic PDA, Equivalence of CFG and PDA & Conversion, • Pumping lemma for CFL, Intersections and Complements of CFL, Non-CFL. • Conclusion of Unit
5.	**Turing Machine (TM)**
	• Introduction of Unit • TM Definition, Model Of Computation, • Turing Machine as Language Acceptor, • TM that Compute Partial Function, Church Turning Thesis, • Combining TM, Variations Of TM, Non Deterministic TM, Universal TM, • Recursively and Enumerable Languages, Context sensitive languages and Chomsky hierarchy. • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Theory of Computer Science: Automata, Languages and Computation	Mishra & Chandrashekhar	3rd	PHI
2.	An Introduction to Formal Languages and Automata	Peter Linz	6th	Mass Market Paperback
Reference Book				
3.	Introduction to Languages and the Theory of Computation, 4th by John Martin, Tata Mc Graw Hill			
4.	Introduction to computer theory By Deniel I. Cohen , Joh Wiley & Sons, Inc			
5.	Compiler Design By Alfred V Aho, Addison Weslley			
Online Resources				
4.	http://en.wikipedia.org/wiki/Theory_of_computation			
5.	http://meru.cecs.missouri.edu/courses/cecs341/tc.html			
6.	https://www.geeksforgeeks.org/introduction-of-theory-of-computation/			

Code: BCEECE4112	Fundamentals of Machine Learning	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Analyze and distinguish between types of machine learning techniques
- Estimate the correlation coefficient for a given data set
- Implement applications with classification and clustering techniques
- Know the uses of appropriate performance metrics of machine learning
- To apply the concepts of Machine Learning to solve real-world problems

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to Machine Learning**	07
2.	**Regression**	08
3.	**Classification**	08
4.	**Clustering**	07
5.	**Performance Metrics**	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Machine Learning**
	• Introduction to Machine Learning • Definition of Machine Learning • Working principles of Machine Learning • Classification of Machine Learning: Supervised Learning, Unsupervised Learning, Reinforcement Learning • Supervised Learning: Classification and Regression • Unsupervised Learning: Clustering and Association • Reinforcement Learning • Types of Reinforcement learning: Positive Reinforcement and Negative Reinforcement • Working of Reinforcement learning • Markov Decision Process • Reinforcement Learning Algorithms: Q-Learning and State Action Reward State action (SARSA) • Application of Reinforcement Learning • Case Study: Implementation of Q learning algorithm/reinforcement learning for problems in automotive domain/games • Conclusion of Unit
2.	**Regression**
	• Introduction to Regression • Types of Regression: Linear regression, Logistics regression, Ridge Regression, Lasso Regression, Bayesian Linear Regression and Polynomial Regression • Regression and Correlation • Crosstabs and Scatterplots • Pearson's r • Regression – Finding The line

	• Regression – Describing the line • Contingency Tables • Case Study: Implementation of Linear regression for students dataset • Conclusion of Unit
3.	**Classification**
	• Introduction of Unit • Classification model building • Types of Classification Algorithm: Binary Classification and Multi Class Classification • Logistic Regression • k-Nearest Neighbors • Decision Trees • Random Forest • Support Vector Machine • Naïve bayes • Conclusion of Unit
4.	**Clustering**
	• Introduction of clustering • Clustering Workflow • Types of Clustering: Centroid-based clustering, Density-based clustering, Distribution-based Clustering and Hierarchical clustering • K- means Clustering • Agglomerative Nesting or AGNES • Fuzzy C Means Algorithm – FANNY (Fuzzy Analysis Clustering) • Mean Shift Clustering • DBSCAN – Density-based Spatial Clustering • Gaussian Mixed Models (GMM) with Expectation-Maximization Clustering • Case Study: Implementation of clustering algorithm for problems in financial/insurance/health care domain with Python programming language and libraries • Conclusion of Unit
5.	**Performance Metrics**
	• Introduction of Performance metrics • Performance metrics for Regression: Mean Absolute Error (MAE), Mean Squared Error (MSE), Root Mean Squared Error (RMSE), R-Squared, Adjusted R-squared • Performance metrics for classification: Accuracy, Confusion Matrix, Precision, Recall, F1 score, ROC AUC, Kappa, MCC (Matthews Correlation Coefficient) and Log-loss. • Performance metrics for clustering: Silhouette Score, Rand Index, Adjusted Rand Index, Mutual Information, Calinski-Harabasz Index and Davies-Bouldin Index • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Machine Learning – An Algorithmic Perspective, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series.	Stephen Marsland	Second Edition	
2.	Machine Learning	Tom M Mitchell	First Edition	McGraw Hill Education
Reference Book				
1.	Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, Ethem Alpaydin.			
2.	Machine Learning: The Art and Science of Algorithms that Make Sense of Data, 1 st Edition, Cambridge University Press, Peter Flach.			
3.	Learning from Data", AML Book Publishers, Y. S. Abu-Mostafa, M. Magdon-Ismail, and H.-T. Lin			
Online Resources				
1.	https://nptel.ac.in/courses/106106139			
2.	https://www.udemy.com/course/machine-learning-course/			
3.	https://www.javatpoint.com/machine-learning			

Code: BCEECE4113	Security Audit & Risk Management	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Analyze the fundamental methods used in information system auditing process.
- Demonstrate the role of auditor and how to prepare the auditing plan for information system auditing. Apply computer assisted audit tools for auditing process.
- Extract the information and plan for conducting the testing process for information system auditing
- Design security architecture for an information system with all the information policy and responsibilities. Design an audit plan for E-commerce application and mobile applications
- Evaluate management's commitment to risk management and analyze the integration of risk management into the organization's objectives, strategy setting, performance management, and operational management systems.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Foundation for IT Audit, Assurance and Process**	08
2.	**Computer Assisted Audit Tools and Techniques**	08
3.	**Managing Information technology Audit System**	07
4.	**Security consideration for ERP Applications**	09
5.	**Risk Management**	08

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Foundation for IT Audit, Assurance and Process**
	• Assurance Services - Need for Assurance - Characteristics of Assurance Services-Types of Assurance Services ECommerce and Electronic Funds Transfer - Future of electronic payment system. • Audit Standards - Types of Auditors and their functions - Internal Audit Function and External Auditor. Audit Plan - Developing an Audit Schedule - Audit Budget - Preliminary Review - Audit Findings - Analysis Re-examination - Verification - Recommendations - Communication Strategy • Conclusion of Unit
2.	**Computer Assisted Audit Tools and Techniques**
	• Auditor Productivity Tools • Data and Resource Management • Flowcharting Techniques - Flowcharting as an analysis tool • Developing Audit Data Flow Diagrams • Appropriateness of flowcharting techniques • Computer assisted tools for operational reviews • Web Analysis tools • Conclusion of Unit
3.	**Managing Information technology Audit System**
	• Evaluating IT Audit Quality • Criteria for assessing the audit

	• Criteria for assessing the auditor • Best Practices in IT Audit Planning • IT Governance: Performance Measurement • Metrics and Management - Metric Reporting and Independent Assurance • Conclusion of Unit
4.	**Security consideration for ERP Applications**
	• Information Security Policy • Security Standards - ISO 27002 and National Institute of Standards and Technology • Information Security Controls • Information Owner Responsibilities - Third- Party Responsibilities • Intranet/Extranet Security • Identity Theft • E-Commerce Application Security as a strategic and structural problem • Planning and Control Approach to E-Commerce Security Management • Internet Security and Mobile Computing Security • ERP Data Warehouse-Data Warehouse integrity checklist • ERP-Security features of the basic component. • Conclusion of Unit
5.	**Risk Management**
	• Introduction to risk • Source and evaluation of risks • Risk management • Evaluation of Risk Management Strategies • Risk model • Credit risk measurement and management • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1	Information Technology Control and Audit	Sandra Senft, Frederick Gallegos, Aleksandra Davis	4th	CRC Press, 2012.
2	Derivatives & Risk Management	R.P. Rustagi	Latest	Taxmann
Reference Book				
1	Information System Audit and Assurance, D P Dube, V P Gulati, Tata Mc-Graw Hill, 2008			
2	Micheal E.Whitman, Herbert J.Mattor, "Principles of Information Security", Course Technology, Delmar Cengage Learning, Fourth Edition, 2012.			
3	Jennifer L.Bayuk, Jason Healey, Paul Rohmeyer and Marcus Sachs, "Cyber Security Policy Guidebook", John Wiley Sons, Kindle Edition, 2012			
Online Resources				
1	http://www.isaca.org/			
2	https://www.youtube.com/watch?v=w0I4M82c1dc			
3	https://www.youtube.com/watch?v=yqgGyvw_diA			

Code: BCEECE4114 Fundamentals of Game Marketing 3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Demonstrate the critical importance of Game Technology
- Use learned skills to solve problems of various layouts
- Recognize what is the role each hardware component of a PC plays in games and in making games
- Conduct independent work in entertainment software engineering context.
- Work as a productive member and as part of a team developing larger entertainment software product.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to Gaming Technology**	**08**
2.	**History of Gaming Hardware**	**09**
3.	**Input devices**	**09**
4.	**Functions of a GPU in games**	**07**
5.	**Role of a CPU in games**	**07**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Gaming Technology**
	• Introduction of Unit • Basics of processes and models applied in the entertainment software industry • Basics of the game development tools • Introduction to game engines and their functions • Basics of 3D objects • Introduction to game development-related programming problem. • Basics of artificial intelligence in entertainment software engineering context. • Basics of sound engineering • Gamification and Serious games • Basic principles of AR and VR development • Conclusion of unit
2.	**History of Gaming Hardware**
	• Introduction of Unit • Console architecture over the decades • Evolution of input devices in games along with their design changes • analysis of hardware generations of consoles - with a brief overview of Gen 1-4 devices a • A broader look at some significant consoles of Gen 5-8 • Conclusion of Unit
3.	**Input devices**
	• Introduction of Unit • Types and variations of input devices (touch devices, controllers, keyboards, and mice) • How these devices work • Taking multiple types of inputs from these devices • Working on input • Adding support for these devices in your games – • challenges of building/designing an input device (ergonomics, abstraction vs immersion)

	• Conclusion of Unit
4.	**Functions of a GPU in games**
	• Introduction of Unit • Introduction to graphics APIs • commonly used APIs • Working of APIs in GPU Programming) • Shaders • Lighting Techniques (Ray tracing, ray-casting) • Difference between an API and an SDK • Conclusion of Unit
5.	**Role of a CPU in games**
	• Introduction of Unit • multi-threading • hyper-threading, • multi-core CPUs • parallel processing – • Need of multi-threading in games • Function of CPU in games • collision detection • pathfinding, • Realtime object tracking • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1	Advanced Game Development with Programmable Graphics Hardware	Alan Watt, Fabio Policarpo	April 2005	A K Peters Ltd
2	Unity 5 Game Optimization	Chris Dickinson	Nov 2015	O' Riley Media
Reference Book				
1	Evan Amos, 'The Game Console: A Photographic History from Atari to Xbox', No Starch Press, November 2018, ISBN 978-1593277437			
Online Resources				
1	https://www.edx.org/learn/game-development tps://learnui.design/			
2	https://files.eric.ed.gov/fulltext/EJ1090277.pdf			

Code: BCEECE4115	Installation and Configuration of Server	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Elaborating the basic concepts of selection, configuration and installation of Server.
- Articulate and planning of server, its configuration along with various types of data base and server.
- Explore knowledge about server role in the real environment.
- Discover and configure Print and Document Services and Servers for Remote Management using Server
- Articulate and planning of Local storage, its configuration along with various types of file systems and Formats.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction of Server**	07
2.	**Installing and Configuring Window's Servers 2022**	08
3.	**Installing and Configuring RHEL 9.1 Servers**	08
4.	**Installing and Configuring SQL Server 2022**	07
5.	**Installing and Configuring Oracle Database 21c server**	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction of Server**
	• Introduction of Unit • Introduction-characteristics –types of servers-c/s • Building blocks-c/s OS: base services-extended services- GUI vs. • OOUI. Base Middleware: NOS-RPC-Peer-to-Peer • Communication-sockets-SQL database servers-SQL • Database server architecture-trigger, • Stored procedures-rules. • Conclusion of Unit
2.	**Installing and Configuring Window's Servers 2022**
	• Introduction of Unit • Introduction of window's server ,Edition, Supporting Server Role, • Installing Windows Server 2012: • System Requirement, Types of Window's server Core Capabilities, Upgrade paths • Installing Windows Server and Migration Tools • Configuring Servers: Post-Installation Tasks, Configuring NIC Teaming, Using Roles • Manager, • Configuring Servers: Active Directory, Active Directory Federation, • Network Policy Access Services (NPAS), Dynamic Host Configuration Protocol • (DHCP) Server, • Domain Name System (DNS) Server, Web & Application Servers, Printer, File Services Server, FTP • Conclusion of Unit

3.	**Installing and Configuring RHEL 9.1 Servers**
	• Introduction of Unit • Introduction of RHEL Server, System Requirement, Type of Linux Server ,Capabilities of Linux Server • Installing RHEL Server, Repository installation. • Configuring Servers : FTP, Domain Name System (DNS) Server, Web & Application Servers. • Conclusion of Unit
4.	**Installing and Configuring SQL Server 2022**
	• Introduction of Unit • Introduction of SQL server, Hardware Requirements • SQL Server installation, Completing the SSMS Install • Connecting to your Database, Creating a Database for your Assignments • Dual Booting Versus Using a Virtual Machine • Conclusion of Unit
5.	**Installing and Configuring Oracle Database 21c server**
	• Introduction of Unit • Introduction of Oracle Database 21c server, Hardware Requirements • Oracle Database 21c server installation in Linux or Windows • Create User , Connect User, Create Data base, Data base Connect to User • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Fedora 9 and Red Hat Enterprise Linux Bible	Christopher Negus		
2.	Windows Server 2022 Beginners Guide	Howard J. Wall	2022	
Reference Book				
1.	Windows Server 2022 & Powershell, Sara Perrott, Dummies			
2.	Red Hat Enterprise Linux 8 Administration, Miguel Perez Colino, Pablo Iranzo, Packt Publishing			
3.	Oracle 19c Database Administration, Tanveer A			
Online Resources				
1.	https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9			
2.	https://github.com/PacktPublishing/Red-Hat-Enterprise-Linux-RHEL-9-Administration			
3.	https://docs.oracle.com/en/cloud/saas/supply-chain-management/22b/index.html			

Code: BULCHU4201	Communication Skills-II	3 Credits [LTP: 0-0-2]

COURSE OUTCOME

Students will be able to:

- Develop the ability to identify difficult sounds, words and phrases to strengthen listening and applying these improved skills in spoken communication.
- Cultivating knack for reading and writing by understanding the nuances of sentence structure and presentation style.
- Applying negotiation and Identify steps for proper negotiation preparation & learn bargaining techniques and strategies of inventing options for mutual gain and move negotiations from bargaining to closing.
- Develop a heightened awareness of the potential of digital communication and apply their knowledge in creating documents considering the needs of the netizens.
- Propose their outlook through exposure to new and different experiences and ideas and enrich their understanding of the issues under discussion.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Advanced Listening & Speaking Skills**	**6**
2.	**Advanced Reading & Writing Skills**	**6**
3.	**Art of Negotiation Skills**	**4**
4.	**Email Etiquettes**	**4**
5.	**Group Discussion**	**5**

B. LIST OF LABS

1.	Listening Skills II: Analysis of videos/audios by famous personalities
2.	Speaking Skills II: Extempore, Debate etc.
3.	Public Speaking: Key Concepts, Overcoming Stage Fear
4.	Story-Telling Skills: Techniques of Story Telling, Prompts for story creation
5.	Situational Conversational Skills
6.	PowerPoint Presentation Skills-II
7.	Reading Skills II: Technical Writings, Research Papers& Articles
8.	Writing Skills II: Blog Writing &Review Writing
9.	Picture Perception & Discussion
10.	Art of Negotiation: Identify the qualities of successful and unsuccessful negotiators. Identify different negotiation situations to practice during class.
11.	Email Etiquettes
12.	Group Discussion: Dos &Don'ts, Informal GD

Code: BCECCE4601	Talent Enrichment Programme(TEP)-IV	1 Credit [LTP: 0-0-6]

COURSEOUTCOME:

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students through active participate on in various activities falling in Technical and non-technical categories.

Social outreach, Discipline, TEP -I, VAC & Extra Curricular activities shall be evaluated on the basis of its sub constituent programme, as a complete one credit course. It shall be counted in calculation of SGPA but it is not a back log subject. However, the attendance of these classes shall be recorded and accounted in the total attendance.

Activities included in this category in this Semester are as follows:

Code	Activity	Hours	Credits
BCECCE4601	Discipline, Value Added Courses & Social Outreach	2	1
	Talent Enrichment Programme (TEP)-IV	2	
	Library / MOOC / NSP	2	

V SEMESTER

DEPARTMENT CORE COURSES

Code: BCECCE5101	Design & Analysis of Algorithms	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Apply Divide and conquer. Greedy algorithm design techniques.
- To handle the dynamic programming concept with solving real word problem
- To manage of different Pattern matching algorithms.
- Apply randomize algorithms
- To analyze the different class of algorithms and difference between them

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction**	06
2.	**Dynamic Programming, Branch and Bound**	06
3.	**Pattern Matching and Assignment Problem**	08
4.	**Randomized Algorithm**	08
5.	**NP-Hard and NP- Complete Problem**	08

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction**
	• Introduction to Unit • Algorithm Specification, Algorithm Complexity and Order Notations. • Divide and Conquer Method: General Method, Binary Search, Merge Sort, Quick sort and strassen's matrix multiplication algorithm. • Greedy Method: General method, Knapsack Problem, Job Sequencing, Optimal Merge Patterns and Minimal Spanning Tree: Prim's, Kruskal's Algorithm • Conclusion of Unit
2.	**Dynamic Programming, Branch and Bound**
	• Introduction to Unit • Dynamic Programming: Matrix Chain Multiplication, Longest Common • Subseuence and 0/1Knapsack Problem, All pairs shortest path, Flow shop scheduling • Branch And Bound: Traveling Salesman Problem, Bounding, FIFO Branch and Boun d, • Backtracking: The8-queensproblem,Hamiltoniancycles Comparison between Dynamic, Backtracking and Branch Bound • Conclusion of Unit
3.	**Pattern Matching and Assignment Problem**
	• Introduction to Unit • Pattern Matching Algorithms: Naïve and Rabin Karp string matching algorithms, KMP Matcher and Boyer Moore Algorithms.

	• Assignment Problems: Formulation of Assignment and Quadratic assignment Problem. • Conclusion of Unit.
4.	**Randomized Algorithm**
	• Introduction of Unit. • Probabilistic Analysis & Randomized Algorithms: Las Vegas algorithm, Monte Carlo algorithms for Min-Cut, randomized algorithm for 2- SAT. • Problem definition of Multi commodity flow, Flow shop scheduling and Network capacity • Assignment problems. • Conclusion of Unit
5.	**NP-Hard and NP- Complete Problem**
	• Introduction of Unit. • Definitions of P, NP-Hard and NP-Complete Problems. Decision Problems. Cook's Theorem. Proving NP- Complete Problems - Satisfiability problem and Vertex Cover Problem. • Approximation Algorithms for Vertex Cover and Set Cover Problem • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Fundamentals of Computer Algorithms	E.Horowitz & S.Sahani	Latest	Galgotia Publications
2.	Introduction to Algorithms	Corman, Leiserson & Rivest	Latest	MIT Press
Reference Book				
1.	Algorithm Analysis & Design, Goodrich, Tamassia, Wiley			
2.	Computer Algorithms, Introduction to Design and Analysis, SaraBasse, A. V. Geider			
Online Resources				
1.	https://www.javatpoint.com/daa-tutorial			
2.	https://www.guru99.com/design-analysis-algorithms-tutorial.html			
3.	https://www.geeksforgeeks.org/system-design-tutorial/			

Code: BCECCE5102	Software Engineering	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Gather and specify requirements of the software projects.
- Analyze software requirements with existing tools.
- Differentiate different testing methodologies.
- To apply the basic project management practices in real life projects.
- Work in a team as well as independently on software projects

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Software Process Models**	8
2.	**Software Design**	7
3.	**Introduction to Software Testing**	8
4.	**Software Quality Management**	7
5.	**Software Project Management**	7

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Software Process Models**
	• Introduction to Unit • How to develop software? • Different models - Water fall model – Prototyping – evolutionary model- Spiral model– RAD model -Agile models: Extreme Programming, and Scrum-pros and cons of each model • Requirements Analysis-Functional and Non-functional requirements, • Software Requirement Specification(SRS)–Decision tables–Decision Trees • Conclusion of the Unit
2.	**Software Design**
	• Introduction to Unit • Overview of design process: High-level and detailed design • Cohesion and Coupling Design Methodologies • Function–Oriented software design: Structured Analysis using DFD Structured Design using Structure Char • Architectural Design, Interface design, Component Level design • Software Reuse and Software Maintenance issues • Conclusion of the Unit
3.	**Introduction to Software Testing**
	• Coding, Code Review, documentation. • Testing: - Unit testing, Black-box Testing, White-box testing, • Cyclomatic complexity measure, coverage analysis, mutation testing, • Debugging techniques, Integration testing, System testing, • Regression testing. • Conclusion of the Unit
4.	**Software Quality Management**
	• Introduction to Unit • Overview of SQA Planning • Software configuration management

	• Study of ISO9000 &CMM • Software reverse engineering • Software reengineering • Conclusion of the Unit
5.	**Software Project Management**
	• Introduction to Unit • Various phases of Project Management –Planning– Organizing– Staffing– Directing and Controlling, Metrics for project size estimation • Software Project Cost Estimation–COCOMO models • Software Project Scheduling • CASE tools: CASE definitions–CASE Classifications–Analysis and Design Work benches, Testing Workbenches • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Fundamentals of Software Engineering,	Rajib Mall	PHI	2018
2.	Software Engineering	I. Sommerville	Pearson Education	Asia
Reference Book				
1.	Software engineering, Roger S Pressman			
2.	An Integrated Approach to Software Engineering, Pankaj Jalote			
Online Resources				
1.	https://www.javatpoint.com/software-engineering-tutorial			
2.	https://www.geeksforgeeks.org/software-engineering/			
3.	https://www.tutorialandexample.com/software-engineering-tutorial			

Code: BCECCE5103	Artificial Intelligence	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Acquire a basic foundation in science, arithmetic, and basics of software engineering, programming building and multidisciplinary designing to start by and by as a product engineer
- Deliver quality-oriented software products to maintain the leadership skills as an individual or in a group to demonstrate practically the modern working strategies.
- Acquaint with requirement analysis and designing phase of software development.
- Explore quality assurance and reliability of the software and to identify economic implications of SLC to the process of software designing.
- Apply various software models, techniques and methodologies to bring out innovative and novelistic solutions for the growth of mankind in all aspects and evolving into their continuous professional development

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to AI**	8
2.	**Problem solving**	7
3.	**Knowledge and reasoning**	8
4.	**Acting logically**	7
5.	**Generalized Models**	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to AI**
	• Introduction to the unit • What is AI? , Thinking humanly, Acting rationally, The Foundations of Artificial Intelligence, The History of Artificial Intelligence. • The gestation of artificial intelligence, AI becomes an industry, Knowledge-based systems, The return of neural networks, The State of the Art. • Intelligent Agents, How Agents Should Act, Structure of Intelligent Agents, Simple reflex agents, Goal-based agents, Utility-based agents. • Environments, Environment programs. • Conclusion unit
2.	**Problem-solving**
	• Introduction to the unit • Solving Problems by Searching, Problem-Solving Agents. • Formulating Problems, Well-defined problems and solutions, Measuring problem- solving performance. • Toy problems, searching for Solutions, Search Strategies, Avoiding Repeated States, Constraint Satisfaction Search. • Informed Search Methods, Best-First Search, Heuristic Functions. • Memory Bounded Search, Iterative Improvement Algorithms. • Applications in constraint satisfaction problems. • Conclusion unit
3.	**Knowledge and reasoning**
	• Introduction to the unit • A Knowledge-Based Agent, Representation, Reasoning, and Logic, Prepositional Logic.

	• An Agent for the Wumpus World, Problems with the propositional agent, First-Order Logic, Syntax • and Semantics, Extensions and Notational Variations, Using First-Order Logic. • A Simple Reflex Agent, Deducing Hidden Properties of the World, Toward a Goal- Based Agent, Building a Knowledge Base. • Knowledge Engineering, Inference Rules Involving Quantifiers, Generalized Modus Ponens. • Forward and Backward Chaining, Completeness, Resolution: A Complete Inference Procedure, Completeness of resolution • Conclusion unit
4.	**Acting logically**
	• Introduction to the unit • A Simple Planning Agent, From Problem Solving to Planning, Planning in Situation Calculus. • Basic Representations for Planning, A Partial-Order Planning Algorithm, Planning with Partially Instantiated Operators, Knowledge Engineering for Planning, Practical Planners. • Hierarchical Decomposition, Analysis of Hierarchical Decomposition. • More Expressive Operator Descriptions, Resource Constraints, Planning and Acting. • Conditional Planning, A Simple Re-planning Agent, Fully Integrated Planning and Execution • Conclusion unit
5.	**Generalized Models**
	• Introduction to the unit • A General Model of Learning Agents, Components of the performance element. • Representation of the components, Inductive Learning, Learning Decision Trees, Using Information Theory, Learning General Logical Descriptions, Computational Learning Theory. • Learning in Neural and Belief Networks, Neural Networks, Perceptrons. • Multilayer Feed-Forward Networks, Bayesian Methods for Learning Belief Networks. • Reinforcement Learning, Passive Learning in a Known Environment, Passive Learning in an Unknown Environment, Generalization in Reinforcement Learning • Conclusion of unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Artificial Intelligence, A Modern Approach	Stuart J. Russell and Peter Norvig	Edition 6, 2010	McGraw Hill
2.	Artificial Intelligence (Sie)	Knight Kevin		
Reference Book				
1.	Artificial Intelligence: An Essential Beginner's Guide to, AI, Neil Wilkins, Bpb Publications			
Online Resources				
1.	https://www.javatpoint.com/artificial-intelligence-tutorial			
2.	https://www.simplilearn.com/tutorials/artificial-intelligence-tutorial			
3.	https://www.w3schools.com/ai/			

Code: BCECCE5104 Advance Java 3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Design and build web applications using servlets and JSP Mange sessions in servlets and JSP
- Identify where and when to use MVC design pattern Create custom tag in JSP
- Develop web application using struts
- Develop database application using hibernate Develop IOC and DI using springs
- Develop web application using springs.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Java Servlets**	**08**
2.	**Java Server Pages(JSP)**	**07**
3.	**Java Server Faces**	**08**
4.	**Hibernate**	**08**
5.	**Springs**	**07**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Java Servlets**
	• Introduction of Unit • Servlets and HTTP Servlets, Filters, Security, Servlet Life Cycle, Servlets for the World Wide Web, Requests, Responses, and Headers, GET and POST, HTTP, Deploying a Servlet, Web Application Deployment Descriptor Structure, Servlet Configuration, Http Servlet Request/Response, Servlet Context, Session Management, • Case Study • Conclusion of Unit
2.	**Java Server Pages(JSP)**
	• Introduction of Unit: JavaBeans, Custom Tags and JSP Fragments, JSP Life Cycle, The Difference Between Servlets and JSP, JSP Syntax and Semantics, Elements and Template Data, JSP Configuration, Standard JSP Actions, Attributes, Comments, Quoting and Escape Characters, Exception Handling, JavaBeans and the JSP Expression Language, JSP Standard Tag Library, Custom Tag Libraries, Database Connectivity, Building a Complete Web Application. • Case Study • Conclusion of Unit
3.	**Java Server Faces**
	• Introduction of Unit: features, life cycle, manage Beans, UI Components- input Text, output Text, form, command Button, input Text Area, input Hidden, input File, Bean, Validation, facelets, JSF JDBC, JSF with controllers, architectural overview of application developed with JSF and JSP, validator tag, data tables. • Conclusion of Unit
4.	**Hibernate**
	• Introduction of Unit: advantages, features, Architecture, Environment, Life Cycle, ORM Tool, First program, Sessions, Session factory, Persistent Class, Using the Session, MVC, Hibernate Query language, Criteria Query, Mapping Types, Annotations, Query Language, Native SQL. • Case Study • Conclusion of Unit

5.	**Springs**
	• Introduction of Unit: Architecture, Environment Setup, Create Sample Program, IOC Containers, Bean Definition, Bean Scopes, Bean Lifecycle, Dependency Injection, IOC Injection, Setter Injection, Injecting Inner Beans, Injecting Collection, Event Handling, MVC Framework. • Case Study • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Servlets and Java Server Pages	Jayson Falkner		Kevin Jones-2003
2.	Beginning Hibernate	Joseph B. Ottinger, Jeff Linwood, Dave Minter		Apress-2014
Reference Book				
1.	Professional Java Development with the Spring Framework, Rod Johnson, 8th edition –Wiley			
2.	Core Java Server Faces, David M. Geary, 2004 – 3rd Edition-Prentice Hall			
Online Resources				
1.	https://www.simplilearn.com/resources-to-learn-java-programming-article			
2.	https://www.docdroid.net/mY1yTPu/advancedjavaprogrammingbyuttamkumarroy-pdf			
3.	https://www.edureka.co/blog/advanced-java-tutorial			

PRACTICAL

Code: BCECCE5201 Design & Analysis of Algorithms Lab 1 Credit [LTP: 0-0-2]

Course Outcome: -

Students will be able to:

- To apply divide and conquer method to implement quick sort, merge sort, linear search, Binary search in C.
- Implement job sequencing using greedy method.
- Find the minimum cost of spanning tree.
- Implement the dynamic programming using branch and bound method.
- Implement the NP-Hard, NP-. Complete problem.

A. LIST OF EXPERIMENTS:

1	Write a C program to implement the Stack using arrays. Write Push(), Pop(), and Display()methods to demonstrate its working.
2	Write a C program to sort a list of elements using the quick sort algorithm. The elements can be read from a file.
3	Write a C program to implement a Merge sort algorithm to a list of elements for different values of n and determine the time required to sort the elements.
4	Find the minimum cost of spanning tree in C using Prim's algorithms.
5	Find the minimum cost of spanning tree in C using Kruskal's algorithm.
6	Implement 0/1 Knapsack problem using Dynamic Programming in C.
7	Write a C program to find the shortest paths between nodes in a graph using Dijkstra's algorithm.
8	Write a C program Print all the nodes reachable from a starting node in a digraph using BFS method. Check whether a graph is connected or not using DFS method.
9	Write a C program to implement all pairs shortest paths problem using Floyd's algorithm.
10	Write a C program to implement N Queen's problem using Back Tracking.

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Mastering Algorithms with C	Kyle Loudon	Latest	O'Reilly
2.	Algorithms Illuminated (Part 3): Greedy Algorithms and Dynamic Programming	Tim Roughgarden	Kindle	
Reference Book				
1.	Data Structures And Algorithms Made Easy Narasimha Karumanchi kindle Edition			
Online Resources				
1.	https://www.sanfoundry.com/c-program			
2.	https://www.thecrazyprogrammer.com/2015/03/c-program-for-n-queens-problem-using-backtracking.html			

Code: BCECCE5202	Software Engineering Lab	1 Credit	[LTP: 0-0-2]

Course Outcome: -

Students will be able to:

- To handle the software engineering methodologies involved in the phases for project development.
- To gain knowledge about open-source tools used for implementing software engineering methods.
- To develop product-prototypes implementing software engineering methods.
- To able to develop any kind of application software
- To analyze every kind of application Software

A. LIST OF EXPERIMENTS:

1	Prepare a SRS document in line with the IEEE recommended standards
2	Draw the Entity relationship diagram of a project.
3	Develop DFD Model (Level 0, Level 1 DFD and data dictionary) of the sample problem (Useof a CASE tool required). (1 class)
4	Develop Structured design for the DFD model developed. (1 class)
5	Develop UML Use case diagram for a problem (Use of a CASE tool any of Rational rose, ArgoUML, or Visual Paradigm etc.
6	To draw the structural view diagram for the system: Class diagram, object diagram.
7	To draw the behavioral view diagram: State-chart diagram, Activity diagram.
8	To perform the behavioral view diagram for the suggested system : Sequence diagram, Collaboration diagram
9	To perform various testing using the testing tool Junit for unit testing for a sample code of the suggested system
10	To Prepare time line chart/Gantt Chart/PERT Chart for selected software project.

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Software Engineering	K.K. Aggarwal & Yogesh Singh	2005	New Age International
2.	An Integrated Approach to Software Engineering	Pankaj Jalote,	Second Edition	Springer
Reference Book				
1.	Software engineering, Roger S Pressman			
Online Resources				
1.	https://www.javatpoint.com/software-engineering-tutorial			
2.	https://www.geeksforgeeks.org/software-engineering/			
3.	https://www.tutorialandexample.com/software-engineering-tutorial			

Code: BCECCE5203	Artificial Intelligence Lab	1 Credit	[LTP: 0-0-2]

Course Outcome: -

Students will be able:

- To design and analyze AI based algorithms.
- To work on various AI tools.
- To have skills to address the solution of real-life problems.
- Elicit, analyze, and specify software requirements for AI based applications.
- Simulate a problem in hand and analyze its performance.

A. LIST OF EXPERIMENTS:

1	Installation and working on Python and PROLOG. and getting familiar with various AI tools in Python viz. tensor flow, keras, theano, nltk, scikit-learn, FANN, Pytorch, open cv etc.
2	Study of Prolog. Write simple facts for the statements using PROLOG.
3	Write a program to solve the 5-queens problem.
4	Write programs for computation of recursive functions like factorial Fibonacci numbers, etc.
5	Write Program for Monkey-banana Problem.
6	Write a Program for water jug problem.
7	Write a program for traveling salesman problem.
8	Write a program which behaves like a small expert for medical Diagnosis.
9	Implement hidden Markov models (HMM) for inference
10	Create a bayesian network in python and make inference through it.
11	Write programs for computation of recursive functions like factorial Fibonacci numbers, etc.

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems	Aurélien Géron	2nd Edition	O'Reilly Media
2.	Programming in Prolog	W.P. Clocksin, C.S. Mellish	4th Edition	Springer
Reference Book				
1.	Barber, David. Bayesian reasoning and machine learning. Cambridge University Press, 2012.			
2.	Meent, Jan-Willem van de. et al. "An introduction to probabilistic programming." (2018).			
Online Resources				
1.	Journals: Artificial Intelligence, Artificial Intelligence Programming, Machine Learning, IEEE Expert, Data and Knowledge Engineering, Pattern Recognition etc.			
2.	Conferences: AAAI, IJCAI, UAI, ICML, ACL etc.			
3.	https://analyticsindiamag.com/a-guide-to-inferencing-with-bayesian-network-in-python/			

Code: BCECCE5204	Advance Java Lab	1 Credit	[LTP: 0-0-2]

Course Outcome: -

Students will be able to:

- Develop dynamic web application
- Develop database application using hibernate
- Develop IOC and DI using springs
- Develop web application using springs.
- Identify where and when to use MVC design pattern Create custom tag in JSP

A. LIST OF EXPERIMENTS:

1	Develop dynamic web application to display current system date and time using servlets
2	Develop dynamic web application to display login page with proper HTML UI elements using servlets.
3	Implement a servlet to authenticate login details, which is created previously (user name and password should be accepted using HTML and displayed using a Servlet)
4	Develop dynamic web application to manage product (prod Id, name, category, price) details using servlets. This app must have following pages a. Home page b. Product adding page c. Product editing page d. Product displaying page
5	Develop dynamic web application to manage product (prodId, name, category, price) details using servlets. This app must have following pages a. Home page b. Product adding page c. Product editing page d. Product displaying page
6	Write JSP program to implement custom tag with name <product>, which display product (prodId, name, category, price) details
7	Enhance previous JSP program to fetch data from database
8	Develop Rich Internet Applications to manage product and user details using struts and database
9	Develop Hibernate application to manage product details like insert, update, delete and display from database using HQL
10	Develop Spring based dynamic web application to manage courses, students in a college environment using Web MVC framework and JDBC
11	Transfer a file from one system to another system by the network
12	Develop Chat Server using Java.

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Advanced Java Programming	B.Prasanalakshmi	1st	CH Publishers
2.	Advanced Java Programming	Uttam K Roy	1st	Oxford University Press
3.	Advanced Java Technology -A Conceptual Approach	A.A.Puntambekar	1st	Technical Publications
Reference Book				
1.	Advanced Java Coding Problems: Best Advanced Coding Problems with Explanation and Solutions, by Pratap Divyansh			
2.	Advanced Java Optimization Techniques, by Jason Arnold			
Online Resources				
1.	https://www.simplilearn.com/resources-to-learn-java-programming-article			
2.	https://www.docdroid.net/mY1yTPu/advancedjavaprogrammingbyuttamkumarroy-pdf			

DEPARTMENT ELECTIVE

Code: BCEECE5111	Advance Cloud Computing	3 Credits [LTP: 3-0-0]

COURSE OUTCOME
Students will be able to:

- Describe the types of medical robots and the concepts of navigation and motion replication.
- Discuss about the sensors used for localization and tracking
- Summarize the applications of surgical robotics
- Outline the concepts in Rehabilitation of limbs and brain machine interface
- Classify the types of assistive robots. Analyze the design characteristics, methodology and technological choices for medical robots
-

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction**	07
2.	**Communications and Networking in the Cloud Computing & Protocols**	08
3.	**Fundamentals Of Online Robots & IOT Architecture**	08
4.	**Mobile Robots and Cloud Computing with Web of Things**	07
5.	**Remote Mobility in the Cloud Computing & IOT Applications**	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction**
	• Introduction of Unit • Overview and background, Brief history of cloud computing and robotics. • Network Robotics, ROS, MatLab • Data Center and remote-device communication, Wireless network and Robot • Different Types of Antennas & Characteristics of Antenna • Privacy and Security Issues in the cloud network. • Conclusion of Unit
2.	**Communications and Networking in the Cloud Computing & Protocols**
	• Introduction of Unit • The Internet, Wired Communication Links • Wireless Links – Properties of Networked Telerobotics • Building a Networked Telerobotic system • State command Presentation, Command Execution/ State Generation, Collaborative Control • Protocol Standardization for IoT , Efforts – M2M and WSN Protocols • SCADA and RFID Protocols, Issues with IoT Standardization,

	• Unified Data Standards – Protocols – IEEE802.15.4 • BACNet Protocol– Modbus – KNX – Zigbee • Network layer, APS layer , Security • Conclusion of Unit
3.	**Fundamentals Of Online Robots & IOT Architecture**
	• Introduction of Unit • Introduction – Robot Manipulators, Teleoperation – Teleoperation on a local network • Teleoperation via a constrained link. • IoT Open-source architecture (OIC), OIC Architecture & Design principles • IoT Devices and deployment models- IoTivity : An Open source IoT stack • Overview-IoTivity stack architecture, Resource model and Abstraction. • Conclusion of Unit
4.	**Mobile Robots and Cloud Computing with Web of Things**
	• Introduction of Unit • Introduction to networked robot system on the Web, Software Architecture and design – Interface design. • Web of Things versus Internet of Things, Two Pillars of the Web • Architecture Standardization for WoT, Platform Middleware for WoT • Unified Multitier WoT Architecture • WoT Portals andBusiness Intelligence. • Conclusion of Unit
5.	**Remote Mobility in the Cloud Computing & IOT Applications**
	• Introduction of Unit • Autonomous Mobile Robot on the Web , • Mobile Mini Robots, Performance of Mobile Robots controlled through WEB • Handling Latency in Internet based Tele operation • Case Study Computer Networked Robotics • Online Robots and the Robot Museum. • IoT applications for industry: Future Factory Concepts, Brownfield IoT • Smart Objects, Smart Applications. Study of existing IoT platforms /middleware • IoT- A, Hydra etc. • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1	Handbook of Cloud Computing	BorkoFurht, Armando Escalante	2010	Springer Science & Business,
2	Cloud Robotics – Distributed Robotics using Cloud Computing	Joao Pedro, Carvalho Rosa,	2016	Coimbra
Reference Book				
1	Robots and Sensor Clouds			
2	Networking Humans, Robots and Environments			
3	Emergent Trends in Robotics and Intelligent Systems			
Online Resources				

1	https://www.simplilearn.com/cloud-solutions-architect-masters-program-training?utm_source=google&utm_medium=cpc&utm_term=cloud%20course&utm_content=17438038281-138244819140-602766657095&utm_device=c&utm_campaign=]earch-TechCluster-Cloud-AbsoluteBroadKeywords-IN-Main-AllDevice-adgroup-Cloud-Course-Broad&gclid=EAIaIQobChMIra3uw7Gs-AIVEBsrCh0BAgqsEAAYASAAEgLJlvD
2	https://www.ibm.com/in-en/cloud/internet-of-things?utm_content=SRCWW&p1=Search&p4=43700052658173554&p5=e&gclid=EAIaIQobChMInZHDz7Gs-AIVvp1LBR0V-gHmEAAYASAAEgLJpfD_BwE&gclsrc=aw.ds

Code: BCEECE5112	Advance Artificial Intelligence	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Know about the basics of advanced topics in artificial intelligence and inference models.
- Be aware about the modern methods of probabilistic reasoning which are extremely important and transforming the approach to a great variety of computational problems in AI based application.
- To manage the foundation of exact inference and decision-making algorithms.
- Know the variety of models used in reasoning used in cutting edge technologies in the field of AI.
- Be aware about the basic concepts of variable representation.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**The Bayesian Network Representation**	**08**
2.	**Undirected Graphical Models**	**07**
3.	**Local Probabilistic Models**	**08**
4.	**Template-Based Representations and Gaussian Network Models**	**09**
5.	**Exact Inference**	**08**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**The Bayesian Network Representation**
	• Introduction of Unit • Independent Random Variables, The Conditional Parameterization, • The Naive Bayes Model, Bayesian Networks: The Student Example Revisited, Basic Independencies in Bayesian Networks • Graphs and Distributions, Independencies in Graphs: D-separation, Soundness and Completeness • Minimal I-Maps, • Conclusion of Unit
2.	**Undirected Graphical Models**
	• Introduction of Unit • Parameterization, Gibbs Distributions and Markov Networks, Reduced Markov Networks, Markov Network Independencies: Basic Independencies • From Bayesian Networks to Markov Networks, From Markov Networks to Bayesian Networks • Conclusion of UnitIntroduction of Unit • Parameterization, Gibbs Distributions and Markov Networks, Reduced Markov Networks, Markov Network Independencies: Basic Independencies • From Bayesian Networks to Markov Networks, From Markov Networks to Bayesian Networks • Conclusion of Unit
3.	**Local Probabilistic Models**
	• Introduction of Unit • Tabular CPDs, Deterministic CPDs, Representation, Independencies, • Context-Specific CPDs: Representation, Independencies • Continuous Variables: Hybrid Models, Conditional Bayesian Networks

	• Conclusion of Unit
4.	**Template-Based Representations and Gaussian Network Models**
	• Introduction of Unit • Temporal Models: Basic Assumptions, Dynamic Bayesian Networks, State-Observation Models • Template Variables and Template Factors, Probabilistic Relational Models • Multivariate Gaussians: Basic Parameterization, Operations on Gaussians, Independencies in Gaussians • Gaussian Bayesian Networks, Gaussian Markov Random Fields • Conclusion of Unit
5.	**Exact Inference**
	• Introduction of Unit • Analysis of Complexity: Analysis of Exact Inference, Analysis of Approximate Inference, • Variable Elimination: The Basic Ideas, Basic Elimination, Dealing with Evidence, Complexity and • Graph Structure: Variable Elimination, Simple Analysis, Graph-Theoretic Analysis • Variable Elimination and Clique Trees: Cluster Graphs, Clique Trees • Exact Inference as Optimization: Fixed-Point Characterization, Inference as Optimization • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Probabilistic Graphical Models Principles and Techniques	Daphne Koller Nir Friedman	2009 Edition	MIT press
2.	Artificial Intelligence A Modern Approach	Stuart J. Russell and Peter Norvig (Editors)	Third Edition	Springer
Reference Book				
1.	Shi, Zhongzhi. Advanced artificial intelligence. Vol. 4. World Scientific, 2019.			
2.	Klenke, Achim. Probability theory: a comprehensive course. Springer Science & Business Media, 2013.			
Online Resources				
1.	aima.cs.berkeley.edu			
2.	https://www.cs.ubc.ca/~murphyk/Papers/dbnchapter.pdf			
3.	https://www.stat.cmu.edu/tr/tr758/tr758.pdf			

Code: BCEECE5113	Cloud Migration & Deployment	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Gain fundamental understanding of cloud technologies and cloud deployment
- Gain fundamental understanding of AWS cloud technologies
- Able to understand Cloud Migration and its Plan
- Able to handle how to migrate the Services to the Cloud.
- Able to handle Virtual Private Cloud

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to Cloud Deployment and Services**	08
2.	**S3, Cloud watch**	08
3.	**Cloud Migration**	07
4.	**Migrating Services to Cloud**	08
5.	**Virtual Private Cloud (Vpc)**	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Cloud Deployment and Services**
	• Introduction of Unit • Introduction to Cloud Deployment Models (Private, Public, Hybrid and Community), Cloud deployment model Security, Differences among different Cloud Deployment Model, Advantages and disadvantages of various cloud computing Deployment model, Google Cloud Platform, Data Center-Based Cloud, Cloud Services Pricing Concepts, Cloud Pricing over Different Deployment Model • Introduction To EC2, Instance Types and Uses, Auto scaling Instances, Amazon Machine Images (AMIS), Modifying Existing Images, Creating New Images Off of Running Instances, Converting an Instance Store AMI To An EBS AMI, Instances Backed By Storage Types, Creating A Web Server Using Ec2, • Conclusion of Unit
2.	**S3, Cloud watch**
	• Introduction of Unit • Introduction To S3, Buckets and Objects, Security, Creating A Web Server Using S3Endpoints, • Introduction To Cloud watch, Creating Alarm Notifications, Auto scaling Instances, Deploying Scalable Application On AWS, • Selecting And Launching an Application Environment, Provisioning Application Resources with Cloud formation. • Conclusion of Unit
3.	**Cloud Migration**
	• Introduction of Unit • Introduction to Migration Plan – Migration plan considerations – Time Management, Security, Vendor Selection, Selecting the deployment model, Validating the services to be moved to cloud, Effectiveness of cloud migration, Migration and deployment options, Optimization and

	Cost Management in an effective cloud migration, Business continuity after Migration, Case Study on Cloud Migration • Conclusion of Unit
4.	**Migrating Services to Cloud**
	• Introduction of Unit • Migrating Services to AWS, Cloud Adoption Framework, Successful Migration, Understanding On-premises cost, Migration cost considerations, Migration options, Three Step processes for large scale services, Successful Migrations, Handling Failures, Risks involved in working at a big scale migration • Conclusion of Unit
5.	**Virtual Private Cloud (Vpc)**
	• Introduction of Unit • Load Balancers and Availability Zones, Elastic Network Interfaces (ENI), Setting Up VPC And Internet Gateway, Setting Up a Security Group, Launching and EC2 Instance and Assigning An ENI, Setting Up A VPN, Setting Up A Customer Gateway For VPN, • Setting Up Dedicated Hardware For VPC • Scenario 1: VPC With A Public Subnet Only (Standalone Web) • Scenario 2: VPC with Public and Private Subnets (3 Tier App) • Scenario 3: VPC With Public and Private Subnets and Hardware VPN Access (Web On The Cloud, Database and App On Prem) • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Cloud Computing: Principles and Paradigms	Rajkuma rBuyya, James Broberg, Andrzej M. Goscinski		John Wiley and Sons Publications
2.	Cloud Deployment Models A Complete Guide - 2019	GerardusBlokdyk		Kindle publication
Reference Book				
3.	Migrating Large-Scale Services to the Cloud, Eric Passmore, Apress			
Online Resources				
4.	https://cloud.netapp.com/blog/cloud-migration-strategy-challenges-and-steps			
5.	https://www.devopsgroup.com/insights/resources/tutorials/all/cloud-migration/			

Code: BCEECE5114	PHP & MySQL	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Learning PHP basics, syntax, data types.
- Analysing loops, array and string in PHP
- Developing sessions in PHP using session management.
- Use of exception handling in PHP
- Analyze and solve various database tasks using the PHP language.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to PHP**	07
2.	**Decisions and loop, Function, Array**	08
3.	**Handling Html Form with Php,**	08
4.	**Session and Cookie, working with file and Directories**	07
5.	**Database Connectivity with MySql**	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to PHP**
	• Introduction of Unit • Evaluation of Php • Basic Syntax • Defining variable and constant • Php Data type • Operator and Expression. • Conclusion of Unit
2.	**Decisions and loop, Function, Array & String**
	• Introduction of Unit • looping • What is a function • Call by value and Call by reference • Recursive function • String Creation and accessing • String Searching & Replacing • Formatting String • String Related Library function • Anatomy of an Array • Creating index based and Associative array Accessing array • Element Looping with Inde. x based array • Looping with associative array using each () and foreach() • Some useful Library function.

	• Conclusion of Unit
3.	**Session and Cookie, Working with file and Directories**
	• Introduction of Unit • Introduction to Session • Session Functionality • What is a Cookie • Setting Cookies with PHP • Using Cookies with Sessions • Deleting Cookies • Registering Session variables • Destroying the variables and Session • Understanding file & directory • Open, close, copy, rename and delete a file, • working with directories, creating and deleting folder, • File Uploading & Downloading. • Conclusion of Unit
4.	**Exception Handling**
	• Introduction of Unit • Understanding Exception and error, • Try, catch, and throw. • Error tracking and debugging • Conclusion of Unit
5.	**Database Connectivity with MySql**
	• Introduction of Unit • Different methods of database connectivity • Creating a MySql Database • Connection with MySql Database • Project • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	PHP: The Complete Reference	Steven Holzner	1 July 2017	TMH
Reference Book				
2.	Learning PHP, MySQL & JavaScript with j Query, CSS & HTML5 – 1 January 2015			
Online Resources				
1.	https://www.w3schools.com/php/			
2.	https://www.tutorialspoint.com/php/index.htm			

Code: BCEECE5115	Introduction to 3D Animation & Modeling	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Know the basic concepts of 3D Modeling
- Analyze the concepts Key frame Animation
- Create the Simulation & Effects techniques in 3D modeling
- Apply Lighting and Camera effects in 3D modeling
- Able to work on Texturing with Max and Rendering with V-Ray

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to 3DModelling**	07
2.	**Keyframe Animation**	07
3.	**Simulation & Effects**	08
4.	**Lighting& Camera**	07
5.	**Texturing with Max & Rendering with V-Ray**	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to 3DModelling**
	• Introduction to 3DModelling • Modeling with Polygons • Using the graphite • Working with XRefs • Building simple scenes • Building complex scenes with XRefs, using assets tracking • Deforming surfaces & using the mesh modifiers • Modeling with patches & NURBS • Conclusion of Unit
2.	**Keyframe Animation**
	• Introduction to Keyframe Animation • Creating Keyframes • Auto Keyframes • Move & Scale Keyframe on the timeline • Animating with constraints & simple controllers • Animation Modifiers & complex controllers • Function curves in the track view • Motion mixer • Conclusion of Unit
3.	**Simulation & Effects**
	• Introduction to Simulation & Effects • Bind to Space Warp object • Gravity, wind • Displace force object

	• Deflectors FFD space warp • Wave ripple • Bomb • Creating particle system through parray • Understanding particle flow user interface • How to particle flow works • Hair & fur modifier • Cloth & garment maker modifiers • Conclusion of Unit
4.	Lighting& Camera
	• Introduction to Lighting& Camera • Configuring & Aiming Cameras • Camera motion blur • Camera depth of field • Camera tracking • Using basic lights & lighting Techniques • Working with advanced lighting • Light Tracing • Radiosity, video post • Mental ray lighting etc. • Conclusion of Unit
5.	**Texturing with Max & Rendering with V-Ray**
	• Introduction to Texturing with Max • Using the material editor & the material explorer • Creating & applying standard materials • Adding material details with maps • Creating compound materials & material modifiers • Unwrapping UVs & mapping texture • Using atmospheric & render effects • V-ray light setup • V-ray rendering settings • HDRI Illumination • Fine-tuning shadows • Final render setting • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	3dsmax7 Fundamentals	TedBoardman		NewRiders
2.	3d'sMax5Fundamentals	TedBoardman		Techmedia
3.	Inside3dsmax7	TedBoardman		NewRiders
Reference Book				
1.	3D Modelling, Animation, and Rendering, Createspace, Michael E. Mortenson			
2.	3ds Max 8 from Modelling to Animation, Bpb, Boris Kulagin			
3.	3D Modelling and Animation, Igi Publishing, Michael G.			
Online Resources				
1.	https://www.udemy.com/topic/3d-modeling/			
2.	https://www.coursera.org/courses?query=3d%20modeling			
3.	https://www.futurelearn.com/courses/introduction-to-3d-modeling/			

Code: BULCHU5201	Human Values & Professional Ethics	1 Credit	[LTP: 0-0-2]

Course Outcome: -

Students will be able to:

- Know the importance of human values and learn from others' experiences to become the conscious practitioners of the same.
- Enhance their self-esteem, confidence and assertive behaviour to handle difficult situations with grace, style, and professionalism.
- Distinguish among various levels of professional ethics while developing an understanding of them as a process in an organization.
- Implement emotional intelligence to achieve set targets and excel in interpersonal as well as intrapersonal
- Demonstrate knowledge of personal beliefs and values and a commitment to continuing personal reflection and reassessment.

A. LIST OF EXPERIMENTS:

1	Human Values: Love & Compassion
2	Truth, Non-Violence, Righteousness
3	Peace, Service, Renunciation (Sacrifice)
4	Self-Esteem: Do's and Don'ts to develop positive self-esteem
5	Self-Assertiveness: Development of Assertive Personality
6	Ambition & Desire: Self & Body (concepts & differences)
7	Professional Ethics: Personal & Professional Ethics
8	Emotional Intelligence: Skill Building for Strengthening the Elements of Self-awareness, Self-regulation, Internal motivation, Empathy, Social skills
9	Governing Ethics & Ethics Dilemma
10	Profession, Professionalism & Professional Risks
11	Professional Accountabilities & Professional Success
12	Life Skills & Value Education

Code: BCECCE5601	Talent Enrichment Programme(TEP)-V	1 Credit [LTP: 0-0-6]

COURSEOUTCOME:

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students through active participate on in various activities falling in Technical and non-technical categories.

Social outreach, Discipline, TEP -I, VAC & Extra Curricular activities shall be evaluated on the basis of its sub constituent programme, as a complete one credit course. It shall be counted in calculation of SGPA but it is not a back log subject. However, the attendance of these classes shall be recorded and accounted in the total attendance.

Activities included in this category in this Semester are as follows:

Code	Activity	Hours	Credits
BCECCE5601	Discipline, Value Added Courses & Social Outreach	2	1
	Talent Enrichment Programme (TEP)-V	2	
	Library / MOOC / NSP	2	

VI SEMESTER

DEPARTMENT CORE COURSES

Code: BCECCE6101	Computer Architecture	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Explain the organization of basic computer, its design and the design of control unit.
- Demonstrate the working of central processing.
- Describe the operations and language f the register transfer, micro-operations and input- output organization.
- Organize memory and memory management hardware.
- Elaborate advanced concepts of computer architecture, Parallel Processing, inter processor communication and synchronization.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Basics Of Digital Logics**	8
2.	**Register Transfer and Micro-operation**	8
3.	**Basic Computer Organization**	8
4.	**Micro Programmed Control Unit**	6
5.	**Computer Arithmetic**	6

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Basics Of Digital Logics**
	• Introduction of Unit • Number systems**:** Binary number system, Octal & Hexa-decimal number system, Conversion of Number System, r's & (r-1)'s, Binary arithmetic Operations, • Logic Gates**:** AND, OR, NOT GATES and their Truth tables, NOR, NAND & XOR gates. • Boolean algebra**:** AND, OR, Inversion, Basic Boolean Law's, Demorgan's theorem, Minimization techniques: K -Map, Sum of Product & Product of Sum, • Conclusion & Real Life Application
2.	**Register Transfer and Micro-operation**
	• Introduction of Unit • Register Transfer Language, Register Transfer, Bus and Memory Transfer: Three state bus buffers, Memory Transfer. • Logic Micro-operations: List of Logic micro-operations, Shift Micro-operations (excluding H/W implementation), Arithmetic Logic Shift Unit. • Conclusion &Real Life Application
3.	**Basic Computer Organization**
	• Introduction of Unit • Instruction Codes, Computer Registers: Common bus system, Computer Instructions

	• Instruction formats, Instruction Cycle: Fetch and Decode, Flowchart for Instruction cycle, Register reference instructions. • Conclusion & Real-Life Applications
4.	**Micro Programmed Control Unit**
	• Introduction of Unit • Control Memory, Address Sequencing, Conditional branching, Mapping of instruction, Subroutines. • Central Processing unit: Introduction of CPU. • Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, • Associative Memory, Cache Memory, Virtual Memory • Conclusion & Real Life Application
5.	**Computer Arithmetic**
	• Introduction of Unit • Modes of Data Transfer: Priority Interrupt, Direct Memory Access, • Introduction, Addition and Subtraction, • Multiplication Algorithms (Booth algorithm), Division Algorithms, • Input – Output Organization: Peripheral devices, Input – Output interface, Introduction of Multiprocessors: Characteristics of multi-processors. • Conclusion & Real-Life Application

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Computer System Architecture	Morris Mano	PHI	
2.	Computer Organization and Architecture	William Stallings	PHI	
Reference Book				
1.	Digital Computer Electronics: An Introduction to Microcomputers, Malvino, TMH			
2.	PC Hardware in a Nutshell Barbara Fritchman Thompson, Robert Bruce, Thompson, O'Reilly, 2nd Edition , 2010			
3.	Fundamentals of Computer Organization and Architecture, Mostafa AB-EL-BARR and Hesham EL-REWNI by John Wiley and Sons			
Online Resources				
1.	https://www.javatpoint.com/computer-organization-and-architecture-tutorial			
2.	https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/			

Code: BCECCE6102	Big Data Analytics	3 Credits [LTP: 3-0-0]

COURSE OUTCOME
Students will be able to:

- Provide HDFS Concepts and Interfacing with HDFS
- Access and Process Data on Distributed File System
- Manage Job Execution in Hadoop Environment
- Explain the components of Hadoop and Hadoop Eco-System
- Apply Machine Learning Techniques using R

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to Big Data And Hadoop**	07
2.	**HDFS(Hadoop Distributed File System)**	08
3.	**Map Reduce**	08
4.	**Hadoop Eco System**	07
5.	**Data Analytics with R**	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Big Data And Hadoop**
	• Introduction of Unit • The Design of HDFS, HDFS Concepts, Command Line Interface, • Hadoop file system interfaces, Data flow, • Data Ingest with Flume and Scoop and Hadoop archives, • Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures • Conclusion of Unit
2.	**HDFS (Hadoop Distributed File System)**
	• Introduction of Unit • The Design of HDFS, HDFS Concepts, Command Line Interface, • Hadoop file system interfaces, Data flow, • Data Ingest with Flume and Scoop and Hadoop archives, • Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures • Conclusion of Unit
3.	**Map Reduce**
	• Introduction of Unit • Anatomy of a Map Reduce Job Run, Failures, • Job Scheduling, Shuffle and Sort, • Task Execution, Map Reduce Types and Formats, Map Reduce Features. • Conclusion of Unit
4.	**Hadoop Eco System**
	• Introduction of Unit • Pig : Introduction to PIG, Execution Modes of Pig, • Comparison of Pig with Databases, Grunt, Pig Latin,

	• User Defined Functions, Data Processing operators. Hive : Hive Shell, • Hive Services, Hive Metastore, Comparison with Traditional Databases, • HiveQL, Tables, Querying Data and User Defined Functions. Hbase : HBasics, Concepts, Clients, Example, Hbase Versus RDBMS. • Big SQL : Introduction • Conclusion of Unit
5.	**Data Analytics with R**
	• Introduction of Unit • Machine Learning: Introduction, Supervised Learning, • Unsupervised Learning, Collaborative Filtering, • Big Data Analytics with BigR, • Conclusion with R

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Hadoop: The Definitive Guide	Tom White	Third Editon	O'reily
2.	Big Data Analytics	Seema Acharya, Subhasini Chellappan	2015	Wiley
Reference Book				
1.	Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.			
2.	Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013)			
3.	Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R			
Online Resources				
1.	http://www.bdbanalytics.ir/media/1121/big-data-analytics_turning-big-data-into-big-money.pdf			
2.	https://www.techtarget.com/searchbusinessanalytics/definition/big-data-analytics			
3.	https://www.tutorialspoint.com/hadoop/hadoop_big_data_overview.htm			

Code: BCECCE6103	Server-Side Scripting	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Invent server components models and also gain a working knowledge of Web and Internet applications.
- Design various algorithms used in server side to demonstrate how it works on the server side as well as client side.
- Modify the available programs and scripts to enrich the computation power and reduce the load.
- Explain steps involved in database connectivity and security on the server side using various server-side scripting languages.
- Design the variety of applications used in modern servers to fulfill the need of client-side requirements.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to Server-Side Scripting Languages**	8
2.	**Introduction to Python**	8
3.	**CGI and GUI Programming in Python**	7
4.	**Introduction to Ruby on Rails**	8
5.	**Advanced Rails Applications**	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Server-Side Scripting Languages**
	• Introduction to Unit • Server-side Scripting, Different Scripting Languages • Web services • Web application frameworks – MVC • General purpose frameworks – e.g., Django, RoR; • Discussion forums • Wikis • Weblogs • Content management system (CMS). • Conclusion of unit
2.	**Introduction to Python**
	• Introduction to Unit • How to set up the environment • Lexical conventions and Syntax • Variables, Data Types, Operators • Statements and Expressions • Decision making, Loops • Strings, Tuples • Lists, Dictionary • Recursion • Date and Time, Functions • Modules – math, random; Files I/O, Exceptions

	• Conclusion of uni
3.	**CGI and GUI Programming in Python**
	• Introduction to unit • Classes and Objects • Regular Expressions • CGI Programming • Database Access Networking • Sending Email • Multithreading, XML Processing, GUI Programming • Extending and Embedding Python. • Conclusion of unit
4.	**Introduction to Ruby on Rails**
	• Introduction to unit • MVC Architecture, How to install • Framework, Directory structure • Features and Basic Rails Application • Conclusion of unit
5.	**Advanced Rails Applications**
	• Introduction to unit • Setting up the database, Active records, Migrations, Controllers • Routes, Views, Layout, Scaffolding, AJAX • Uploading files, sending Email • Conclusion of unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Python: Essential Reference	David M. Beazley	3rd Edition, 2007	Pearson Education
2.	Core Python Programming	Wesley J. Chun	1999	McGraw Hill International Edition
Reference Book				
1.	Python Programming: An Introduction to Computer Science, John M. Zelle, Franklin – Beedle and Associate, Paperback – December 1, 2003			
Online Resources				
1.	https://developer.mozilla.org/en-US/docs/Learn/Server-side/First_steps/Introduction			
2.	https://www.tutorialspoint.com/wml/wml_server_scripts.htm			

Code: BCECCE6104	Software Testing	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Demonstrate the knowledge of fundamentals of software testing.
- Communicate clearly and effectively use the technical language of testing correctly.
- Able to test software in structured, organized and dynamic ways.
- Develop and validate a test plan and know about regression testing.
- Document test plans and test cases designed & Use automatic testing tools.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Testing Methodology**	08
2.	**Software Testing Terminology**	08
3.	**Dynamic Testing Techniques**	08
4.	**Static and Regression Testing**	09
5.	**Managing the Test Process and Test Automation**	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Testing Methodology**
	• Introduction to Effective Software Testing, • Evolution of Software Testing, Software Testing Myths, • Goals of Software Testing, • Psychology for Software Testing, • Software Testing Definitions, • Model for Software Testing, • Role of tester- testing as a process • Overview of Testing maturity model • Defects -Hypothesis and tests
2.	**Software Testing Terminology**
	• Definitions, Life Cycle of a Bug, Bug Classification based on SDLC, Testing Principles, • Software Testing Life Cycle (STLC), Software Testing Methodology, Software Testing Strategy, Test Strategy Matrix, • Verification and Validation, Verification and Validation Activities, How to verify Requirements and Objectives, • Verification of High level Design, Verification of Data Design, • Verification of Architectural Design, Verification of Low level Design, Unit Verification.
3.	**Dynamic Testing Techniques**
	• Dynamic Testing : Black Box Testing Techniques, Boundary Value Analysis, Boundary value checking, Equivalence Class Testing, Identification of Equivalence classes, State Table based Testing, Decision Table based Testing, Cause Effect Graphing based Testing • White Box Testing : Need of White box testing, Logic Coverage Criteria, Basis Path Testing, Control Flow Graph, Path Testing, Terminology, Cyclomatic Complexity, Formulae based on

	• Cyclomatic complexity. Guidelines for Basis Path Testing, Applications of Path Testing, Graph Matrices Graph Matrix, Connection Matrix, Loop Testing, Data Flow Testing, Static Data flow testing, Dynamic Data flow testing, Mutation Testing, Mutation Testing Process.
4.	**Static and Regression Testing**
	• Static Testing: Inspections, Inspection Process, Walkthroughs, Technical Reviews, Unit Validation Testing, Integration Testing Types of Incremental Integration Testing, Pair-wise Integration, Path Based Integration, Function Testing, System Testing, Performance Testing, Usability Testing, performing the system tests, Acceptance Testing. • Regression Testing: Progressive vs Regression Testing, Regression testing produces quality software Regression Testability, Objectives of Regression Testing, Regression Testing Types Regression Testing Techniques, Selective Retest Techniques, Strategy for Test Case Selection, Regression Test selection Techniques, Evaluating Regression Test Selection Techniques, Minimization Technique, Regression Test Prioritization, Types of Test case Prioritization, Prioritization Techniques, Prioritization Techniques, Code-based test case prioritization Vs coverage based test case prioritization.
5.	**Managing the Test Process and Test Automation**
	• Test Management, Test Organization, Test Planning, Test Plan Hierarchy, Master Test Plan, Verification Test Plan, Validation Test Plan, Unit Test Plan, Integration Test Plan, Function Test Plan, System Test Plan, Acceptance Test Plan, • Detailed Test Design and Test Specifications, Test Log, Test Reports, Software Metric, Testing • Metrics for Monitoring and Controlling the Testing Process, Testing Process Maturity Models. • Automation and Testing Tools, Need of Automation, Categorization of Testing Tools Static and Dynamic Testing Tools, Testing Activity Tools, Selection of Testing Tools Costs incurred in Testing Tools, Guidelines for Automated Testing, Overview of some commercial Testing Tools.

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Software Testing-Principle and Practices	Naresh Chauhan	3rd	Oxford
2.	Fundamentals of Software Engineering,	RajibMall	PHI	2018
Reference Book				
1.	The Art of Software Testing, 3rd Edition by Glenford J. Myers, Corey Sandler, Tom Badgett.			
2.	Software Testing, 2nd Edition by Ron Patton			
Online Resources				
1.	https://www.javatpoint.com/software-testing-tutorial			
2.	https://www.guru99.com/software-testing.html			

PRACTICAL

Code: BCECCE6201	Big Data Analytics Lab	1 Credit	[LTP: 0-0-2]

Course Outcome: -

Students will be able to:

- Identify the key issues in big data management and experiment with Hadoop framework.
- Develop problem solving and critical thinking skills in Hadoop.
- Develop problem solving and critical thinking skills in Map Reduce.
- Construct and explain with structure and unstructured data by using NoSQL commands.
- Implement fundamental enabling techniques and scalable algorithms for data stream mining

A. LIST OF EXPERIMENTS:

1	Hadoop Installation: Ubuntu & THEL 9 Operating System in stand-alone mode
2	File Management tasks in Hadoop
3	Implement the following Data structures in Java: Linked Lists, Stacks, Queues, Set, Map
4	Word Count Map Reduce program to understand Map Reduce
5	Implement the following file management tasks in Hadoop: Adding files and directories Retrieving files Deleting files
6	Implement Matrix Multiplication with Hadoop Map Reduce
7	Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.
8	Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes
9	Weather Report POC-Map Reduce Program to analyses time-temperature statistics and generate report with max/min temperature.
10	Implementing Matrix Multiplication with Hadoop Map Reduce
11	Pig Latin scripts to sort, group, join, project, and filter your data.
12	Hive Databases: Tables, Views, Functions and Indexes

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Hadoop in Practice	Alex	2014	
2.	Big Data	Holmes	2016	Black Book
3.	Big Data and Hadoop	V.K. Jain	2017	
Reference Book				
1.	Hadoop Practice Guide,"Jisha Mariam Jose"			
2.	Hadoop: The Definitive Guide ,"Tom White",O'Relly			
Online Resources				
1.	https://ia600201.us.archive.org/7/items/HadoopInPractice/Hadoop%20in%20Practice.pdf			

Code: BCECCE6202	Server Side Scripting Lab	1 Credit	[LTP: 0-0-2]

Course Outcome: -

Students will be able to:

- Design server components models and also practice knowledge of Web and Internet applications.
- Develop various algorithms used in server side to practically use it on the client side.
- Modify the available programs and scripts to enrich the computation power and reduce the load on the server.
- Categorize different application on the web and internet to demonstrate the working on various platforms of server-side scripting.
- Design the variety of applications used in modern servers to fulfill the need of client-side requirements

A. LIST OF EXPERIMENTS:

1	Write a python program to perform the following: Add two numbers, Calculate the area of a cube, Check is the number is even, odd, prime Print Fibonacci series
2	Write a python program to perform following: Display Calendar, Shuffle a deck of cards. Sort different words in alphabetic order. Count the occurrences of a letter, vowels, etc in a given sentence
3	Write a python program to merge mails
4	Write a python program to find the resolution of an image
5	Write a python program to find the hash of file
6	Write a python game – where 2 dice has to be rolled. When doubles are rolled, then display how many times it took to roll the double.
7	Write a python game to guess colors. Player can guess a color, and if the random color picked is same, then the player gets 5 points.
8	Create a simple rail application
9	Manage data using a database in a rail application
10	Create controllers and views – ruby on rails
11	Develop applications using rails scaffolding
12	Send and receive mails using ruby on rails

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Python: Essential Reference	David M. Beazley	3rd Edition	Pearson Education, 2007
2.	Core Python Programming,	Wesley J. Chun,	1999	McGraw Hill International Edition
Reference Book				
1.	Python Programming: An Introduction to Computer Science, John M. Zelle, Franklin – Beedle and Associate, Paperback – December 1, 2003			
Online Resources				
1.	https://developer.mozilla.org/en-US/docs/Learn/Server-side/First_steps/Introduction			
2.	https://www.tutorialspoint.com/wml/wml_server scripts.htm			

Code: BCECCE6203	Software Testing Lab	1 Credit	[LTP: 0-0-2]

Course Outcome: -

Students will be able to:

- Test software in structured, organized and dynamic ways.
- Document test plans and test cases designed
- Use automatic testing tools.
- Develop a test plan and know about different testing tools
- Validate a test plan

A. LIST OF EXPERIMENTS:

1	Find the test cases and coverage using JaButi.Tool. a. Write a program that calculates the area and perimeter of the circle. And find the Coverage & Test Cases of that program. b. Write a program which read the first name and last name from console and matching with expected result. Write a program that takes three double numbers from the java console representing, respectively, the three coefficients a,b, and c of a quadratic equation.
2	Write a program that reads commercial website URL from a url from file .you should expect that the URL starts with www and ends with .com. retrieve the name of the site and output it. For instance, if the user inputs www.yahoo.com, you should output yahoo. After that find the test cases and coverage using JaButi.
3	Write a program that reads two words representing passwords from the java console and outputs the number of characters in the smaller of the two. For example, if the words are open and sesame, then the output should be 4, the length of the shorter word, open. And test this program using JaButi.
4	Analyze the performance of following website using JMeter. a. Site Amazon Website Amazon.com Type shopping b. Flip kart Flipkart.com shopping c. Railway reservation Irctc.co.in Ticket booking site d. Train searching Erail.in Train searching
5	Calculate the coverage analysis of given programs using Eclemma Free open-source Tool. a. Write a program that takes three double numbers from the java console representing, respectively, the three coefficients a,b, and c of a quadratic equation. b. Write a program that calculates the area and perimeter of the circle. And find the Coverage & Test Cases of that program. c. Write a program which read the first name and last name from console and matching with expected result.
6	Find the Pass or fail test cases using unit testing tool Junit.
7	Find the Pass or fail test cases using unit testing tool TestNG.
8	Calculate the mutation score of programs using jumble Tool a. Write a program that calculates the area and perimeter of the circle. And find the Coverage & Test Cases of that program. b. Write a program which read the first name and last name from console and matching with expected result. c. Write a program that takes three double numbers from the java console representing, respectively, the three coefficients a,b, and c of a quadratic equation.
9	Generate Test sequences and validate using Selenium tool for given websites below:

	a. Site Amazon Website Amazon.com Type shopping b. Flip kart Flipkart.com shopping c. Railway reservation Irctc.co.in Ticket booking site d. Train searching Erail.in Train searching
10	Write a program for a calculator and find the test case and coverage and Def-use-graph.

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Software Testing-Principle and Practices	Naresh Chauhan	3rd	Oxford
2.	Fundamentals of Software Engineering,	RajibMall	PHI	2018
Reference Book				
1.	The Art of Software Testing, 3rd Edition by Glenford J. Myers, Corey Sandler, Tom Badgett.			
2.	Software Testing, 2nd Edition by Ron Patton			
Online Resources				
1.	https://www.javatpoint.com/software-testing-tutorial			
2.	https://www.guru99.com/software-testing.html			

DEPARTMENT ELECTIVE

Code: BCEECE6111	Block Chain	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Explore the working of Blockchain technology
- Analyze the working of Smart Consensus
- Analyze the working of Hyperledger
- explain architecture of Blockchain
- Use Real life application of Blockchain

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction of Blockchain**	08
2.	**Distributed Consensus**	08
3.	**Solidity Programming**	08
4.	**Blockchain Architecture**	08
5.	**BlockChain Application**	08

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction of Blockchain**
	• Introduction of Unit • Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public blockchain, Memory Hard Algorithm, Zero Knowledge Proof, , Blockchain, Blockchain Architecture – Block, Hash, Distributer P2P, Structure of Blockchain • Conclusion of Unit
2.	**Distributed Consensus**
	• Introduction of Unit • Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate, Consensus mechanism: Proof of Work (PoW), Proof of Stake (PoS), Byzantine Fault Tolerance (BFT), Proof of Authority (PoA) and Proof of Elapsed Time (PoET), Operation of Bitcoin. • Conclusion of Unit
3.	**Solidity Programming**
	• Introduction of Unit • Solidity - Language of Smart Contracts, Installing Solidity & Ethereum Wallet, Basics of Solidity, Layout of a Solidity Source File & Structure of Smart Contracts, General Value Types (Int, Real, String, Bytes, Arrays, Mapping, Enum, address) • Conclusion of Unit
4.	**BlockChain Architecture**
	• Introduction of Unit

	• What is Ethereum, Introduction to Ethereum, Consensus Mechanisms, How Smart Contracts Work, Metamask Setup, Ethereum Accounts, Receiving Ether's What's a Transaction?, Smart Contracts • What is Corda, Top corda contributed tools, Corda on the AWS Cloud, Corbeans:Corda integration for spring boot,Cordentity • What is Tezos(XTZ), the XTZ Token, How does Tezos Work. • Conclusion of Unit
5.	**Blockchain Application**
	• Introduction of Unit • Internet of Things, Medical Record Management System, Domain Name Service and Future of Blockchain, Alt Coins, Blockchain and Enterprise – A Technology of Coordination, Why Permissioned Blockchains Are Used in Enterprise Network, • Use Case: Blockchains for Trade Finance • Blockchain Use Case: Capital Markets • BlockChain Use Case for HealthCare • BlockChain Use Case for Agriculture • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Mastering Blockchain: Distributed Ledger Technology, decentralization, and smart contracts explained-	Imran Bashir	2nd Edition	Packt Publishing Ltd, March 2018.
2.	Blockchain By Example: A developer's guide to creating decentralized applications using Bitcoin, Ethereum, and Hyperledger	Bellaj Badr, Richard Horrocks, Xun (Brian) Wu,		Packt Publishing Limited, 2018.
Reference Book				
1.	Andreas M. Antonopoulos , "Mastering Bitcoin: Unlocking Digital Cryptocurrencies", O'Reilly Media Inc, 2015			
2.	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction", Princeton University Press, 2016.			
Online Resources				
1.	https://www.edx.org/learn/Blockchain			

Code: BCEECE6112	Sampling Method	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Explain the important terminologies and need for sampling over complete enumeration.
- Identify the need for learning and sampling proportion in sampling theory.
- Estimate the mean and variance of the samples drawn using simple random sampling with and without replacement.
- Estimate the mean and variance of the samples drawn using stratified and systematic random sampling.
- Estimate the mean and variance of the samples drawn using cluster sampling

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to Sampling**	08
2.	**Sampling proportions and Percentages**	07
3.	**Simple Random Sampling**	07
4.	**Stratified and Systemic Random Sampling**	08
5.	**Cluster Sampling**	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Sampling**
	• Introduction to unit • Important terminologies related with sampling methods: samples, population, standard error, sampling distribution, sample size, need for sampling, advantages and disadvantages of sampling, important principle steps in sample survey, sample survey vs complete enumeration, the role of sampling theory, probability sampling, alternative to probability sampling, importance of normal distribution in sampling theory, bias and its effects in sampling process, role of mean square error in sampling theory. • Conclusion of unit
2.	**Sampling proportions and Percentages**
	• Introduction to unit • Qualitative characteristics of samples, variances of the sample estimates, the effect of P on the standard errors, probability distribution function: the binomial probability distribution, the hypergeometric distribution, confidence limits, classification into more than two classes, confidence limits with more than two classes, the conditional distribution of p, proportions and totals over subpopulation, comparison between different domains. • Conclusion of unit
3.	**Simple Random Sampling**
	• Introduction to unit • Introduction, need for simple random sampling, overview and definition of simple random sampling with and without replacement, selection of a simple random sample, definitions and notations conventions in simple random sampling, properties of the estimates, variances of the estimates, the finite population correction, estimation of standard error from the

	samples, confidence limits, estimation of a ratio, estimates of means over subpopulation, estimates of totals over sub population, comparison between domain means, validity of normal approximation, linear estimates of the population mean. • Conclusion of unit
4.	**Stratified and Systemic Random Sampling**
	• Introduction to unit • Definition and overview of stratified and systemic random sampling, properties of the estimates, estimated variance and confidence limits, proportional allocation, optimum allocation, Neyman Allocation, relative precision of stratified sampling over simple random sampling, allocation requires more than 100 percent sampling, , Choice of Sample Sizes in Different Strata, advantages and disadvantages of stratified sampling, Systematic Sampling: The Sample Mean and its Variance, Comparison of Systematic with Random Sampling, Comparison of Systematic with Stratified Random Sampling, Estimation of the Variance, two stage sample with equal and unequal units. • Conclusion of unit
5.	**Cluster Sampling**
	• Introduction to unit • Equal Clusters: Introduction, definition, efficiency of cluster sampling, Efficiency of Cluster Sampling in Terms of Intra-Class Correlation, Estimation from the Sample of the Efficiency of Cluster Sampling, Relationship between the Variance of the Mean of a Single Cluster and its Size, Optimum Unit of Sampling and Multipurpose Surveys, Unequal Clusters: Estimates of the Mean and their Variances, Probability Proportional to Cluster Size: Estimate of the Mean and its Variance, Probability Proportional to Cluster Size: Efficiency of Cluster Sampling, Probability Proportional to Cluster Size: Relative Efficiency of Different Estimates. • Conclusion of unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Sampling Theory of Survey with Applications	Pandurang V Sukhatme		Indian society of Agricultural Statistics, New Delhi.
2.	Sampling Techniques	William G. Cochran,		Third Edition - Wiley Publications.
Reference Book				
1.	Large Sample Techniques, Jiming Jiang, Springer			
Online Resources				
1.	https://www.tutorialspoint.com/statistics/sampling_methods.htm			
2.	https://www.vskills.in/certification/tutorial/sampling-methods-3/			

Code: BCEECE6113	Security Analysis & Protocols	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Students able to learn end-to-end network security concepts and techniques.
- Importance of security analysis and modelling decisions.
- Designing the security defense model.
- Identifying the Security Properties on Linux.
- Implement the Network authentication and privacy

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to Security Analysis**	06
2.	**Model System**	07
3.	**Model Adversary**	08
4.	**Identify Security Properties**	07
5.	**Protocols**	08

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction**
	• Introduction of Unit • Computer Security • Cryptography Protocols • Security Analysis - Model System, Model Adversary, Identify security properties, • Check Properties preserved under attack • Conclusion of Unit
2.	**Model System**
	• Introduction of Unit • OSI Model - Introduction, Layers, Top layers vs lower layers • OSI Model - Host Communication • OSI Model - Encapsulation • Explicit Intruder Model • Example by Needham-Schroeder • Needham-Schroeder Crypto : Nonces, public-key cryptography • Needham-Schroeder Key Exchange • Needham Schroeder properties • Anomaly in Needham-Schroeder • Murj • Conclusion of Unit
3.	**Model System**
	• Introduction of Unit • Adversary model explained with an example • Types of Adversaries • Importance of Adversary and its behaviour

	• Actions of Adversaries • Adversary in Computer Science • Adversary in threat • Adversary model for cyber security • Case study on Adversary model for Cyber Defence Strategies • Conclusion of Unit
4.	**Identify Security Properties**
	• Introduction of Unit • Classification of Security Properties • Principles and Properties of Security • Identify Security Properties on Linux using CheckSec • Conclusion of Unit
5.	**Protocols**
	• Introduction of Unit • Network Authentication and privacy • Authentication, Secrecy • E.g.Kerboroes, SSL, WEP • E-Commerce • Fair Exchange • Voting • Anonymity with Accountability • Policy Specifications • Privacy , Access Control • Adherence to Policy

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	IT Security Metrics	Lance Hayden		Tata McGraw Hill
2.	Security Metrics	Caroline Wong		Tata McGraw Hill
Reference Book				
1.	The Complete Reference to Network Security - Roberta Bragg , Mark Rhodes-Ousley			
Online Resources				
1.	https://web.stanford.edu/class/cs259/WWW06/syllabus.html			
2.	http://www.cs.unibo.it/~aldini/fosad01/material/fosad-all.pdf			
3.	https://www.ten-inc.com/presentations/invincea1.pdf			

Code: BCEECE6114	Advance Scripting: Flask and RoR	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Explain Flask and Database
- Implement Advanced Flask concept
- Explain Ruby on Rails
- Implement Fundamental Statement & Control.
- Explain basic principles of Models

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hr)
1.	Flask Fundamentals & Data Models and Databases Database	07
2.	Advanced Flask & RESTful APIs	09
3.	Introduction to Ruby on Rails	08
4.	Ruby Fundamental Statement & Control	09
5.	Advanced Models & Forms with Active Record Associations	07

B. DETAILED SYLLABUS

Unit	Unit Details

1.	**Flask Fundamentals & Data Models and Databases Database**
	• Introduction of Unit • Microframeworks URLs, Routes, Dynamic RoutesJinja2 and Template Rendering Template Variables, Control Structures, Bootstrap Error Handling Forms, • GET and POST requests. Redirects, Sessions, and Message Flashing • Database Management, Relational Databases, SQL, • SQLAIchemy vs. Flask-SQLAIchemy ,Defining Models and Relationships • Interacting With Models, Database Operations Database Migration with Flask-Migrate • Conclusion of Unit
2.	**Advanced Flask & RESTful APIs**
	• Introduction of Unit • Separation of Responsibilities, Application Factory , Blueprints Unit Testing • Email Verification, User Authentication and Permissions, password Hashing. • User Profiles Paginating • Build and Deploy Your Own API: Installation And Setup, Serializers, URLs API Blueprint, Status Codes, Authentication • Conclusion of Unit
3.	**Introduction to Ruby on Rails**
	• Introduction of Unit • Scaffolding: The Scaffold command, Overview of Models, Views, and Controllers (MVC) • Adjusting the Templates Created by Scaffolding: Formatting in Rails, Working with Dynamic web pages, Editing the text in the tab, Redirecting the homepage URL, Editing the CSS • Version Control with Git: Initializing a repository, Committing and Pushing changes, Creating, switching, and deleting branches, Merging branches • Conclusion of Unit
4.	**Ruby Fundamental Statement & Control**
	• Introduction of Unit • Ruby Data Types & Variables: String, Integer, Float, Boolean and Nil values, Properties of Ruby data types, Instance variables & Local variables, Global variables, Built-in functions, creating your own functions, Passing arguments and returning values, If/Else and Unless Statements, While/Until Loops. • Ruby Data Structures: Arrays: The Simplest Collections, Hashes, Enumerators, Common Iterators • Classes: Creating classes, Inheritance, Class Methods, Overriding Methods • Generating a Controller: Creating a New Rails Site for Flix, How Controller methods relate to views, Private methods, The params hash • Views: Generating and creating Views, when you don't need a View, Mapping Views to controller actions and routes, Dynamic Views, The rails routes command • Conclusion of Unit
5.	**Advanced Models & Forms with Active Record Associations**
	• Introduction of Unit • Generating a Model, How Migration Files work, Migratiing the Database, Rolling back a migration • Rails Forms: Rails forms vs HTML forms, HTTP Overview, Rails Form Helpers, Rails forms: form_ for, form tag, and form with Connecting a form to a Model • Views: Creating a View, Adding Dynamic Data, rendering a Partial, Optional Bonus: Rendering a View

	• Model Validations and Methods: The purpose of validations, Adding basic validations, Preventing submission of empty forms, Customizing validations, Adding Error Messages ,Built-in Model methods, Adding hods to models, Model Relationships • Integrating Front-end Code: Rails Asset Pipeline • Launching an application: Preparation, Amazon Web Services, Heroku • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Flask Web Development	Miguel Grinberg	2nd	O'Reilly
2.	The Ultimate Python Programming Guide from Beginner To Intermediate	William Alvin Newton	2021	William Alvin Newton
Reference Book				
1.	Building Web Apps with Python and Flask," Malhar Lathkar",BPB			
2.	Programming Ruby," David Thomas"			
3.	Ruby on Rails For Beginners ," Joseph Joyner			
Online Resources				
1.	https://www.railstutorial.org/book			
2.	https://www.pdfdrive.com/ruby-on-rails-tutorial-e14979185.html			
3.	https://www.learnenough.com/ruby-on-rails-4th-edition-tutorial/beginning			

Code: BCEECE6115 Web Programming for Graphics & Gaming 3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Acquire practical competency with emerging technologies and skills needed for becoming an effective graphics designer.
- Able to apply geometric transformations on graphics objects and their application in composite form in 2D, 3D.
- Able to assess hardware and software aspects necessary to develop Graphics and Web Designing.
- Program a game for a hand-held device
- Get skills needed for becoming web designer also.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to Web & Basics of HTML and CSS**	**07**
2.	**Introduction to graphics and gaming**	**09**
3.	**Sprites and animation**	**07**
4.	**Level design**	**07**
5.	**User interface & Audio**	**06**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Web & Basics of HTML and CSS**
	• What is HTML • HTML Documents, Basic structure of an HTML document. • Creating an HTML document , Mark up Tags . • Heading-Paragraphs , Line Breaks • Creating Style Sheet, CSS Properties,CSS Styling(Background, Text Format , • Working with Lists and Tables. • CSS Id and Class, Box Model(Introduction, Border properties, Padding Properties, • Margin properties). • CSS Advanced (Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector). • Conclusion of Unit
2.	**Introduction to Graphics and Gaming**
	• Types of games, Different aspects of game design. • Different components in a game. • Game engines; . • Geometric primitives. • 2D transforms and 3D linear transforms. • Homogeneous matrices. • Conclusion of Unit
3.	**Sprites and animation**
	• Different image formats. • Polygon file formats. • Creating sprites. • Animations using sprite-sheets. • Animations using key frames. • Animation controllers. • Conclusion of Unit
4.	**Level design**
	• Scenes. • Tiles. • visual continuity in tiles. • Adding objects to scene. • Lighting, RGB space, • Transparency • Conclusion of Unit
5.	**User interface & Audio**
	• Layout • Menu system. • Visual components, Event system. • Different audio formats, • Audio mixing. • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Fundamental of web development	Randyconnolly, Ricardo Hoar	2016	McGraw Hill
2.	Computer Graphics: Principles and practice	John Hughes	3rd edition	Addison-Wesle
3.	Game Programming Patterns	Nystrom Robert	3rd edition, 2014	Genever Benning
Reference Book				
1.	Steven M. Schafer, "HTML, XHTML, and CSS Bible, 5ed", Wiley India			
2.	Angel, E. (2005) Interactive Computer Graphics: A Top-Down Approach with Open GL, Addison Wesley.			
3.	Paris Buttfield-Addison et al., Unity Game Development Cookbook: Essentials for Every Game, 1st Edition, O'Reilly Media, 2019			
Online Resources				
1.	https://careerfoundry.com/en/tutorials/web-development-for-beginners/introduction-to-web-development/			
2.	https://www.youtube.com/watch?v=LhFequVQprw			
3.	https://www.w3schools.com/graphics/game_images.asp			

Code: BULCHU6201	Professional Skills-I	1 Credit	[LTP: 0-0-3]

Course Outcome: -

Students will be able to:

- Compare the professional and personal approach towards any task and demonstrate their understanding by displaying professional attitude in the assigned tasks.
- Recognize, explain, and use the formal elements of specific genres of organizational communication: reports, proposals, memorandums, web pages, wikis, blogs, business letters, and promotional documents etc.
- Prepare and deliver a clear and fluent demonstrative, informative, and persuasive presentation and enlarge their vocabulary by keeping a vocabulary journal.
- Demonstrate preparedness for any type of interview from classic one-on-one interview to panel interviews, Phone/Skype interviews, Behavioral/Situational etc. along with sharping the ability to critically analyze a given piece of information and collectively work in a group to arrive at a solution or develop a perspective.
- Develop skills for negotiation and time management to identify steps for proper negotiation preparation & learn bargaining techniques and strategies of inventing options for mutual gain and move negotiations from bargaining to closing.

A. LIST OF EXPERIMENTS:

1	Professional & Ethical Approaches: Degree of adherence, Business world & meeting deadlines
2	Job Hunting and Networking: Skill Branding & Usage of Online Platforms
3	Trust Building & Cultural Etiquettes
4	Professional Writing-I: Direct-Indirect approaches to Business Writing-Five main stages of writing Business Messages.
5	Professional Email Writing
6	Resume Building-I: Difference between C.V. & Resume, formats, points to cover, practice sessions
7	E-Learning & E-Content Development-I
8	Presentation Skills: format & structure of presentations, using tools & techniques
9	Job Interviews I: Preparation and Presentation
10	Advanced Group Discussion – I
11	Negotiation Skills & and Conflict Resolution-I
12	Professional Code of Ethics & Effective Time Management

Code: BCECCE6601	Talent Enrichment Programme(TEP)-VI	1 Credit [LTP: 0-0-6]

COURSEOUTCOME:

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students through active participate on in various activities falling in Technical and non-technical categories.

Social outreach, Discipline, TEP -I, VAC & Extra Curricular activities shall be evaluated on the basis of its sub constituent program me, as a complete one credit course. It shall be counted in calculation of SGPA but it is not a back log subject. However, the attendance of these classes shall be recorded and accounted in the total attendance.

Activities included in this category in this Semester are as follows:

Code	Activity	Hours	Credits
BCECCE6601	Discipline, Value Added Courses & Social Outreach	**2**	1
	Talent Enrichment Programme (TEP)-VI	**2**	
	Library / MOOC / NSP	**2**	

VII SEMESTER

DEPARTMENT CORE COURSES

Code: BCECCE7101	Internet of Things	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Implement general concepts of Internet of Things (IoT) and recognize various devices, sensors and applications (Recognize, Knowledge)
- Applicable design concept to IoT solutions and fundamental enable techniques. (Apply)
- Analyze various IoT Model and Architecture M2M and IoT architectures (Analyze)
- Evaluate design issues in IoT applications, Back-end and Data Handling Analysis (Evaluate)
- Create IoT solutions using sensors, actuators, devices with cloud computing and Case Study.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction To Iot**	08
2.	**Iot Networking Core**	08
3.	**Iot Architecture**	07
4.	**Iot Application Development**	08
5.	**Industrial Iot**	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction To Iot**
	• Introduction of Unit • Sensing, Actuation, Networking basics, • Communication Protocols • Sensor Networks • IoT Definition, Characteristics of IoT • Functional Blocks, Physical design of IoT, Logical design of IoT • Communication models & APIs • Conclusion of Unit
2.	**Iot Networking Core**
	• Introduction to unit • Introduction to Arduino Programming • Integration of Sensors and Actuators with Arduino • Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi • Other IoT supported hardware platforms such as: ARM Cortex Processors, Intel Galileo boards • Wireless networking equipment and configurations • Accessing hardware and device file interactions

	• Conclusion of Unit
3.	**Iot Architecture**
	• Introduction of Unit • IoT reference Model and Architecture • Remote monitoring and sensing • Remote controlling and performance analysis • Communication pattern, 6LoWPAN, • Sensors and sensor Node and interfacing using any Embedded target boards • Conclusion of Unit
4.	**Iot Application Development**
	• Introduction of Unit • Application protocols: MQTT, REST/HTTP, CoAP, MySQL • Back-end Application Designing • Apache for handling HTTP Requests • MongoDB Object type Database • HTML, CSS & jQuery for UI Designing • JSON lib for data processing, Security & Privacy during development • Conclusion of Unit
5.	**Industrial IoT**
	• Introduction of Unit • Data Handling and Analytics • Sensor-Cloud, Cloud Computing Services for IoT • Case Study: Agriculture, Healthcare, Activity Monitoring • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Internet of Things: Architectures, Protocols and Standards	Simone Cirani, Gianluigi, Marco, and Luca Veltri	Latest	WILEY
2.	Internet of Things	RMD Sundaram Shriram K Vasudevan, Abhishek S	Latest	WILEY
Reference Book				
3.	Designing the Internet of Things, Adrian McEwen, Hakim Cassimally, John Wiley and Sons			
4.	Internet of Things (A Hands-on Approach), Vijay Madisetti and Arshdeep Bahga,1st Edition, VPT, 2014			
Online Resources				
5.	https://data-flair.training/blogs/iot-tutorial/			
6.	https://www.javatpoint.com/iot-internet-of-things			
7.	https://www.guru99.com/iot-tutorial.html			

Code: BCECCE7102	Data Mining	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Ability to understand the types of the data to be mined and present a general classification of tasks.
- Apply preprocessing methods for any given raw data.
- Extract interesting patterns, measurement and rule based data from large amounts of data.
- Choose and employ suitable data mining algorithms to build analytical applications.
- Comprehend the organization of data in the form of data warehouse and advanced concepts.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to Data Mining**	07
2.	**Classification**	08
3.	**Cluster Analysis**	07
4.	**Association Rule Mining and Visualization**	08
5.	**Data warehousing**	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Data Mining**
	• Introduction to Data Mining • Data Mining Tasks • Components of Data Mining Algorithms • Data Mining supporting Techniques • Major Issues in Data Mining • Measurement and Data • Data Preprocessing • Data sets • Conclusion of Unit
2.	**Classification**
	• Introduction to Classification • Basic Concepts • Decision Tree induction • Bayes Classification Methods • Rule Based Classification • Model Evaluation and Selection • Techniques to Improve Classification Accuracy • Classification: Advanced concepts • Bayesian Belief Networks • Classification by Back Propagation • Support Vector Machine • Classification using frequent patterns. • Conclusion of Unit

3.	**Cluster Analysis**
	• Introduction to Cluster Analysis • Basic concepts and Methods • Partitioning methods • Hierarchical methods • Density Based Methods • Grid Based Methods • Evaluation of Clustering • Advanced Cluster Analysis: Probabilistic model-based clustering, Clustering High Dimensional Data, Clustering Graph and Network Data, Clustering with Constraints. • Conclusion of Unit
4.	**Association Rule Mining and Visualization**
	• Introduction to Association Rule Mining • Large Item sets • Basic Algorithms • Parallel and Distributed Algorithms • Comparing Approaches • Incremental Rules • Advanced Association Rule Techniques • Measuring the Quality of Rules • Introduction to Visualization • Visualization of Multidimensional Data • Diagrams for Multidimensional visualization • Visual Data Mining • Data Mining Applications • Case Study: WEKA. • Conclusion of Unit
5.	**Data warehousing**
	• Introduction to Data warehousing • Data warehousing components • Multi-dimensional data model • Data warehouse architecture • Data warehouse implementation • Mapping the data warehouse to multiprocessor architecture • OLAP • Need • Categorization of OLAP Tools • Introduction to Data Cube • Data Cube Technology: Efficient Methods for Data Cube Computation • Exploration and Discovery in Multidimensional Databases • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Data Mining Concepts and Techniques	Jiawei Han and Micheline Kamber	Third Edition	Elsevier
2.	Principles of Data Mining (Adaptive Computation and Machine Learning)	David J. Hand, Heikki Mannila and Padhraic Smyth	Latest	A Bradford Book
3.	Data Mining: Introductory and Advanced Topics	Margaret H Dunham	Latest	Pearson
Reference Book				
1.	Data Mining Concepts and Techniques, Author Jiawei Han and Micheline Kamber, August 2000			
2.	Principles of Data Mining (Adaptive Computation and Machine Learning), David J. Hand, Heikki Mannila and Padhraic Smyth			
3.	Data Mining: Introductory and Advanced Topics, Margaret H Dunham,Pearson			
Online Resources				
1.	https://www.educba.com/data-mining-concepts-and-techniques/			
2.	https://nptel.ac.in/courses/106105174			
3.	https://onlinecourses.swayam2.ac.in/cec20_cs12/preview			

Code: BCECCE7103	Compiler Construction	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Know the structure of compilers, specification and recognition of Tokens.
- Know the various parsing technique like item construction with parser.
- Recognize the basic techniques used in compiler construction, analysis, and intermediate code generation
- Comprehend intermediate code generation and run-time environment.
- Learn the concepts code optimization, global data flow analysis and efficient algorithm.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to compiler**	**07**
2.	**Syntax Analysis**	**08**
3.	**Intermediate Code Generator**	**08**
4.	**Run- Time Environment and Code Generation**	**07**
5.	**Code Optimization**	**07**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Compiler**
	• Introduction to compiler • Structure of a compiler • Lexical Analysis • Role of Lexical Analyzer • Input Buffering • Specification of Tokens • Recognition of Tokens • Lex • Finite Automata • Regular Expressions to Automata • Minimizing DFA. • Conclusion of Unit
2.	**Syntax Analysis**
	• Introduction to syntax analysis • Role of Parser • Grammars • Error Handling • Context-free grammars • Writing a grammar • Top-Down Parsing • General Strategies Recursive Descent Parser Predictive Parser-LL(1) • Parser-Shift Reduce Parser-LR • Parser-LR (0)

	• Item Construction of SLR Parsing Table • Introduction to LALR Parser • Error Handling and Recovery in Syntax Analyzer • YACC • Conclusion of Unit
3.	**Intermediate Code Generator**
	• Introduction to Intermediate Code Generator • Syntax Directed Definitions • Evaluation Orders for Syntax Directed Definitions • Intermediate Languages: Syntax Tree, Three Address Code, Types and Declarations • Translation of Expressions • Type Checking. • Conclusion of Unit
4.	**Run- Time Environment and Code Generation**
	• Introduction to Run- Time Environment and Code Generation • Storage Organization • Stack Allocation Space • Access to Non-local Data on the Stack • Heap Management • Issues in Code Generation • Design of a simple Code Generator. • Conclusion of Unit
5.	**Code Optimization**
	• Introduction to Code Optimization • Principal Sources of Optimization • Peep-hole optimization • DAG • Optimization of Basic Blocks • Global Data Flow Analysis • Efficient Data Flow Algorithm. • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	**Text Books:**	**Author**	**Edition**	**Publication**
1.	Compilers: Principles, Techniques and Tools	Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman	Second Edition	Pearson Education
Reference Book				
1.	Optimizing Compilers for Modern Architectures: A Dependence based Approach, Morgan, Kaufmann Publishers, 2002, Randy Allen, Ken Kennedy.			
2.	Advanced Compiler Design and Implementation, Morgan Kaufmann Publishers - Elsevier Science, India, Indian Reprint 2003, 2. Steven S. Muchnick.			
3.	Engineering a Compiler‖, Morgan Kaufmann Publishers Elsevier Science, 2004, Keith D Cooper and Linda Torczon.			
Online Resources				
1.	https://www.udemy.com/course/introduction-to-compiler-construction-and-design/			
2.	https://www.coursera.org/courses?query=compilers			
3.	https://nptel.ac.in/courses/106108113			

PRACTICAL

Code: BCECCE7201 Data Mining Lab 1 Credit [LTP: 0-0-2]

Course Outcome: -

Students will be able to:

- Know how to implement and demonstrate algorithms in WEKA
- Implement the concepts of data preprocessing & item construction in WEKA.
- Comprehend intermediate code generation, implement association rule process in WEKA.
- Implement classification and clustering algorithms in WEKA.
- Learn the concepts, global data flow analysis and efficient algorithm Visualize data in WEKA.

A. LIST OF EXPERIMENTS:

1	Demonstration of preprocessing on dataset student.arff
2	Demonstration of preprocessing on dataset labor.arff
3	Demonstration of Association rule process on dataset contactlenses. arff using aprioris algorithm
4	Demonstration of Association rule process on dataset test.arff using apriori algorithm
5	Demonstration of classification rule process on dataset student.arff using j48 Algorithm
6	Demonstration of classification rule process on dataset employee.arff using j48 algorithm
7	Demonstration of classification rule process on dataset employee.arff using id3 algorithm
8	Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm
9	Demonstration of clustering rule process on dataset iris.arff using simple k-means
10	Demonstration of clustering rule process on dataset student.arff using simple kmeans
11	Usage of WEKA for visualization of data set student.arff.
12	Usage of WEKA for visualization of data set employee.arff.

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Data Mining Concepts and Techniques	Jiawei Han and Micheline Kamber	Third Edition	Elsevier
2.	Principles of Data Mining (Adaptive Computation and Machine Learning)	David J. Hand, Heikki Mannila and Padhraic Smyth	Latest	Springer
3.	Data Mining: Introductory and Advanced Topics	Margaret H Dunham	Latest	Pearson Education, 2006
Reference Book				
1.	Data Mining Concepts and Techniques, Jiawei Han and Micheline Kamber,Third Edition Elsevier			
2.	Principles of Data Mining (Adaptive Computation and Machine Learning), David J. Hand, Heikki Mannila and Padhraic Smyth			
3.	Data Mining: Introductory and Advanced Topics, Margaret H Dunham Latest,Pearson Education, 2006			
Online Resources				
1.	https://www.javatpoint.com/data-mining			
2.	https://nptel.ac.in/courses/106105174			

Code: BCECCE7202 Compiler Construction Lab 1 Credit [LTP: 0-0-2]

Course Outcome: -

Students will be able to:

- Be exposed to compiler writing tools compilers, specification and recognition of Tokens.
- Learn to implement the different Phases of compiler code generation and run-time environment.
- Be familiar with control flow and data flow analysis, global data flow analysis and efficient algorithm.
- Study simple optimization techniques with run-time environment.
- Learn the concepts code optimize a given program and intermediate code generation.

A. LIST OF EXPERIMENTS:

1	Implementation of Symbol Table
2	Develop a lexical analyzer to recognize a few patterns in C. (Ex. identifiers, constants, comments, operators etc.)
3	Implementation of Lexical Analyzer using Lex Tool
4	Generate YACC specification for a few syntactic categories. a) Program to recognize a valid arithmetic expression that uses operator +, – , * and /. b) Program to recognize a valid variable which starts with a letter followed by any number of letters or digits. c)Implementation of Calculator using LEX and YACC
5	Convert the BNF rules into Yacc form and write code to generate Abstract Syntax Tree.
6	Implement type checking
7	Implement control flow analysis and Data flow Analysis
8	Implement any one storage allocation strategies (Heap,Stack,Static)
9	Construction of DAG
10	Implement the back end of the compiler which takes the three-address code and produces the 8086 assembly language instructions that can be assembled and run using a 8086 assembler. The target assembly instructions can be simple move, add, sub, jump. Also simple addressing modes are used.
11	Implementation of Simple Code Optimization Techniques (Constant Folding., etc.)

B. RECOMMENDED STUDY MATERIAL

S. No	**Text Books:**	**Author**	**Edition**	**Publication**
1.	Compilers: Principles, Techniques and Tools	Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman	Second Edition	Pearson Education
Reference Book				
1.	Optimizing Compilers for Modern Architectures: A Dependence based Approach, Morgan, Kaufmann Publishers, 2002, Randy Allen, Ken Kennedy.			
2.	Advanced Compiler Design and Implementation, Morgan Kaufmann Publishers - Elsevier Science, India, Indian Reprint 2003, 2. Steven S. Muchnik.			
3.	Engineering a Compiler‖, Morgan Kaufmann Publishers Elsevier Science, 2004, Keith D Cooper and Linda Torczon.			
Online Resources				
1.	https://www.udemy.com/course/introduction-to-compiler-construction-and-design/			
2.	https://www.coursera.org/courses?query=compilers			

DEPARTMENT ELECTIVE

Code: BCEECE7111	Software Define Network	3 Credits [LTP: 3-0-0]

COURSE OUTCOME
Students will be able to:

- Analyze the evolution of software defined networks and modern data center.
- Express the various components of SDN and their uses date planes.
- Describe the use of SDN in the current networking scenario drawbacks of Open SDN.
- Design and develop various applications of SDN, VxLAN, NVGRE.
- Study simple optimization techniques with run-time environment Open Daylight Controller Floodlight Controller.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction**	08
2.	**Open Flow & SDN Controllers**	07
3.	**Data Centers**	08
4.	**SDN Programming**	07
5.	**SDN**	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction**
	• History of Software Defined Networking (SDN), • Modern Data Center • Traditional Switch Architecture • Why SDN, Evolution of SDN • How SDN Works • Centralized and Distributed Control • Date Planes • Conclusion of unit.
2.	**Open Flow & SDN Controllers**
	• Open Flow Specification • Drawbacks of Open SDN • SDN via APIs • SDN via Hypervisor • Based Overlays • SDN via Opening up the Device, SDN Controllers . • Conclusion of unit.
3.	**Data Centers**
	• Introduction to Unit • Multitenant Data Center

	• Virtualized Multitenant Data Center • SDN Solutions for the Data Center Network • VLANs, EVPN • VxLAN ,NVGRE. • Conclusion of Unit
4.	**SDN Programming**
	• Programming SDNs • Northbound Application Programming Interface • Current Languages and Tools • Composition of SDNs • Network Functions Virtualization (NFV) • Software Defined Networks: Concepts, Implementation and Applications. • Conclusion of Unit
5.	**SDN**
	• Introduction of Unit • Juniper SDN Framework • IETF SDN Framework • Open Daylight Controller • Floodlight Controller. • Bandwidth Calendaring. • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1	Software Defined Networks: A Comprehensive Approach	Paul Goransson and Chuck Black	First Edition,	Morgan
2	Software Defined Networks	Thomas D. Nadeau, Ken Gray	2013	O'Reilly Media
Reference Book				
1.	Siamak Azodolmolky, ―Software Defined Networking with Open Flow, Packet Publishing, 2013.			
Online Resources				
2.	https://www.telecomtutorial.info/post/introduction-to-sdn-software-defined-network			
3.	https://www.cs.rochester.edu/courses/257/fall2016/student_seminars/jon_aho_kailash_joshi_SDN.pdf			
4.	https://www.slideserve.com/kelii/sdn-performance-architecture-evaluation			

Code: BCEECE7112	Time Series Analysis	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Learn the various paradigms and working mechanisms of Time Series Analysis.
- Articulate the fundamentals of algorithm designing and also canvassing the implement ability of such algorithms in further generation of series.
- Identify the working mechanisms of dynamic series and backtracking in the algorithm generation.
- To verify the functionality and benefits of such Spectral Analysis.
- Interpret various importance of stationarity in time series analysis mechanisms for backtracking and branch and bound fundamentals
- Enhance competitively algorithmic approach in problem solving and implementing, discovering fully functional coding paradigm.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to Time Series Analysis**	07
2.	**Univariate time series analysis**	07
3.	**Univariate time series analysis – II**	07
4.	**Spectral Analysis**	08
5.	**Multivariate Time Series Analysis – VAREstimation**	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Time Series Analysis**
	• Introduction of Unit • Introduction to time series plot in history, time series data and cross sectional data, difference between time series and cross sectional data, time series and stochastic process, means, variances, covariance, stationarity, importance of stationarity in time series analysis, components of time series analysis: trend, seasonal, cyclical and irregular, white noise process, random walk, elementary time series models with zero mean, model evaluation techniques: Bias, MAD, MSE, MAPE. • Conclusion of unit
2.	**Univariate time series analysis**
	• Introduction of Unit • Models related to stationary data, Auto Regressive model, Moving Average model, Stationarity of data, concepts on unit root, impacts of unit root in estimating the model parameters, tests related to unit root: Dickey Fuller test, Augmented Dickey Fuller test, KPSS Test, The Phillips Peron Test, seasonal unit roots, periodic integration and unit root testing. • Conclusion of unit
3.	**Univariate time series analysis – II**
	• Introduction of Unit • ARMA (p,q) process, ACF (Auto Correlation Function) and PACF (Partial Auto Correlation Function) of an ARMA (p,q) process, forecasting ARMA process, integration of non-stationary data, first order integration and second order integration, ARIMA (p,i,q),

	estimation of parameters of ARIMA model, Wald Test Statistic for significance of coefficients • Conclusion of unit
4.	**Spectral Analysis**
	• Introduction of Unit • Spectral densities, periodogram, he Spectral Representation and Spectral Distribution, Sampling Properties of the Sample Spectral Density, time invariant linear filters, the spectral density of ARMA (Auto Regressive Moving Average), smoothing the Spectral Density, Bias and variance, bandwidth, Confidence Intervals for the Spectrum, Leakage and Tapering, auto regressive spectrum estimation. • Conclusion of unit
5.	**Multivariate Time Series Analysis - VAR Estimation**
	• Introduction of Unit • Introduction to multivariate time series analysis, Concepts of Vector Auto Regression, multivariate least square estimation, asymptotic properties of Lease square estimation, Introduction to Vector Error Correction Models, Cointegrated Processes (Johensen Co-integration technique), Common Stochastic Trends, Deterministic Terms in Cointegrated Processes, Forecasting Integrated and Cointegrated Variables, Introduction to Univariate • GARCH models, multivariate GARCH, estimation of GARCH models • Conclusion of unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Introductory Econometrics A Modern Approach	Jeffrey M. Wooldridge	Fifth Edition	Introductory Econometrics A modern Approach
2.	Basic Econometrics	Damodar N. Gujarati, Dawn C. Porter	Fifth Edition -	McGraw- Hill/Irwin Publication
3.	Introduction to Time Series and Forecasting	Peter J. Brockwell Richard A.Davis	Fourth Edition	Springer
Reference Book				
1.	Time Series Analysis with applications in R, Jonathan D. Cryer, Kung-Sik Chan, Second Edition, Springer			
2.	New Introduction to Multiple Time Series Analysis, Helmut Lütkepohl, Springer			
Online Resources				
4.	https://www.analyticsvidhya.com/blog/2021/07/time-series-forecasting-complete-tutorial-part-1/			
5.	https://www.analyticsvidhya.com/blog/2021/07/time-series-forecasting-complete-tutorial-part-1/			

Code: BCEECE7113	Cyber Threat intelligence & Bug Bounting	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- To recognize why Intelligence and cyber threat intelligence is a useful for developers.
- Identify the key issues in apply Intelligence, develop and experiment with Intelligence & Cyber.
- Develop problem solving and critical thinking skills in fundamental enable techniques like SQL Injection conditionals and loops.
- Construct and explain with structure and concept of different Bug Bounty.
- Implement Read and write data from/to SQL Injection Cross Site Script step-wise by defining functions.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Understanding Intelligence & Cyber Threat Intelligence	07
2.	Threat Intelligence Consumption	08
3.	The Bug Bunty	08
4.	SQL Injection	07
5.	Cross Site Script	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Understanding Intelligence & Cyber Threat Intelligence**
	• Introduction of Unit • Intelligence Lexicon and Definitions, Traditional Intelligence Cycle, Structured Analytical Techniques, Defining Threats, Understanding Risk, Cyber Threat Intelligence and Its Role, Expectation of Organizations and Analysts, Diamond Model and Activity Groups, Four Types of Threat Detection • The Threat Intelligence Lifecycle • 1. Direction 2. Collection 3. Processing 4. Analysis 5. Dissemination 6. Feedback • Conclusion of Unit
2.	**Threat Intelligence Consumption**
	• Introduction of Unit • Sliding Scale of Cyber security, Consuming Intelligence for Different Goals, Enabling Other Teams with Intelligence, Building an Intelligence Team, Positioning the Team in the Organization, Prerequisites for Intelligence Generation, Intelligence Requirements, Priority Intelligence Requirements, Beginning the Intelligence Lifecycle, Threat Modeling • Conclusion of Unit
3.	**The Bug Bounty**
	• Introduction of Unit • What is a Bug Bounty Program?, Popular Bug Bounty Platforms Bug crowd (Demo) HackerOne(Demo),Benefits of Bug Bounty, Brief About Common Vulnerabilities, Hacking Terminologies, What is Information Gathering?, Concept of Digital Footprinting, What Information to gather?, What is Whois Information, Information gathering about People &

	Organization, Gathering Information about Websites, Google Dorking & GHDB, DVWA Introduction, bWAPP Introduction, Introduction to Burp Suite. • Conclusion of Unit
4.	**SQL Injection**
	• Introduction of Unit • Introduction to SQL, Writing Basic SQL Query, Different types of comments used in SQL, SQLi Introduction & Impact, Union Based SQLi (Demo), Boolean Based SQli, Time Based SQLi, Validation Bypass (Client and Server), IDOR Vulnerability, IDOR on bWAPP, Rate Limiting Flaw, File Upload Vulnerability, File Upload on DVWA, Live IDOR POC, Live Rate Limiting Flaw POC • Conclusion of Unit
5.	**Cross Site Script**
	• Introduction of Unit • What Is Cross Site Scripting(XSS)?, Stored XSS, Stored XSS (DVWA), Reflected XSS • Reflected XSS (DVWA), DOM based XSS, Blind XSS, Live XSS POC, Host Header Injection methods & URL redirection, Live Host Header Injection POC, Live URL Redirection POC, Understanding Session, Cookies & Session Fixation, Forced Browsing, Cross Site Request Forgery Introduction, CSRF Attack(DVWA), Open Redirections, Personally Identifiable Information (PII) Leakage, Sensitive, Information Disclosure, Live CSRF POC, Live Sensitive Information POC, Live Session Fixation POC • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Cyber Threat Intelligence [The Beginner's Guide]	Kurt Baker	March 2022	Springdell
2.	Bug Bounty Hunting: A Complete Guide	K. Vilith	Aug 2020	Krademy
Reference Book				
3.	Bug bounty Hunting Essential, Caarlos A., Shahmeer Amir,Packt			
4.	The Hacker Play Book 3: Practical Guide to Penetration Testing,peter Kim			
Online Resources				
5.	https://krademy.com/bug-bounty-hunting-complete-guide			
6.	https://owasp.org/www-pdf-archive/Getting_Started_with_Bug_Bounty..pdf			
7.	https://www.codegrazer.com/conference/dc151_Talk_BugBounty_scene_nijagaw.pdf			

BCEECE7114	Multiplayer Programming	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Comprehend Multiplayer Games **Object Serialization**
- Serialized data structures for network transmission
- Pupils should be able to implement TCP/UDP programming.
- Appreciate Security & Real-World Engines, Object Replication.
- Scholars will be able to research and comprehend the impact of emerging networking technology trends.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction of Multiplayer Games**	07
2.	**Object Serialization**	08
3.	**Network Protocol and Scalability**	08
4.	**Security & Real-World Engines**	07
5.	**Gamer Services & Cloud Hosting Dedicated Servers**	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction of Multiplayer Games**
	• Introduction of Unit • A Brief History of Multiplayer Games, Star siege: Tribes, Age of Empires • Origins: Packet Switching, The TCP/IP Layer Cake, The Physical Layer, The Link Layer, The Network Layer, The Transport Layer, The Application Layer, NAT • Berkeley Sockets: Creating Sockets, API Operating System Differences, Socket Address, UDP Sockets, TCP Sockets, Blocking and Non-Blocking I/O, Additional Socket Options. • Conclusion of Unit
2.	**Object Serialization**
	• Introduction of Unit • The Need for Serialization, Streams, Referenced Data, Compression, Maintainability • Object Replication: The State of the World, Replicating an Object, Naïve World State Replication, Changes in World State, RPCs as Serialized Objects • Network Topologies and Sample Games: Network Topologies, Implementing Client-Server, Implementing Peer-to-Peer • Conclusion of Unit
3.	**Network Protocol and Scalability**
	• Introduction of Unit • Latency, Jitter, Packet Loss, Reliability: TCP or UDP? Packet Delivery notification, Object Replication Reliability, Simulating Real-World Conditions • Improved Latency Handling: The Dumb Terminal Client, Client-Side Interpolation, Client-Side Prediction, Server-Side Rewind • Scalability: Object Scope and Relevancy, Server Partitioning, Instancing, Prioritization and Frequency • Conclusion of Unit

4.	**Security & Real-World Engines**
	• Introduction of Unit • Packet Sniffing, Input Validation, Software Cheat Detection, • Securing the Server • Unreal Engine 4, Unity • Conclusion of Unit
5.	**Gamer Services & Cloud Hosting Dedicated Servers**
	• Introduction of Unit • Choosing a Gamer Service, Basic Setup, Lobbies and Matchmaking, • Networking, Player Statistics, Player Achievements, Leaderboards, Other Services • To Host or Not To Host, Tools of the Trade, Overview and Terminology • Local Server Process Manager, Virtual Machine Manager • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Multiplayer Game Programming	Josh Glazer, Sanjay Madhav	Third edition	Addison-Wesley Professional
2.	Game Engine Architecture	Jason Gregory	Third edition	Pearson
Reference Book				
1	Game Programming Algorithms and Techniques: A Platform-Agnostic Approach, Jason Gregory			
Online Resources				
1.	https://theswissbay.ch/pdf/Gentoomen%20Library/Game%20Development/Programming/Multiplayer%20Game%20Programming.pdf			
2.	https://medium.com/castle-archives/making-a-basic-multiplayer-game-b919bc48d17a			
3.	https://github.com/MultiplayerBook/MultiplayerBook			

BCEECE7115	Fundamental of Exchange Server	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Acquire the latest features in Exchange Server and learn how to make use of it.
- Learn how to install Exchange Server in a new environment and in a coexistence environment.
- Learn how to perform migrations from Exchange Server 2010/2013/2016/2019
- Expert techniques to manage mailboxes, groups, connectivity, and the client access.
- Server Troubleshoot common issues efficiently and effectively.
- Disaster Recover of Exchange Server .

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction**	08
2.	**Planning & Development**	07
3.	**Managing Exchange Server**	08
4.	**Backing Up and Restoring Exchange Server**	07
5.	**Troubleshooting Exchange Server**	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction**
	• Basics of Email System • Active Directory for Exchange Server • Domain Name System • Introduction to Microsoft Exchange Server • Architecture - Exchange Server 2010/2013/2016/2019 • Conclusion of Unit
2.	**Planning & Development**
	• Prerequisite of Exchange Server Deployment • Storage - Prerequisite for Exchange Server 2019 • Deploy First Exchange Server 2019 • Admin tools installation for Exchange Server 2019 • Activate Exchange Server & Review Installation logs • Rename and Move Mailbox Database • Create a User Mailbox in Exchange Server • Conclusion of Unit
3.	**Managing Exchange Server**
	• Introduction of Unit • Mail Transport Service - Introduction to Mail flow in Exchange Server, Receive Connector, DNS and Receive first email, Understand SMTP Commands & Create a custom receive connector, Accepted Domain, send Connector - send email from Exchange server • Client Access Service - Client Access Services Overview, Namespace Planning • Outlook on the Web - Connectivity for Outlook Clients, Connectivity for Non-Outlook Clients

	• Mobile Active Sync - Section Introduction, Exchange Active Sync, Mobile IOS and Android, Allow, Block, Wipe and Quarantine • Edge Transport Server - Introduction to Edge Transport server, Deploy Edge Transport Server, Edge Subscription • Conclusion of Unit
4.	**Backing Up and Restoring Exchange Server**
	• Introduction to Backing Up Exchange Server • Preparing to Back Up and Recover the Exchange Server • Using Windows Server Backup to Back Up the Exchange Server • Using Windows Server Backup to Recover the Data • Recover Exchange Server Data Using Alternative Methods • Recovering the Entire Exchange Server • Conclusion of Unit
5.	**Troubleshooting Exchange Server**
	• Basic Troubleshooting principles • Third edition Troubleshooting Mailbox Servers • Troubleshooting Mail Flow • Troubleshooting Client Connectivity • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Microsoft Exchange Server 2019 Administration Guide	Edward Van Biljon	Kindle Edition	BPB
2.	Mastering Microsoft Exchange Server 2016	Clifton Leonard, Brian Svidergot, Byron wright, Vladimir Meloski	Second Edition	Sybex
Reference Book				
1	Mastering Windows Server 2019 Jordan Krause Third Edition			
Online Resources				
1.	https://www.udemy.com/course/learn-microsoft-exchange-server-beginner-to-master/			
2.	https://books.google.co.in/books?id=Mastering Microsoft Exchange Server 2016			

Code: BULCHU7201 Leadership & Management Skills 1 Credit [LTP: 0-0-2]

Course Outcome: -

Students will be able to:

- Integrate their understanding into their leadership skills development process.
- Demonstrate knowledge of the working environment impacting business organizations and exhibit an understanding of ethical implications of decisions.
- Assess leadership styles and sharpen the managerial skills to communicate effectively and facilitate decision making in relation with self-management, stress management and conflict management.
- Generate a creative thinking, something beyond the obvious answers and solution to a specific problem.
- Understand the significance of trust and team skills, creating new innovative ideas with the help of brainstorming and learn work etiquettes.

A. LIST OF EXPERIMENTS:

1	Leadership Skills: Stages of development
2	Leadership Skills I: Attributes of great leaders, decision making, activities to enhance such qualities
3	Leadership Through Biographies
4	Entrepreneurial Skills: Traits & Competencies of an Entrepreneur
5	Managerial Skills: Conflict Management
6	Self-Management: Challenges & Solutions
7	Stress Management : Causes of stress and regulation
8	Creating Business Plans: Problem Identification and Idea Generation
9	Design Thinking: Transforming Challenges into Opportunities
10	Creative Thinking & Analytical Thinking: Presentation
11	Team building: Developing teams and team work
12	Confidence Building : Improving engagement, communicating effectively & activities to facilitate decision making

Code: BULCHU7202	Professional Skills-II	1 Credit [LTP: 0-0-2]

Course Outcome: -

Students will be able to:

- Learn how to update and manage the experience, education, and skills & expertise sections on social media & formulate appropriate updates as a means to promote business activities.
- Understand how to leverage grammar and formatting in formal documents & demonstrate how to follow the stages of the writing process (prewriting/writing/rewriting) and apply them to technical and workplace writing tasks.
- Evaluate presentation's weak spots and areas for improvement & learn, practice and acquire the skills necessary to deliver effective presentation with clarity and impact.
- Evaluate basic factors such as personal skills & abilities, career fields, willingness to learn and strengthen the chances to get desirable jobs.
- Understand negotiation and team skills dynamics and how to prepare for uncertainty & learn to craft agile strategy and be quick on your feet in changing circumstances.

A. LIST OF EXPERIMENTS:

1	Personal Branding : Its best practices
2	Professional Writing II: Abstract Writing, Statement of purpose and other formal documents
3	Expanding Professional Vocabulary
4	Resume Building-II: Revising & Updating
5	E-Learning & E-Content Development-II
6	Presentation Skills in Professional Setting
7	Job Interviews II: Preparation and Presentation for Mock Interviews
8	Advanced Group Discussion-II: Analysis of professional GD Videos and Practices on Topics/Video/Article based topics
9	Negotiation Skills & and Conflict Resolution-II
10	Change and Transition Management
11	Team Building Strategies: Project Management
12	Career Awareness & Productive Mindset

Code: BCECCE7601	Talent Enrichment Programme (TEP)-VII	1 Credit [LTP: 0-0-5]

COURSEOUTCOME:

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students through active participate on in various activities falling in Technical and non-technical categories.

Social outreach, Discipline, TEP -I, VAC & Extra Curricular activities shall be evaluated on the basis of its sub constituent programme, as a complete one credit course. It shall be counted in calculation of SGPA but it is not a back log subject. However, the attendance of these classes shall be recorded and accounted in the total attendance.

Activities included in this category in this Semester are as follows:

Code	Activity	Hours	Credits
BCECCE7601	Discipline, Value Added Courses & Social Outreach	**1**	1
	Talent Enrichment Programme (TEP)-VII	**2**	
	Library / MOOC / NSP	**2**	

VIII SEMESTER

Code: BCECCE8301	Major Project/Dissertation	11 Credits [LTP: 0-0-22]

A	Details

The students will undertake a project as part of their final semester. The students can do independent projects or can take up projects in groups of two or more depending on the complexity of the project. The maximum group size will be four and in case of team projects there should be a clear delineation of the responsibilities and work done by each project member. The projects must be approved by the mentor assigned to the student. The mentors will counsel the students for choosing the topic for the projects and together they will come up with the objectives and the process of the project. From there, the student takes over and works on the project.

If the student chooses to undertake an industry project, then the topic should be informed to the mentor, and the student should appear for intermediate valuations. Prior to undertaking this project the students undergo a bridge course.

Bridge Course:

The bridge course ensures that all the students have the correct prerequisite knowledge before their industry interface. The purpose of a bridge course is to prepare for a healthy interaction with industry and to meet their expectations. It would be difficult to establish standards without appropriate backgrounds and therefore to bridge this gap, students are put through a week mandatory classroom participation where faculty and other experts will give adequate inputs in application based subjects, IT and soft skills.

The Project:

Each student will be allotted a Faculty Guide and an Industry Guide during the internship/project work. Students need to maintain a Project Diary and update the project progress, work reports in the project diary. Every student must submit a detailed project report as per the provided template. In the case of team projects, a single copy of these items must be submitted but each team member will be required to submit an individual report detailing their own contribution to the project.

Each student/group should be allotted a supervisor and periodic internal review shall be conducted which is evaluated by panel of examiners.

Project Evaluation Guidelines:

The Project evaluator(s) verify and validate the information presented in the project report.

The break-up of marks would be as follows:

1. Internal Evaluation
2. External Assessment
3. Viva Voce

Internal Evaluation:

Internal Evaluator of project needs to evaluate Internal Project work based on the following criteria:

- Project Scope , Objectives and Deliverables
- Research Work, Understanding of concepts
- Output of Results and Proper Documentation
- Interim Reports and Presentations– Twice during the course of the project

External Evaluation:

The Project evaluator(s) perform the External Assessment based on the following criteria.

- Understanding of the Project Concept
- Delivery Skill
- The Final Project Report
- Originality and Novelty

The Final Project Report Details:

- The report should have an excel sheet that documents the work of every project member

Viva Voce

- Handling questions
- Clarity and Communication Skill

Marking Scheme:

1. **Internal Evaluation:** 35% of Total Marks
2. **External Evaluation:** 50% of Total Marks
3. **Viva Voce:** 15 % of Total Marks

For e.g., If the total mark for the project is 100, then

- Internal Evaluation = 35 marks
  The break-up of marks is shown below:-
- Interim Evaluation 1: 10 marks
- Interim Evaluation 2: 10 marks
- Understanding of concepts: 5 marks
- Programming technique: 5 marks
- Execution of code : 5 marks
- External Evaluation = 50 marks

The break-up of marks is shown below:-

- Project Report: 15 marks
- Explanation of project working: 10 marks
- Execution of code: 10 marks – (if done in industry, a stand-alone module can be reprogrammed and submitted. Error rectification etc. can be included by the evaluator)
- Participation in coding: 15 marks
- Viva Voce = 15 marks

The break-up of marks is shown below: -

- Questions related to project: 10 marks
- Questions related to technology: 5 marks

The Project evaluator(s) verifies and validates the information presented in the project report

Code: BCECCE8601	Talent Enrichment Programme (TEP)-VIII	1 Credit [LTP: 0-0-11]

COURSEOUTCOME:

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students through active participate on in various activities falling in Technical and non-technical categories.

Social outreach, Discipline, TEP -I, VAC & Extra Curricular activities shall be evaluated on the basis of its sub constituent programme, as a complete one credit course. It shall be counted in calculation of SGPA but it is not a back log subject. However, the attendance of these classes shall be recorded and accounted in the total attendance.

Activities included in this category in this Semester are as follows:

Code	Activity	Hours	Credits
BCECCE8601	Discipline, Value Added Courses & Social Outreach	**1**	1
	Talent Enrichment Programme (TEP)-VIII	**2**	
	Library / MOOC / NSP	**2**	

********** HAPPY LEARNING **********