ARKA JAIN University
Jharkhand

Syllabus of

Bachelor of Technology in Computer Science & Engineering

Semester-I-II-III-IV-V-VI-VII-VIII

for Batch (2020-24)

Table of Content

Sl. No	Content	Page No
1	Syllabus – Semester I	3-46
2	Syllabus – Semester II	47-87
3	Syllabus – Semester III	88-143
4	Syllabus – Semester IV	144-188
5	Syllabus – Semester V	189-236
6	Syllabus – Semester VI	237-295
7	Syllabus – Semester VII	296-349
8	Syllabus – Semester VIII	350-391

ARKA JAIN University Jharkhand

Syllabus of

B.Tech. in Computer Science & Engineering

Semester-I

ARKAJAIN University, Jharkhand
School of Engineering & IT
Department of Engineering
Faculty – Bachelor of Technology in Computer Science Engineering
Scheme of Study (w.e.f Batch 2020-21)

SEMESTER –I

Sr. No.	Name of the Subject	Group	L-T-P	Credit
1	Engineering Mathematics–I	A & B	3-1-0	4
2	Engineering Chemistry	A	3-0-0	3
	Programming for Problem Solving	B	3-0-0	3
3	Basic Electrical Engineering	A	3-1-0	4
	Engineering physics	B	3-1-0	4
4	Engineering Mechanics	A	3-0-0	3
	English for Communication	B	3-0-0	3
5	Constitution of India	B	0-0-0	0
	Practical			
6	Engineering Chemistry Lab	A	0-0-1	1
	Engineering Physics Lab	B	0-0-1	1
7	Basic Electrical Engineering Lab	A	0-0-1	1
	Programming for Problem Solving Lab	B	0-0-2	2
8	Engineering Mechanics Lab	A	0-0-1	1
9	Engineering Graphics & Design	A	0-0-2	2
	Workshop Practices	B	0-0-2	2
	TOTAL	A or B	12-2-5	19

SEMESTER –II

Sr. No.	Name of the Subject	Group	L-T-P	Credit
1	Engineering Mathematics–II	A & B	3-1-0	4
2	Engineering Chemistry	B	3-0-0	3
	Programming for Problem Solving	A	3-0-0	3
3	Basic Electrical Engineering	B	3-1-0	4
	Engineering physics	A	3-1-0	4
4	Engineering Mechanics	B	3-0-0	3
	English for Communication	A	3-0-0	3
5	Constitution of India	A	0-0-0	0
	Practical			
6	Engineering Chemistry Lab	B	0-0-1	1
	Engineering Physics Lab	A	0-0-1	1
7	Basic Electrical Engineering Lab	B	0-0-1	1
	Programming for Problem Solving Lab	A	0-0-2	2
8	Engineering Mechanics Lab	B	0-0-1	1
	Engineering Graphics& Design	B	0-0-2	2
9	Workshop Practices	A	0-0-2	2
	TOTAL	A or B	12-2-5	19

SEMESTER –I (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering Chemistry	BSC	3	3	100	70	20	5	5
2	Engineering Mathematics–I	BSC	4	4	100	70	20	5	5
3	Basic Electrical Engineering	ESC	4	4	100	70	20	5	5
4	Engineering Mechanics	ESC	3	3	100	70	20	5	5
	Practical								
5	Engineering Chemistry Lab	BSC	1	2	50	35	5	5	5
6	Basic Electrical Engineering Lab	ESC	1	2	50	35	5	5	5
7	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
8	Engineering Graphics & Design	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**24**	**600**	**420**	**100**	**40**	**40**

SEMESTER I (Group-B)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering physics	BSC	4	4	100	70	20	5	5
2	Engineering Mathematics –I	BSC	4	4	100	70	20	5	5
3	Programming for Problem Solving	ESC	3	3	100	70	20	5	5
4	English for Communication	HSMC	3	3	100	70	20	5	5
5	Constitution of India	MC	0	2	50	35	10	2.5	2.5
	Practical								
6	Engineering physics Lab	BSC	1	2	50	35	5	5	5
7	Programming for Problem Solving Lab	ESC	2	4	50	35	5	5	5
8	Workshop Practices	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**26**	**600**	**420**	**105**	**37.5**	**37.5**

SEMESTER II (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering physics	BSC	4	4	100	70	20	5	5
2	Engineering Mathematics –II	BSC	4	4	100	70	20	5	5
3	Programming for Problem Solving	ESC	3	3	100	70	20	5	5
4	English for Communication	HSMC	3	3	100	70	20	5	5
5	Constitution of India	MC	0	2	50	35	10	2.5	2.5
	Practical								
6	Engineering physics Lab	BSC	1	2	50	35	5	5	5
7	Programming for Problem Solving Lab	ESC	2	4	50	35	5	5	5
8	Workshop Practices	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**26**	**600**	**420**	**105**	**37.5**	**37.5**

SEMESTER –II (Group-B)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering Chemistry	BSC	3	3	100	70	20	5	5
2	Engineering Mathematics–II	BSC	4	4	100	70	20	5	5
3	Basic Electrical Engineering	ESC	4	4	100	70	20	5	5
4	Engineering Mechanics	ESC	3	3	100	70	20	5	5
	Practical								
5	Engineering Chemistry Lab	BSC	1	2	50	35	5	5	5
6	Basic Electrical Engineering Lab	ESC	1	2	50	35	5	5	5
7	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
8	Engineering Graphics & Design	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**24**	**600**	**420**	**100**	**40**	**40**

SEMESTER-III

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Analog Electronic Circuits	PCC	3	3	100	70	20	5	5
2	Data structure	PCC	3	3	100	70	20	5	5
3	Digital Electronics	PCC	3	3	100	70	20	5	5
4	Engineering Mathematics -III	BSC	4	3	100	70	20	5	5
5	Humanities-I Professional Practice, Law & Ethics Organizational Behavior	HSMC	3	3	100	70	20	5	5
6	Environmental Science	MC	0	2	50	35	10	2.5	2.5
7	Python Programming	PCC	3	3	100	70	20	5	5
	PRACTICAL								
8	Analog Electronic Circuits Lab	PCC	2	4	50	35	5	5	5
9	Data structure Lab	PCC	2	4	50	35	5	5	5
10	Digital Electronics Lab	PCC	2	4	50	35	5	5	5
11	IT Workshop(MAT LAB)	PCC	1	2	50	35	5	5	5
12	Python Programming Lab	PCC	2	4	50	35	5	5	5
	TOTAL		28	38	900	640	155	57.5	57.5

SEMESTER-IV

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Discrete Mathematics	BSC	4	4	100	70	20	5	5
2	Computer Organization & Architecture	PCC	3	3	100	70	20	5	5
3	Operating Systems	PCC	3	3	100	70	20	5	5
4	Design & Analysis of Algorithms	PCC	3	3	100	70	20	5	5
5	Microprocessor & Microcontroller	PCC	3	3	100	70	20	5	5
6	Software Engineering	PCC	3	3	100	70	20	5	5
	PRACTICAL								
6	Operating Systems Lab	PCC	2	4	50	35	5	5	5
7	Design & Analysis of Algorithms Lab	PCC	2	4	50	35	5	5	5
8	Computer Organization & Architecture Lab	PCC	2	4	50	35	5	5	5
	TOTAL		25	31	750	525	135	45	45

SEMESTER V

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory / Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Signals & Systems	PCC	3	3	100	70	20	5	5
2	Database Management Systems	PCC	3	3	100	70	20	5	5
3	Formal Language &Automata Theory	PCC	3	3	100	70	20	5	5
4	Object Oriented Programming	PCC	3	3	100	70	20	5	5
5	Humanities-II Soft Skills and Interpersonal Communication	HSMC	3	3	100	70	20	5	5
6	Elective-1 Graph Theory ImageProcessing Advanced Algorithms	PEC	3	3	100	70	20	5	5
	PRACTICAL								
7	Database Management Systems Lab	PCC	2	4	50	35	5	5	5
8	Object Oriented Programming Lab	PCC	2	4	50	35	5	5	5
9	Summer Internship-I (3-4 Weeks)	PCC	1	0	50	50	0	0	0
	TOTAL		23	26	750	540	130	40	40

SEMESTER VI

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Compiler Design	PCC	3	3	100	70	20	5	5
2	Computer Networks	PCC	3	3	100	70	20	5	5
3	Advance Java Programming	PCC	3	3	100	70	20	5	5
4	Elective-II Artificial Intelligence Machine Learning Visual Programming	PEC	3	3	100	70	20	5	5
5	Elective-III Web Technology Neural Networks and Deep Learning	PEC	3	3	100	70	20	5	5
6	Open Elective –I Cyber Law and Ethics Human Resource Development and Organizational Behavior Advanced Algorithms	HSMC	3	3	100	70	20	5	5
	Practical								
7	Compiler Design Lab	PCC	2	4	50	35	5	5	5
8	Computer Networks Lab	PCC	2	4	50	35	5	5	5
9	Advance Java Programming Lab	PCC	2	4	50	35	5	5	5
	TOTAL		24	30	750	525	135	45	4

SEMESTER VII

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Elective-IV Cryptography & Network Security Advanced Operating Systems Web and Internet	PEC	3	3	100	70	20	5	5
2	Elective-V Quantum Computing Optimization Techniques Real Time Systems	PEC	3	3	100	70	20	5	5
3	Open Elective-II Electronic Design Automation Computer Graphics Data mining and warehousing Semantic Web and Social Networks	OEC	3	3	100	70	20	5	5
4	Biology For Engineers	BSC	3	3	100	70	20	5	5
5	Data Analytics	PCC	3	3	100	70	20	5	5
	Practical								
5	Minor Project	PROJ	4	8	100	100	0	0	0
6	Industrial Training (Summer Internship-4-6 Week)	PROJ	4	0	100	100	0	0	0
	TOTAL		23	23	700	550	100	25	25

SEMESTER VIII

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Elective-VI CloudComputing Data Mining AdvancedComputerArchitecture	PEC	3	3	100	70	20	5	5
2	Open Elective-III Signals and systems Advanced Operating Systems	OEC	3	3	100	70	20	5	5
3	Open Elective-IV Cyber security Soft Computing	OEC	3	3	100	70	20	5	5
4	VLSI System Design	PCC	3	3	100	70	20	5	5
	PRACTICAL								
5	Major Project	PROJ	6	12	100	0	0	0	0
6	Extra- Curricular/ Co-Curricular Activity	PROJ	0	0	100	70	30	0	0
	Total		18	24	600	35	110	20	20

Distribution of Credit across 8 semesters:

Sl. No	Type of Paper	No. of Paper	Total Credit
1	Humanities and Social Sciences including Management courses **(HSMC)**	5	15
2	Basic Science courses**(BSC)**	9	28
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc**(ESC)**	8	18
4	Professional core courses (**PCC)**	30	77
5	Professional Elective courses relevant to chosen specialization/branch**(PEC)**	5	15
6	Open subjects – Electives from other technical and /or emerging subjects (**OEC)**	3	9
7	Project work, seminar and internship in industry or elsewhere**(PROJ)**	5	14
8	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Knowledge Tradition]**(MC)**	2	0
	Total	66	176

CIA – Continuous Internal Assessment – Based on Projects / Assignment during the semester

Note:
AICTE Activity Points to be earned by students admitted to Degree program (For more details refer to Chapter 6, AICTE, Activity Point Program, Model Internship Guidelines):
Every regular student, who is admitted to the 4-year Degree program, is required to earn 100 activity points in addition to the total credits earned for the program. Students entering 4 years Degree Program through lateral entry are required to earn 75 activity points in addition to the total credits earned for the program. The activity points earned by the student shall be reflected on the students 8th Semester grade card.
The activities to earn the points can be spread over the duration of the course. However, minimum prescribed duration should be fulfilled.
Activity Points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression.
Incase student fail to earn the prescribed activity points;eight semester Grade Card shall be issued only after earning the required activity Points.
Students shall be eligible for the award of degree only after the release of the Eight Semester grade card.

There are two groups (A & B) in semester 1 & 2. The Group division will be decided by The Dean SoE & IT before commencement of classes

ARKAJAIN University, Jharkhand
School of Engineering & IT
Department of Engineering
Faculty – Bachelor of Technology in Computer Science Engineering
PROGRAM OUTCOMES &PROGRAM SPECIFIC OUTCOMES

PROGRAM OUTCOMES

After completing this undergraduate program, a learner:

[PO.1]. Engineering knowledge: An ability to apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to get the solution of the engineering problems.

[PO.2]. Problem analysis: Ability to Identify, formulates, review research literature, and analyze complex engineering problems.

[PO.3]. Design/Development of Solutions: Ability to design solutions for complex Engineering Problems by considering social, Economic and Environmental aspects.

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge to design, conduct analyze experiments to get valid conclusion**.**

[PO.5]. Modern tool usage: ability to create, select, and apply appropriate techniques, and to model complex engineering activities with an understanding of the limitations.

[PO.6]. The engineer and society: Ability to apply knowledge by considering social health, safety, legal and cultural issues.

[PO.7]. Environment and sustainability: Understanding of the impact of the adopted engineering solutions in social and environmental contexts.

[PO.8]. Ethics: Understanding of the ethical issues of the civil engineering and applying ethical principles in engineering practices.

[PO.9]. Individual and teamwork: Ability to work effectively as an individual or in team, as a member or as a leader.

[PO.10]. Communication: An ability to communicate clearly and effectively through different modes of communication.

[PO.11]. Project management and finance: Ability to handle project and to manage finance related issue.

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning.

PROGRAM SPECIFIC OUTCOMES

[PSO.1]. Understand the principles, architecture and organization of computers, embedded systems and computer networks.

[PSO.2]. Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems that include both hardware and software.

[PSO.3]. Apply software design and development practices to develop software applications in emerging areas such as IoT, Data Analytics, Social Networks, Cloud and High Performance Computing.

[PSO.4]. Demonstrate&communicate Ability to demonstrate the knowledge, skill to analyze the cause and effect on Computer Science Engineering.

PROGRAM ARTICULATION MATRIX

SEM	COURSE CODE	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
		PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES															
I	Engineering Chemistry-BTE-22011	1		1		1	1						1		1		
	Engineering Mathematics–I –BTE-21001	2			1		1					1	1	1		1	
	Basic Electrical Engineering-BTE21003	1	1	1	1	1		1	1	1	1				1	1	
	Engineering Mechanics-BTE22009	1		1				1					1				1
	Engineering Chemistry Lab-BTE22015	1			1	1											1
	Basic Electrical Engineering Lab-BTE21005	1	1	1	1		1	1	1	1		1	1	1	1	1	1
	Engineering Mechanics Lab-BTE22013	1		1				1					1				1
	Engineering Graphics & Design-BTE21004	1				1				1		1		1	1		1
II	Engineering Physics-BTE22010	1	2	2	2	1					1		2		1		1
	Engineering Mathematics –II-BTE22008		2	1	1	2			2							1	1
	Programming for Problem Solving-BTE212159	1	1		1			1									
	English for Communication-BTE22370	1	1	1			1				2		1				1
	Constitution of India-BTE25095																
	Engineering physics Lab-BTE2014			2	2	1		1							1	1	1
	Programming for Problem Solving Lab-BTE21262																
	Workshop Practices-BTE21007	1	1	1	1		1						1				
III	Analog Electronic Circuits-BTE23027			1	1	1				1			1				
	Data structure-BTE23028	1	1	1	1		1	1		1							
	Digital Electronics-BTE23029	1		1		1					1					1	
	Engineering Mathematics -III -BTE23046	2	2	2													
	Humanities-I Professional Practice, Law & Ethics-BTE25373		1	1		1							1			1	1
	Organizational Behavior-BTE24060																
	Environmental Science-BTE24085		3					2									
	Python Programming-BTE23391	3	3	2	3	1							3				2
	Analog Electronic Circuits Lab-BTE23033	1	2														

	Data structure Lab-BTE23034	1	2	2		2											
	Digital Electronics Lab-BTE23035		1	2	2												
	Python Programming Lab-BTE23392	2	2		2										1	1	
	IT Workshop(MATLAB)-BTE23271	3	2	3	3	3									1	1	
IV	Discrete Mathematics-BTE24065	1	2	2	2												
	Computer Organization & Architecture-BTE24066	1	1	2	1			1						2	1		
	Operating Systems-BTE24067	2	3	2	3	1									2	32	
	Design & Analysis of Algorithms-BTE24068	1	1	1	1										1		
	Microprocessor & Microcontroller-BTE24393	2	3	3	2									2	3		
	Software Engineering-BTE24394	3	3	3	3	2		2					3			3	2
	Operating Systems Lab-BTE24070	1	2	2													
	Design & Analysis of Algorithms Lab-BTE24071		2	2		1								1	1		
	Computer Organization & Architecture Lab-BTE24279		2	1	1	1								2			
V	Signals & Systems-BTE25112	1	1														
	Database Management Systems-BTE25101	1	2	2		1									2		
	Formal Language &Automata Theory-BTE25102		1	2													
	Object Oriented Programming-BTE23030		1	1		1								3			
	Humanities-II Soft Skills and Interpersonal Communication-BTE25378				1	2	3	1	3	3	3	2	3		1	3	3
	Elective-1 Graph Theory-BTE26148	1	2		2										2		
	ImageProcessing-BTE27332	1	2		2										2		
	AdvancedAlgorithms-BTE26147		1												3	1	
	Database Management Systems Lab-BTE25108		1	1		1									2		
	Object Oriented Programming Lab-BTE23036	2		1		1											
	Internship / Industrial Training/Vocational Training (3-4 week)-BTE27324																
	Compiler Design-BTE26137		1	2									1				

	Computer Networks-BTE26138	1	2	2													
	Advance Java Programming-BTE26144			3	1	2		1									
	Elective-II Artificial Intelligence-BTE26139	2	1	2													
	Machine Learning-BTE26140	2	1	2													
	Visual Programming-BTE26141	3	3	2	3	1							3				2
	Elective-III Web Technology-BTE26142			2		1											
VI	Neural Networks and Deep Learning-BTE26144		3	2											2		
	Open Elective-I Cyber Law and Ethics-BTE26145	3	3		2	2	3	3		2				3	1		
	Human Resource Development and Organizational Behavior-BTE26387							1	1	1					3	1	
	Advanced Algorithms-BTE26147	3	3	3	3										3	1	
	Compiler Design Lab-BTE26150			1		2							2				
	Computer Networks Lab-BTE26151	2		3										3			
	Advance Java Programming Lab-BTE26395	3	2	3	3	3										2	
VII	Elective-IV																
	Cryptography & Network Security-BTE27182	3	2		1												
	Advanced Operating Systems-BTE27334	2	3	3	2												
	Web and Internet-BTE27335			2	2	2											
	Elective-V																
	QuantumComputing-BTE27336	2	1		2												
	Optimization Techniques-BTE27337	2			2	2											
	Real Time Systems-BTE27186	2	2											1	1	3	2
	Data Analytics-BTE27396	3	3	2	3	2											
	Open Elective-II	2	1		2	2											
	Data mining and warehousing-BTE27339	2	2	3	1												
	Computer Graphics-BTE27192	1	2		1												
	Electronic Design Automation-BTE27193	2	2	3	1	2									1		1

	Semantic Web and Social NetworksBTE26397	3	2			3	1							1		2	1
	Biology For Engineers-BTE23018	3	2	1	1						2	1	1	3	2	1	1
	Minor project-BTE27217																
	Industrial Training (Summer Internship 4-6 week)-BTE27349	2	2	3	1												
VIII	Elective-VI																
	Cloud Computing-BTE27194	1	2		1												
	Data Mining-BTE25105	2	2	3	1												
	AdvancedComputerArchitecture-BTE27190	1	2	1										3	3	2	
	Open Elective-III	3	1	2													
	Signals and systems-BTE25112	2	2	1	3	1								3	3	2	
	VLSI SystemDesign-BTE28339	3	1	2													
	Open Elective-IV																
	Cyber security-BTE28234	2	2														
	Soft Computing-BTE28236	1	2	2													
	Advanced Operating System-BTE27334	2	3	3	3	2											
	Major Project-BTE28297																
	Extra- Curricular/ Co-Curricular Activity-BTE28390																
AVERAGE																	

Subject: Engineering Chemistry

Code: BTE22011

3 Credits | Semester 1

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

Following are the objectives of this course:

- To understand the Concepts of chemical bonding.
- To know the importance of the Periodic Table of the Elements, how it came to be, and its role in organizing chemical information.
- To learn about the basic concepts of Spectroscopy.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Understand the skills required to succeed in graduate school, the chemical industry or professional school.

[CO2] Acquire a foundation of chemistry of sufficient breadth and depthto enable them to understand and critically interpret the primary chemical literature.

[CO3] Recognize the exigency and importance of engineering chemistry in the use of industrial and domestic determination.

[CO4] Design economically and new methods of synthesis of new materials and apply their knowledge for protection of environment and application in their field.

[CO5] Understand an insight into latest (R&D oriented) topics, to enable the engineering student upgrade the existing technologies and pursue further research.

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

ATOMIC AND MOLECULAR STRUCTURE: Molecular orbital of diatomic molecules and plots of the multi-centre orbital. Equations for atomic and molecular orbitals. Energy level diagrams of diatomic. Pi-molecular orbital of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Numerical based on Crystal field stabilization energy. Band structure of solids

SPECTROSCOPIC TECHNIQUES AND APPLICATIONS: Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibration and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterization techniques. Diffraction and scattering

USE OF FREE ENERGY IN CHEMICAL EQUILIBRIA: Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Cell potentials, the Nernst equation and applications, Relation of free energy with EMF. Acid base, oxidation reduction and solubility equilibrium. Corrosion, Types of corrosion, galvanic series, Cathodic and anodic reactions, corrosion prevention methods.

PERIODIC PROPERTIES: Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electro negativity, polarizability, oxidation states, coordination numbers and geometries. Hard soft acids and bases (Classification, pearsons HSAB principle, its application and limitation), molecular geometries (VSEPR theory to NH3, H3O+, SF4, CLF3, ICl2and H2O)

INDUSTRIAL CHEMISTRY: Polymers: types of polymers, polymerization, applications, and important synthetic polymers. Ceramics material: Classification and Applications, Water treatment, Air pollution and Control techniques.

E. TEXT BOOKS

T1. A textbook of Engg. Chemistry-ShashiChawla
T2. Engineering Chemistry by Wiley
T3. Physical Chemistry by Atkins
T4. Engineering chemistry by P.C. Jain (Dhantpat Rai Publishing company)
T5. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
T6. Fundamentals of Molecular Spectroscopy, by C. N. Banwell

F. REFERENCE BOOKS

R1. Environmental Engg. - Keiley
R2. Selected topics in inorganic chemistry-MMT
R3. I. A Levine, Physical chemistry, McGraw Hill
R4. Organic chemistry by clayden.
R5.Essentials of Physical chemistry, Bahl& Tuli, S. Chand Publishing.
R6. Inorganic Chemistry by J D Lee.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[CO1]	Understand the skills required to succeed in graduate school, the chemical industry or professional school.	2				1											
[CO2]	Acquire a foundation of chemistry of sufficient breadth and depthto enable them to understand and critically interpret the primary chemical literature.		2					1							1		
[CO3]	Recognize the exigency and importance of engineering chemistry in the use of industrial and domestic determination.			2			1								1		
[CO4]	Design economically and new methods of synthesis of new materials and apply their knowledge for protection of environment and application in their field.					2							1				1
[CO5]	Understand an insight into latest (R&D oriented) topics, to enable the engineering student upgrade the existing technologies and pursue further research.				2							1				1	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Engineering Mathematics–I

Code: BTE21001

Credit - 4 | Semester 1

Total Lecture: 60 Total Tutorial: 12

A. Introduction:

- To familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level
- Serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Remember the differential and integral calculus to notions of curvature and to improper integrals. Apart from some other applications, they will have a basic Understand of Beta and Gamma functions.

[CO2] Understand the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.

[CO3] Demonstrate the tool of power series and Fourier series for learning advanced Engineering Mathematics.

[CO4] Analyze functions of several variables that is essential in most branches of engineering

[CO5] Evaluate the essential tool of matrices and linear algebra in a comprehensive manner.

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

CALCULUS: Evolutes and involutes, Evaluation of definite and improper integrals, Beta and Gamma functions and their properties Application of definite integral, Curve tracing, area, evaluate surface areas and volumes of revolutions

CALCULUS: Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin's theorems with remainders, Indeterminate forms and Hospitals rule, Maxima and minima

SEQUENCE AND SERIES: Convergence of sequence and series, tests for convergence, Power series, Taylors series, series for exponential, trigonometric and logarithmfunctions,2 Fourier series: Half range sine and cosine series, Parseval's theorem

MULTIVARIABLE CALCULUS (DIFFERENTIATION): Limit, continuity and partial derivatives, directional derivatives, total derivative, Tangent plane and normal line; Maxima, minima and saddle points, Method of Lagrange multipliers; Gradient, curl and divergence

MATRICES: Symmetric, skew- symmetric and orthogonal matrices, ,complex matrix, hermitian, skew hermitian matrix, Inverse and rank of a matrix, rank-nullity theorem; System of linear equations, Eigen values and Eigen vectors; Diagonalization of matrices, Cayley-Hamilton Theorem, and Orthogonal transformation

E. TEXT BOOKS

T1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint,2002

T2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006

F. REFERENCE BOOKS

R1. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008

R2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[CO1]	Remember the differential and integral calculus to notions of curvature and to improper integrals. Apart from some other applications, they will have a basic Understand of Beta and Gamma functions.	1										1					1
[CO2]	Understand the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.		2			1											1
[CO3]	Demonstrate the tool of power series and Fourier series for learning advanced Engineering Mathematics.			2				1								1	
[CO4]	Analyze functions of several variables that is essential in most branches of engineering								2				1				
[CO5]	Evaluate the essential tool of matrices and linear algebra in a comprehensive manner.				1							1		1			

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Basic Electrical Engineering

Code: BTE21003

Credits- 4 | Semester 1

Total Lecture: 60 Total Tutorial: 12

A. Introduction:

- To Enhancement in understanding the basic concepts of Core Electrical Engineering subjects. The topics covered under this subject will help
- To enhance the basic understanding of Electrical machines and power systems and basic electronics through the topic covered under this Subject

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Understand the basic knowledge of electrical quantities such as current, voltage, power, energy and frequency

[CO2] Predict the behavior of any electrical and magnetic circuits.

[CO3] Formulate and solve complex AC, DC circuits.

[CO4] Identify the type of electrical machine used for that particular application.

[CO5] Realize the requirement of transformers in transmission and distribution of electric power and other applications.

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

A. SYLLABUS

D.C. CIRCUITS: Electrical circuit elements (R, L and C), voltage and current sources, dependent and independent sources, Units and dimensions, Source Conversion, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin' s theorem and their application for analysis of series and parallel resistive circuits excited by independent voltage sources, Power & Energy in such circuits. Mesh & nodal analysis, Star Delta transformation & circuits and Norton theorems. Time- domain analysis of first-order RL and RC circuits.

A.C. CIRCUITS : Representation and Generation of sinusoidal AC voltage, definition of average value, R.M.S. value, form factor and peak factor of AC quantity , Concept of phasor, Concept of Power factor, Concept of impedance and admittance, Active, reactive and apparent power, Analysis of single-phase ac circuits consisting of R, L, C R-L, R-C, R-L-C series &parallel circuit Resonance Necessity and advantages of three phase systems, Meaning of Phase sequence, balanced and unbalanced supply and loads. Relationship between line and phase values for balanced star and delta connections. Power in balanced & unbalanced three-phase system and their measurements

TRANSFORMERS: Types of Magnetic Material, BH characteristics (magnetization characteristics) of Ferro magnetic materials, self - inductance and mutual inductance, energy in linear magnetic systems, AC excitation in magnetic circuits, magnetic field produced by current carrying conductor, Force on a current carrying conductor. Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency Auto-transformer and three-phase transformer connections

ELECTRICAL MACHINES: Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators

POWER CONVERTERS &ELECTRICAL INSTALLATIONS: DC-DC buck and boost converters, duty ratio control Single-phase and three-phase voltage source inverters; sinusoidal modulation Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup

E. TEXT BOOKS

T1. B.L. Theraja & A.K Theraja, Electrical Technology Volume-I, S. Chand & Co
T2.V.N. Mittle, Basic Electrical Engineering, Tata McGraw Hill
T3. S.N. SinghBasic Electrical Engineering , P.H.I
T4. Rajendra Prasad, Fundamentals of Electrical Engineering, Prentice Hall
T5.C.L. WadhwaBasic Electrical Engineering, New Age International
T6.Ram, H. D.; Chauhan, A. K., Foundations and Applications of Applied Mechanics, Cambridge University Press.
T7.Meriam, J. L., Kraige, L.G., Engineering Mechanics- Statics, Vol. I, Wiley Publication, New Delhi.

F. REFERENCE BOOKS

R1. L.S. Bobrow, Fundamentals of Electrical Engineering, Oxford University Press
R2. E. Hughes, Electrical and Electronics Technology, Pearson

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Understand the basic knowledge of electrical quantities such as current, voltage, power, energy and frequency	**2**	**1**														
[CO2]	Predict the behavior of any electrical and magnetic circuits.			**2**	**3**										**1**		
[CO3]	Formulate and solve complex AC, DC circuits.					**2**		**2**								**1**	
[CO4]	Identify the type of electrical machine used for that particular application.						**2**		**1**								
[CO5]	Realize the requirement of transformers in transmission and distribution of electric power and other applications.									**1**	**2**						

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Engineering Mechanics

Code: BTE22009

Credits- 3 | Semester I

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To obtain resultant of various forces
- To obtain resultant of various forces
- To understand role of friction in equilibrium problems
- To know fundamental laws of machines and their applications to various engineering problems

B. Course Outcomes: At the end of the course, students will be able

[CO1] Identify the force systems for given conditions by applying the basics of mechanics.

[CO2] Determine unknown force(s) of different engineering systems.

[CO3] Apply the principles of friction in various conditions for useful purposes.

[CO4] Find the centroid and center of gravity of various components in engineering systems.

[CO5] Select the relevant simple lifting machine(s) for given purposes.

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

BASICS OF MECHANICS AND FORCE SYSTEM: Basic concepts, Applied mechanics, Statics, Dynamics. Space, time, mass, particle, flexible body and rigid body. Scalar and vector quantity, Units of measurement (SI units) - Fundamental units and derived units. Force – unit, representation as a vector and by Bow's notation, characteristics and effects of a force, Principle of transmissibility of force, Force system and its classification. Resolution of a force - Orthogonal components of a force, moment of a force, Varignon's Theorem. Composition of forces – Resultant, analytical method for determination of resultant for concurrent, non-concurrent and parallel co-planar force systems – Law of triangle, parallelogram and polygon of forces.

EQUILIBRIUM: Equilibrium and Equilibrant, Free body and Free body diagram, Analytical and graphical methods of analyzing equilibrium**,** Lami's Theorem – statement and explanation, Application for various engineering problems. Types of beams, supports (simple, hinged, roller and fixed) and loads acting on beam (vertical and inclined point load, uniformly distributed load, couple), Beam reaction for cantilever, simply supported beam with or without overhang –subjected to combination of Point load and uniformly distributed load, Beam reaction graphically for simply supported beam subjected to vertical point loads only

FRICTION & VIRTUAL WORK: Friction and its relevance in engineering, types and laws of friction, limiting equilibrium, limiting friction, co-efficient of friction, angle of friction, angle of repose, relation between co-efficient of friction and angle of friction. Introduction, laws of coulomb friction, simple contact friction problems, belt friction, the square crew thread rolling resistance, Equilibrium of bodies on level surface subjected to force parallel and inclined to plane. Equilibrium of bodies on inclined plane subjected to force parallel to the plane only. Work of a force, Principle of Virtual work and its application.

CENTROID AND CENTRE OF GRAVITY& TRUSS: Centroid of geometrical plane figures (square, rectangle, triangle, circle, semi-circle, quarter circle), Centroid of composite figures composed of not more than three geometrical figures, Centre of Gravity of simple solids (Cube, cuboid, cone, cylinder, sphere, hemisphere) Centre of Gravity of composite solids composed of not more than two simple solids. The structural model, simple trusses, analysis of simple trusses: method of joints, Method of sections, graphical method.

SIMPLE LIFTING MACHINE: Simple lifting machine, load, effort, mechanical advantage, applications and advantages. Velocity ratio, efficiency of machines, law of machine. Ideal machine, friction in machine, maximum Mechanical advantage and efficiency, reversible and non-reversible machines, conditions for reversibility, Velocity ratios of Simple axle and wheel, Differential axle and wheel, Worm and worm wheel, Single purchase and double purchase crab winch, Simple screw jack, Weston's differential pulley block, geared pulley block.

E. TEXT BOOKS

T1.D.S. Bedi, Engineering Mechanics, Khanna Publications, New Delhi (2008)
T2.Khurmi, R.S., Applied Mechanics, S. Chand & Co. New Delhi.
T3.Bansal R K, A text book of Engineering Mechanics, Laxmi Publications.
T4.Ramamrutham, Engineering Mechanics, S. Chand & Co. New Delhi.

F. REFERENCE BOOKS

R1.Dhade, Jamadar &Walawelkar, Fundamental of Applied Mechanics, Pune VidhyarthiGruh.
R2. Ram, H. D.; Chauhan, A. K., Foundations and Applications of Applied Mechanics, CambridgeUniversity Press.

R3. Meriam, J. L., Kraige, L.G., Engineering Mechanics- Statics, Vol. I, Wiley Publication, New Delhi.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Identify the force systems for given conditions by applying the basics of mechanics.	**3**	**3**										**3**				**2**
[CO2]	Determine unknown force(s) of different engineering systems.		**3**										**3**				**3**
[CO3]	Apply the principles of friction in various conditions for useful purposes.		**3**										**3**				**1**
[CO4]	Find the centroid and center of gravity of various components in engineering systems.	**3**			**3**												**2**
[CO5]	Select the relevant simple lifting machine(s) for given purposes.	**3**											**3**				

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Engineering Chemistry Lab

Code: BTE22015

Credits- 1 | Semester I

Total Lecture: 30

A. Introduction:

- To expose the students to a breadth of experimental techniques using modern instrumentation.
- The student will learn the laboratory skills needed to design, safely conduct and interpret chemical research.

B. Course Outcomes: At the end of the course, students will be able

[CO1] Understand the principles of chemistry relevant to the study of science and engineering

[CO2] Estimate rate constants of reactions from concentration of reactants/products as a function of time

[CO3] Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc.

[CO4] Differentiate hard and soft water, solve the related numerical problems on water purification and its significance in industry and daily life.

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	5
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	35
Total		50
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

S.No.	**Name of Experiments**
1	To determine the viscosity and relative viscosity of given sample by using Ostwald's Viscometer.
2	To prepare buffer solution and standardization of pH meter.

3	Determination of chloride content of water.
4	Determination of cell constant and conductance of solutions.
5	Determination of the amount of iron in an iron ore solution by $KMnO_4$
6	To determine adsorption isotherm of acetic acid by activated charcoal
7	To determine alkalinity of a given water sample.
8	To synthesis a polymer/drug.

E. TEXT BOOKS

T1. Practical Chemistry by S.S. Dara

T2.Practical Chemistry by D N Bajpai – S. Chand Publishing

F. REFERENCE BOOKS

R1.Advanced Practical Chemistry Book by pragatiprakashan

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Understand the principles of chemistry relevant to the study of science and engineering	2													1		
[CO2]	Estimate rate constants of reactions from concentration of reactants/products as a function of time				2											1	
[CO3]	Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc.		2														
[CO4]	Differentiate hard and soft water, solve the related numerical problems on water purification and its significance in industry and daily life.					2											1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Basic Electrical Engineering Lab

Code: BTE21005

Credits- 1 | Semester I

Total Lecture: 30

A. Introduction:

- To impart a basic knowledge of electrical instruments voltmeter, ammeter, multi-meter, and oscilloscope. Real-life resistors, capacitors and inductors. Measurement such as current, voltage, power, energy and frequency to understand the impact of technology in a global and societal context.
- Emphasize the effects of electric shock and precautionary measures.
- Improve the ability to function on multi-disciplinary team.

B. Course Outcomes: At the end of the course, students will be able to;

[CO1] Understand different meters and instruments for measurement of electrical quantities

[CO2] Understand the linear and nonlinear characteristics of different types of loads experimentally

[CO3] Design and experiment potential divider circuits

[CO4] Experimentally verify the basic circuit theorems

[CO5] Measure power and power factor in ac circuits

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	5
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	35
Total		50
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

S.No.	Name of Experiments
1	Demonstrate the verification of Ohm’s law.
2	Demonstrate the verification of Resistance in series and parallel apparatus.

3	Demonstrate the verification of Kirchhoff's current law (KCL).
4	Demonstrate the verification of Kirchhoff's voltage law (KVL).
5	Demonstrate the characteristics of half wave rectifier.
6	Demonstrate the characteristics of full wave rectifier.
7	Demonstrate the verification of Thevenin's theorem.
8	Demonstrate the verification of Norton's theorem.

E. TEXT BOOKS

T1.D.P. Kothari & I.J. Nagrath, Basic Electrical Engineering, Tata McGraw Hill, latest edition.
T2.S.N. Singh , Basic Electrical Engineering, P.H.I.,2013
T3.Rajendra Prasad, Fundamentals of Electrical Engineering, Prentice Hall,2014
T4.M.S. Sukhija, T. K. Nagsarkar, Basic Electrical and electronics engineering, Oxford University press, 2012

F. REFERENCE BOOKS

R1.C.L. Wadhwa, Basic Electrical Engineering. New Age International.
R2.B.L. Theraja & A.K Theraja Textbook of Electrical Technology - Vol. 1, S. Chand Publication
R3.E. Hughes & I.M. Smith Hughes Electrical Technology Pearson
R4.Vincent Del Toro Electrical Engineering Fundamentals

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Understand different meters and instruments for measurement of electrical quantities	3	2														
[CO2]	Understand the linear and nonlinear characteristics of different types of loads experimentally			2	2												
[CO3]	Design and experiment potential divider circuits			2									1		1	1	
[CO4]	Experimentally verify the basic circuit theorems						1	1									1
[CO5]	Measure power and power factor in ac circuits	3											3				

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Engineering Mechanics Lab

Code: BTE22013

Credits- 1 | Semester I

Total Lecture: 30

A. Introduction:

- To obtain resultant of various forces.
- To calculate support reactions through conditions of equilibrium for various structures
- To understand role of friction in equilibrium problems
- To know fundamental laws of machines and their applications to various engineering problems

B. Course Outcomes: At the end of the course, students will be able

[CO1] Identify the force systems for given conditions by applying the basics of mechanics.

[CO2] Determine unknown force(s) of different engineering systems.

[CO3] Apply the principles of friction in various conditions for useful purposes.

[CO4] Find the centroid and center of gravity of various components in engineering systems.

[CO5] Select the relevant simple lifting machine(s) for given purposes.

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	5
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	35
Total		50
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

S.No.	**Name of Experiments**
1	To verify the law of moment by using bell crank lever
2	To verify the support reactions of a simply supported beam
3	To calculate the Mechanical advantage, Velocity Ratio and efficiency of Single

	Winch Crab.
4	To calculate the Mechanical Advantage, Velocity Ratio and efficiency of double Winch Crab.
5	To calculate the Mechanical Advantage, Velocity Ratio, and efficiency of Single start Worm & Worm Wheel
6	To calculate the Mechanical Advantage, Velocity Ratio, and efficiency of Double start Worm & Worm Wheel.
7	To calculate the Mechanical Advantage, Velocity Ratio, and efficiency of Triple start Worm & Worm Wheel
8	To verify triangle and parallelogram law of forces with the help of Gravesend's apparatus.

E. TEXT BOOKS

T1.Bedi D.S., Engineering Mechanics, Khanna Publishing House
T2.Khurmi, R.S., Applied Mechanics, S.Chand& Co. New Delhi.
T3.Bansal R K, A text book of Engineering Mechanics, Laxmi Publications.
T4.Ramamrutham, Engineering Mechanics, S.,S Chand & Co. New Delhi.

F. REFERENCE BOOKS

R1. Dhade, Jamadar &Walawelkar, Fundamental of Applied Mechanics, Pune VidhyarthiGruh.
R2. Ram, H. D.; Chauhan, A. K. Foundations and Applications of Applied Mechanics, CambridgeUniversityPress.
R3. Meriam, J. L., Kraige, L.G. , Engineering Mechanics- Statics, Vol. I, Wiley Publication, New Delhi.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[CO1]	Identify the force systems for given conditions by applying the basics of mechanics.	**1**															
[CO2]	Determine unknown force(s) of different engineering systems.			**1**													
[CO3]	Apply the principles of friction in various conditions for useful purposes.							**1**									
[CO4]	Find the centroid and center of gravity of various components in engineering systems.												**1**				**1**
[CO5]	Select the relevant simple lifting machine(s) for given purposes.																

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Engineering Graphics & Design

Code: BTE21004

Credits- 2 | Semester I

Total Lecture: 60

A. Introduction:

- Increase ability to communicate with people
- Learn to sketch and take field dimensions.
- Learn to take data and transform it into graphic drawings.
- Learn basic Auto Cad skills.
- Learn basic engineering drawing formats
- Prepare the student for future Engineering positions

B. Course Outcomes: At the end of the course, students will be able to;

[CO1] Perform basic sketching techniques

[CO2] Understand of architectural and engineering scales will increase.

[CO3] Draw orthographic projections and sections.

[CO4] Draft the engineering drawings in practical application

[CO5] Become familiar with office practice and standards

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	5
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	35
Total		50
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

EXPERIMENT NO.	TITLE OF EXPERIMENT
1	Introduction to Engineering Drawing

2	Projection of Points and Straight Lines
3	Projection Straight Lines
4	Projection of Planes
5	Isometric Axes, Lines, Planes, Solids.
6	Orthographic Projection
7	Development of Surface
8	Introduction to AUTO CAD

E. TEXT BOOKS

T1. Engineering Graphics, N.D Bhatt, Charotar Publishing House Pvt. Limited
T2. Principle of Engineering Graphics And Drawing, R.K Dhawan, S. Chand Publishing
T3. Engineering Graphics And Drafting, P.S GILL,S. K. Kataria& Sons

F. REFERENCE BOOKS

R1. Engineering Drawing and Computer Graphics, Shah, M.B. & Rana B.C. PearsonEducation
R2. Engineering Graphics, Agrawal B. & Agrawal C. M ,TMH Publication
R3. Text book on Engineering Drawing, Narayana, K.L. & P Kannaiah, Scitech Publishers

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	PO8	PO9	PO10	P 11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Perform basic sketching techniques	1															
[CO2]	Understand of architectural and engineering scales will increase.	1															
[CO3]	Draw orthographic projections and sections.											1		2			
[CO4]	Draft the engineering drawings in practical application					1									1		
[CO5]	Become familiar with office practice and standards									1							1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

ARKA JAIN University Jharkhand

Syllabus of

B.Tech. in Computer Science Engineering

Semester-II

ARKAJAIN University, Jharkhand
School of Engineering & IT
Department of Engineering
Faculty – Bachelor of Technology in Computer Science Engineering
Scheme of Study (w.e.f Batch 2020-21)

SEMESTER –I

Sr. No.	Name of the Subject	Group	L-T-P	Credit
1	Engineering Mathematics–I	A & B	3-1-0	4
2	Engineering Chemistry	A	3-0-0	3
	Programming for Problem Solving	B	3-0-0	3
3	Basic Electrical Engineering	A	3-1-0	4
	Engineering physics	B	3-1-0	4
4	Engineering Mechanics	A	3-0-0	3
	English for Communication	B	3-0-0	3
5	Constitution of India	B	0-0-0	0
	Practical			
6	Engineering Chemistry Lab	A	0-0-1	1
	Engineering Physics Lab	B	0-0-1	1
7	Basic Electrical Engineering Lab	A	0-0-1	1
	Programming for Problem Solving Lab	B	0-0-2	2
8	Engineering Mechanics Lab	A	0-0-1	1
9	Engineering Graphics & Design	A	0-0-2	2
	Workshop Practices	B	0-0-2	2
	TOTAL	A or B	12-2-5	19

SEMESTER –II

Sr. No.	Name of the Subject	Group	L-T-P	Credit
1	Engineering Mathematics–II	A & B	3-1-0	4
2	Engineering Chemistry	B	3-0-0	3
	Programming for Problem Solving	A	3-0-0	3
3	Basic Electrical Engineering	B	3-1-0	4
	Engineering physics	A	3-1-0	4
4	Engineering Mechanics	B	3-0-0	3
	English for Communication	A	3-0-0	3
5	Constitution of India	A	0-0-0	0
	Practical			
6	Engineering Chemistry Lab	B	0-0-1	1
	Engineering Physics Lab	A	0-0-1	1
7	Basic Electrical Engineering Lab	B	0-0-1	1
	Programming for Problem Solving Lab	A	0-0-2	2
8	Engineering Mechanics Lab	B	0-0-1	1
	Engineering Graphics& Design	B	0-0-2	2
9	Workshop Practices	A	0-0-2	2
	TOTAL	A or B	12-2-5	19

SEMESTER –I (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering Chemistry	BSC	3	3	100	70	20	5	5
2	Engineering Mathematics–I	BSC	4	4	100	70	20	5	5
3	Basic Electrical Engineering	ESC	4	4	100	70	20	5	5
4	Engineering Mechanics	ESC	3	3	100	70	20	5	5
	Practical								
5	Engineering Chemistry Lab	BSC	1	2	50	35	5	5	5
6	Basic Electrical Engineering Lab	ESC	1	2	50	35	5	5	5
7	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
8	Engineering Graphics & Design	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**24**	**600**	**420**	**100**	**40**	**40**

SEMESTER I (Group-B)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering physics	BSC	4	4	100	70	20	5	5
2	Engineering Mathematics –I	BSC	4	4	100	70	20	5	5
3	Programming for Problem Solving	ESC	3	3	100	70	20	5	5
4	English for Communication	HSMC	3	3	100	70	20	5	5
5	Constitution of India	MC	0	2	50	35	10	2.5	2.5
	Practical								
6	Engineering physics Lab	BSC	1	2	50	35	5	5	5
7	Programming for Problem Solving Lab	ESC	2	4	50	35	5	5	5
8	Workshop Practices	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**26**	**600**	**420**	**105**	**37.5**	**37.5**

SEMESTER II (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering physics	BSC	4	4	100	70	20	5	5
2	Engineering Mathematics –II	BSC	4	4	100	70	20	5	5
3	Programming for Problem Solving	ESC	3	3	100	70	20	5	5
4	English for Communication	HSMC	3	3	100	70	20	5	5
5	Constitution of India	MC	0	2	50	35	10	2.5	2.5
	Practical								
6	Engineering physics Lab	BSC	1	2	50	35	5	5	5
7	Programming for Problem Solving Lab	ESC	2	4	50	35	5	5	5
8	Workshop Practices	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**26**	**600**	**420**	**105**	**37.5**	**37.5**

SEMESTER –II (Group-B)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering Chemistry	BSC	3	3	100	70	20	5	5
2	Engineering Mathematics–II	BSC	4	4	100	70	20	5	5
3	Basic Electrical Engineering	ESC	4	4	100	70	20	5	5
4	Engineering Mechanics	ESC	3	3	100	70	20	5	5
	Practical								
5	Engineering Chemistry Lab	BSC	1	2	50	35	5	5	5
6	Basic Electrical Engineering Lab	ESC	1	2	50	35	5	5	5
7	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
8	Engineering Graphics & Design	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**24**	**600**	**420**	**100**	**40**	**40**

SEMESTER-III

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Analog Electronic Circuits	PCC	3	3	100	70	20	5	5
2	Data structure	PCC	3	3	100	70	20	5	5
3	Digital Electronics	PCC	3	3	100	70	20	5	5
4	Engineering Mathematics - III	BSC	4	3	100	70	20	5	5
5	Humanities-I Professional Practice, Law & Ethics Organizational Behavior	HSMC	3	3	100	70	20	5	5
6	Environmental Science	MC	0	2	50	35	10	2.5	2.5
7	Python Programming	PCC	3	3	100	70	20	5	5
	PRACTICAL								
8	Analog Electronic Circuits Lab	PCC	2	4	50	35	5	5	5
9	Data structure Lab	PCC	2	4	50	35	5	5	5
10	Digital Electronics Lab	PCC	2	4	50	35	5	5	5
11	IT Workshop(MATLAB)	PCC	1	2	50	35	5	5	5
12	Python Programming Lab	PCC	2	4	50	35	5	5	5
	TOTAL		28	38	900	640	155	57.5	57.5

SEMESTER-IV

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Discrete Mathematics	BSC	4	4	100	70	20	5	5
2	Computer Organization & Architecture	PCC	3	3	100	70	20	5	5
3	Operating Systems	PCC	3	3	100	70	20	5	5
4	Design & Analysis of Algorithms	PCC	3	3	100	70	20	5	5
5	Microprocessor & Microcontroller	PCC	3	3	100	70	20	5	5
6	Software Engineering	PCC	3	3	100	70	20	5	5
	PRACTICAL								
6	Operating Systems Lab	PCC	2	4	50	35	5	5	5
7	Design & Analysis of Algorithms Lab	PCC	2	4	50	35	5	5	5
8	Computer Organization & Architecture Lab	PCC	2	4	50	35	5	5	5
	TOTAL		25	31	750	525	135	45	45

SEMESTER V

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Signals & Systems	PCC	3	3	100	70	20	5	5
2	Database Management Systems	PCC	3	3	100	70	20	5	5
3	Formal Language &Automata Theory	PCC	3	3	100	70	20	5	5
4	Object Oriented Programming	PCC	3	3	100	70	20	5	5
5	Humanities-II Soft Skills and Interpersonal Communication	HSMC	3	3	100	70	20	5	5
6	Elective-1 Graph Theory Image Processing Advanced Algorithms	PEC	3	3	100	70	20	5	5
	PRACTICAL								
7	Database Management Systems Lab	PCC	2	4	50	35	5	5	5
8	Object Oriented Programming Lab	PCC	2	4	50	35	5	5	5
9	Summer Internship-I (3-4 Weeks)	PCC	1	0	50	50	0	0	0
	TOTAL		23	26	750	540	130	40	40

SEMESTER VI

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA *	Attendance
1	Compiler Design	PCC	3	3	100	70	20	5	5
2	Computer Networks	PCC	3	3	100	70	20	5	5
3	Advance Java Programming	PCC	3	3	100	70	20	5	5
4	Elective-II Artificial Intelligence Machine Learning Visual Programming	PEC	3	3	100	70	20	5	5
5	Elective-III Web Technology Neural Networks and Deep Learning	PEC	3	3	100	70	20	5	5
6	Open Elective –I Cyber Law and Ethics Human Resource Development and Organizational Behavior Advanced Algorithms	HSMC	3	3	100	70	20	5	5
	Practical								
7	Compiler Design Lab	PCC	2	4	50	35	5	5	5
8	Computer Networks Lab	PCC	2	4	50	35	5	5	5
9	Advance Java Programming Lab	PCC	2	4	50	35	5	5	5
	TOTAL		24	30	750	525	135	45	4

SEMESTER VII

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Elective-IV	PEC	3	3	100	70	20	5	5
	Cryptography & Network Security								
	Advanced Operating Systems								
	Web and Internet								
2	Elective-V	PEC	3	3	100	70	20	5	5
	Quantum Computing								
	Optimization Techniques								
	Real Time Systems								
3	Open Elective-II	OEC	3	3	100	70	20	5	5
	Electronic Design Automation								
	Computer Graphics								
	Data mining and warehousing								
	Semantic Web and Social Networks								
4	Biology For Engineers	BSC	3	3	100	70	20	5	5
5	Data Analytics	PCC	3	3	100	70	20	5	5
	PRACTICAL								
5	Minor Project	PROJ	4	8	100	100	0	0	0
6	Industrial Training (Summer Internship-4-6 Week)	PROJ	4	0	100	100	0	0	0
	TOTAL		23	23	700	550	100	25	25

SEMESTER VIII

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Elective-VI CloudComputing Data Mining AdvancedComputerArchitecture	PEC	3	3	100	70	20	5	5
2	Open Elective-III Signals and systems Advanced Operating System	OEC	3	3	100	70	20	5	5
3	Open Elective-IV Cyber security Soft Computing	OCE	3	3	100	70	20	5	5
4	VLSI System Design	PCC	3	3	100	70	20	5	5
	PRACTICAL								
5	Major Project	PROJ	6	12	100	0	0	0	0
6	Extra- Curricular/ Co-Curricular Activity	PROJ	0	0	100	70	30	0	0
	Total		18	24	600	35	110	20	20

Distribution of Credit across 8 semesters:

Sl. No	Type of Paper	No. of Paper	Total Credit
1	Humanities and Social Sciences including Management courses **(HSMC)**	5	15
2	Basic Science courses**(BSC)**	9	28
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc**(ESC)**	8	18
4	Professional core courses (**PCC)**	30	77
5	Professional Elective courses relevant to chosen specialization/branch**(PEC)**	5	15
6	Open subjects – Electives from other technical and /or emerging subjects (**OEC)**	3	9
7	Project work, seminar and internship in industry or elsewhere**(PROJ)**	5	14
8	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Knowledge Tradition]**(MC)**	2	0
	Total	66	176

CIA – Continuous Internal Assessment – Based on Projects / Assignment during the semester

Note:
AICTE Activity Points to be earned by students admitted to Degree program (For more details refer to Chapter 6, AICTE, Activity Point Program, Model Internship Guidelines):
Every regular student, who is admitted to the 4 year Degree program, is required to earn 100 activity points in addition to the total credits earned for the program. Students entering 4 years Degree Program through lateral entry are required to earn 75 activity points in addition to the total credits earned for the program. The activity points earned by the student shall be reflected on the students 8th Semester grade card.
The activities to earn the points can be spread over the duration of the course. However, minimum prescribed duration should be fulfilled.
Activity Points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression.
Incase student fail to earn the prescribed activity points, Eight semester Grade Card shall be issued only after earning the required activity Points.
Students shall be eligible for the award of degree only after the release of the Eight Semester grade card.

There are two groups (A & B) in semester 1 & 2. The Group division will be decided by The Dean SoE & IT before commencement of classes

ARKAJAIN University, Jharkhand
School of Engineering & IT
Department of Engineering
Faculty – Bachelor of Technology in Computer Science Engineering
PROGRAM OUTCOMES &PROGRAM SPECIFIC OUTCOMES

PROGRAM OUTCOMES

After completing this undergraduate program, a learner:

[PO.1]. Engineering knowledge: An ability to apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to get the solution of the engineering problems.

[PO.2]. Problem analysis: Ability to Identify, formulates, review research literature, and analyze complex engineering problems.

[PO.3]. Design/Development Of Solutions: Ability to design solutions for complex Engineering Problems by considering social, Economical and Environmental aspects.

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge to design, conduct analyse experiments to get valid conclusion**.**

[PO.5]. Modern tool usage: ability to create, select, and apply appropriate techniques, and to model complex engineering activities with an understanding of the limitations.

[PO.6]. The engineer and society: Ability to apply knowledge by considering social health, safety, legal and cultural issues.

[PO.7]. Environment and sustainability: Understanding of the impact of the adopted engineering solutions in social and environmental contexts.

[PO.8]. Ethics: Understanding of the ethical issues of the civil engineering and applying ethical principles in engineering practices.

[PO.9]. Individual and teamwork: Ability to work effectively as an individual or in team, as a member or as a leader.

[PO.10]. Communication: An ability to communicate clearly and effectively through different modes of communication.

[PO.11]. Project management and finance: Ability to handle project and to manage finance related issue.

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning.

PROGRAM SPECIFIC OUTCOMES

[PSO.1]. Understand the principles, architecture and organization of computers, embedded systems and computer networks.

[PSO.2]. Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems that include both hardware and software.

[PSO.3]. Apply software design and development practices to develop software applications in emerging areas such as IoT, Data Analytics, Social Networks, Cloud and High Performance Computing.

[PSO.4]. Demonstrate& communicate: Ability to demonstrate the knowledge, skill to analyze the cause and effect on Computer Science Engineering.

Subject: Engineering Physics

Code: BTE22010

4 Credits | Semester II

Total Lecture: 60 Total Tutorial: 12

A. Introduction:

- To acquire fundamental knowledge about nature and its phenomena including quantitative expression.
- To enhance intellectual, computational, experimental, communication and analytical skills of the students Physics is necessary to satisfy the basic sciences requirement, as appropriate for various engineering disciplines

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Identify and understand the kinds of experimental results which are incompatible with classical Physics leading to the development of a quantum theory of matter and light.

[CO2] Use basic concepts to analyze and design a wide range of semiconductor devices.

[CO3] Understand & solve different types of wave equations.

[CO4] Use the principles of optics to solve various complex engineering problems.

[CO5] Use fundamental laws and relations to solve problems in electricity, electromagnetism

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
EndSemester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

QUANTUM MECHANICS: Introduction to Quantum Physics, black body radiation , Explanation using the photon concept, Photoelectric effect, Compton effect, Wave particle duality, De-Broglie hypothesis, Heisenberg's Uncertainty principle.Born interpretation for wave function, Free-particle wave function and wave-packets, Time-dependent and time independent Schrodinger equation, particle in a box, Finite Potential barrier and tunneling.

ELECTRONIC MATERIALS AND SEMICONDUTOR: Free electron theory, Energy bands in solids, E-k diagram, Direct and indirect band gaps, Types of electronic materials: metals, semiconductors, and insulators, Density of states, Occupation probability, Fermi level, and Effective mass.Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature, Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction,

WAVES AND OSCILLATION: Simple harmonic motion, damped and forced simple harmonic oscillator Mechanical and electrical simple harmonic oscillators,damped harmonic oscillator – heavy, critical and light damping, energy decay in a damped harmonic oscillator, quality factor, forced mechanical and electrical oscillators, electrical and mechanical impedance, resonance.

OPTICS AND LASER: Introduction to interference, Analytical treatment of interference, Displacement of fringes, Thin film, Wedge shaped film, Newton's Ring,Concept of diffraction, Fraunhofer and Fresnel diffraction, Fraunhofer diffraction at single slit, double slit, and diffraction grating, Limit of Resolution, Resolving power of grating,Introduction to interaction of radiation with matter, Stimulated and spontaneous emission, Einstein's coefficient, principles and working of laser: population inversion, pumping, types of laser: He-Ne laser, Ruby laser , application of lasers.

ELECTROMAGNETISM: Electric field and electrostatic potential for a charge distribution; Laplace's and Poisson's equations for electrostatic potential and uniqueness of their solution. Boundary conditions of electric field and electrostatic potential,Bio-Savart law, vector potential and calculating it for a given magnetic field; the equation for the vector potential and its solution for given current densities. Faraday's law of electromagnetic induction, Equation of continuity, displacement current, Maxwell's equation, Poyting theorem, Electromagnetic waves in free space, conducting and non -conducting medium

E. TEXT BOOKS

T1. Concept of Modern Physics by Arthur Beiser: Publication: TMH
T2.Elements of electro magnetics by Mathew N.O. Sadiku: Publication: Oxford University Press
T3.Introduction to electrodynamics by David J. Griffiths; Pub.: Pearson Education.
T4.Optics by Ajoy Ghatak Pub;TMH
T5.Fundamentals of Physics extended volume by Resnick, Halliday and Walker; Pub.:John Wiley & Sons. Inc. Asian Edition.
T6.P. Bhattacharya, Semiconductor Optoelectronic Devices, Prentice Hall of India (1997).
T7.Engineering Physics – Hitendra K.Malik & Ajay Kumar Singh by TMH Publication.
T8.The Physics of Vibrations and Waves, H. J. Pain, 2013, John Wiley and Sons.
T9. Introduction to Quantum mechanics, Nikhil Ranjan Roy, 2016, Vikash Publishing House Pvt Ltd

F. REFERENCE BOOKS

R1. Modern Physics by G. Aruldhas & P. Rajagopal; Pub: Prentice Hall of India.
R2. Quantum Physics by H.C. Verma Pub.: Surya Publication .

R3. Lasers and Non-Linear Optics by B.B. Laud; Pub: New Age International (P) Ltd.
R4. Principles of electricity by Leigh Page and Normal llsley Adams, Pub.: Eurasia Publishing House, New Delhi.
R5. Feynmann Lecture Series on Physics
R6. Waves: Berkeley Physics Course, vol.3, Francis Crawford, 2007, Tata McGraw-Hill.
R7. Online course: “Semiconductor Optoelectronics” by M R Shenoy on NPTEL
R8. Introduction to Modern Physics, Rich Meyer, Kennard, Coop, 2002, Tata McGraw Hill

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Identify and understand the kinds of experimental results which are incompatible with classical Physics leading to the development of a quantum theory of matter and light.	**2**	**3**										**3**				
[CO2]	Use basic concepts to analyze and design a wide range of semiconductor devices.			**2**		**3**									**1**		
[CO3]	Understand & solve different types of wave equations.				**2**								**1**				**2**
[CO4]	Use the principles of optics to solve various complex engineering problems.			**3**	**2**												
[CO5]	Use fundamental laws and relations to solve problems in electricity, electromagnetism		**3**								**2**						

1- Lw Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Engineering Mathematics –II

Code: BTE22008
4 Credits |Semester II

Total Lecture: 60 Total Tutorial: 12

A. Introduction:

- To familiarize the prospective engineers with techniques in multivariate integration, ordinary and partial differential equations and complex variables.
- To equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines
- To equip the students with standard concepts and tools at an intermediate to advanced level

B. Course Outcomes: At the end of the course,

[CO1] Remember the mathematical tools needed in the multiple integrals and their usage.

[CO2] Understand the effective mathematical tools for the solutions of differential equations that model physical processes.

[CO3] Demonstrate the tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.

[CO4] Calculate the analytic function**.**

[CO5] Evaluate complex integrals by using Cauchy-Goursat integral theorem.

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

MULTIVARIABLE CALCULUS (INTEGRATION): Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Center of mass and Gravity. Triple integrals(Cartesian),orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds, Scalar line integrals, vector line integrals, scalar surface integrals,

vector surface integrals, Theorems of Green, Gauss and Stokes

FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS: Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: solvable for p,solvable for y Equations solvable for x and Clairaut's equation

ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER: Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation

Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties

COMPLEX VARIABLE – DIFFERENTIATION: Differentiation, Cauchy-Riemann equations, Analytic functions, harmonic functions, finding harmonic conjugate, Elementary analytic functions (exponential, trigonometric, logarithm)and their properties, Conformal mappings, Mobius transformations and their properties.

COMPLEX VARIABLE – INTEGRATION: Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof),Liouville's theorem and Maximum ,Modulus theorem (without proof)Taylor's series, zeros of analytic functions, singularities, Laurent'sseries; Residues, Cauchy Residue theorem (without proof),Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich

E. TEXT BOOKS

T1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition,Pearson, Reprint, 2002.

T2.Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley &Sons, 2006.

F. REFERENCE BOOKS

R1.W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.

R2.B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Remember the mathematical tools needed in the multiple integrals and their usage.		2		2												
[CO2]	Understand the effective mathematical tools for the solutions of differential equations that model physical processes.			1		1											
[CO3]	Demonstrate the tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.				2			1								1	
[CO4]	Calculate the analytic function**.**					2											1
[CO5]	Evaluate complex integrals by using Cauchy-Goursat integral theorem.		1														

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Programming for Problem Solving

Code: BTE21259

3 Credits | Semester II

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To understand concept of algorithm and programming
- To know various logical components and
- Syntax used in programming
- To learn different ways of transforming a real world problem into system problem

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Formulate simple algorithms for arithmetic and logical problems.

[CO2] Test and execute the programs and correct syntax and logical errors and to implement conditional branching, iteration and recursion

[CO3] Apply programming to solve matrix addition and multiplication problems and searching and sorting problems.

[CO4] Use arrays, pointers and structures to formulate algorithms and programs

[CO5] Decompose a problem into functions and synthesize a complete program using divide and conquer approach

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

FUNDAMENTALS OF INFORMATION TECHNOLOGY: Evolution of Computers, Generation and Classification of Computers Application of Computers and etc**.** Memory Hierarchy, RAM, ROM, Types of Secondary Storage Devices and etc.Information, Technology, Role of Information Technology, Information Technology and Internet and etc.**Introduction**, Evolution of Internet, Basic Internet Terms, Getting Connected to Internet, Internet Applications, Data over Internet, Web Browser, Browsing Internet Using Internet Explorer, E-mail, search

Engines, Instant Messaging.E-Commerce, Electronic Data Interchange, Smart Cards, Mobile Communication and etc.

C FUNDAMENTALS, DECISION & LOOPING STATEMENTS:The C language. Phases of developing a running computer program in C.Data Concepts in C: Constants, Variables, Expressions, Operators, and operator precedence in C. Different basic data types and their sizes. Managing input and output statements, Sequential control statements. Decision making statements (If-Else constructs). Loop control statements (While construct, Do While construct, For construct)

ARRAYS, STRINGS &FUNCTIONS : One-dimensional Arrays: Declaration and Initialization. String variables, Reading and writing strings, Arithmetic operations on characters, Putting strings together, Comparison of two strings. Functions: The prototype declaration, Function definition.Function call: Passing arguments to a function (by value, by reference). Scope of variables. Recursive function calls, Tail recursion, Tree of recursion. Sorting problems: Selection sort, Insertion sort. Sorting in multidimensional arrays. Sorting in arrays. Search problems: Linear search and binary search. Recursive and iterative formulations.

POINTERS &STRUCTURE : Pointers: Declaring and dereferencing pointer variables. Pointer arithmetic. Accessing arrays through pointers. Pointer types, Pointer and strings. Structures in C: Motivation, examples, declaration, and use. Operations on structures.Passing structures as function arguments. Type defining structures.

LINKED LISTS & FILE HANDLING : Self-referential structures, Dynamic data structures, Linked lists with examples.File operations in C: Input, output, and error streams. Opening, closing, and reading from files. Searching through files using functions such as fseek(), ftell(), and rewind(). Programming for command line arguments

E. TEXT BOOKS

T1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill .
T2.E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill.

F. REFERENCE BOOKS

R1.Let us C, Yashwant Kanetkar, BPI publications
R2.Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Formulate simple algorithms for arithmetic and logical problems.	1	1		1			1									
[CO2]	Test and execute the programs and correct syntax and logical errors and to implement conditional branching, iteration and recursion	1	1		1			1									
[CO3]	Apply programming to solve matrix addition and multiplication problems and searching and sorting problems.	1	1		1			1									
[CO4]	Use arrays, pointers and structures to formulate algorithms and programs																
[CO5]	Decompose a problem into functions and synthesize a complete program using divide and conquer approach	1	1		1			1	1								

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

English for Communication

Code: BTE22370

3 Credits | Semester II

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To impart basic skills of Communication in English through intensive practice.
- Students of Engineering so as to enable them to enhance their communicative knowledge and soft skills.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Understand the basic of the communication and represent communication process and to know the practical implementations in the work place.

[CO2] Understand verbal and non-verbal modes of communication effectively in practical situations

[CO3] Analyze vocalics and basic grammar.

[CO4] Create competence in reading and writing.

[CO5] Evaluate speaking process.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

VOCABULARY BUILDING: 'Ancient Architecture in India' from prescribed textbook 'English for Engineers published by Cambridge University. Vocabulary: Synonyms and Antonyms Lexical set of words- Formation of hints with lexical set of words- Usage of Lexical sets in framing meaningful sentences. Standard Abbreviation in English.

IDENTIFYING COMMON ERRORS IN WRITING: Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Articles, Prepositions, Redundancies, Clichés

SELF DEVELOPMENT AND ASSESSMENT: Self-assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, career planning Self-esteem. Managing Time; Personal memory, Rapid reading,

ORAL COMMUNICATION : Public speaking, Group discussion, Oral; presentation, Interviews, Graphic presentation, Presentation aids, Personality Development Writing reports, project proposals, brochures, newsletters, technical articles, manuals, official notes, business letters, memos, progress reports, minutes of meetings, event report.

NATURE AND STYLE OF SENSIBLE WRITING: Business letters: Enquiry/claim complaint and order. Technical reports, Email writing, Technical articles, Writing reports, Paragraph writing, Techniques for writing precisely. Graphic presentation, Project proposals.

E. TEXT BOOKS

T1. David F. Beer and David Mc Murrey, Guide to writing as an Engineer, John Willey. New York, 2004
T2. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)
T3. Shiv Khera, You Can Win, Macmillan Books, New York, 2003.
T4. Raman Sharma, Technical Communications, Oxford Publication, London, 2004.
T5. Dale Jungk, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN: 07828357-4)
T6. Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH New Delhi 2002.
T7. Xebec, Presentation Book, TMH New Delhi, 2000.
T8 . English for Engineers ,Cambridge university.

F. REFERENCE BOOKS

R1. Practical English Usage. Michael Swan. OUP. 1995.
R2. Remedial English Grammar. F.T. Wood. Macmillan.2007
R3. On Writing Well. William Zinsser. Harper Resource Book. 2001
R4. AICTE Modal

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Understand the basic of the communication and represent communication process and to know the practical implementations in the work place.	2								2							
[CO2]	Understand verbal and non-verbal modes of communication effectively in practical situations						2			2							
[CO3]	Analyze vocalics and basic grammar.		2														2
[CO4]	Create competence in reading and writing.			2									2				
[CO5]	Evaluate speaking process.						2				3						

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Constitution of India

Code: BTE25095

0 Credits | Semester II

Total Lecture: 30 Total Tutorial: 6

A. Introduction:

- The objective of the Constitution of India is to establish a society where there is: Justice - social, economic and political. Liberty - thought, expression, faith, belief and worship

B. Course Outcomes:

At the end of the course, students will be able to

[CO1] Understand the emergence and evolution of Indian Constitution. Understand and analyse federalism in the Indian context

[CO2] Understand and explain the significance of Indian Constitution as the fundamental law of the land.

[CO3] Exercise his fundamental rights in proper sense at the same time identifies his responsibilities in national building.

[CO4] Analyse the Indian political system, the powers and functions of the Union, State and Local Governments in detail

[CO5] Understand Electoral Process, Emergency provisions and Amendment procedure.

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

INTRODUCTION: Constitution' meaning of the term,, Indian Constitution: Sources and constitutional history, Features: Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy

UNION GOVERNMENT AND ITS ADMINISTRATION: Structure of the Indian Union: Federalism Centre- State relationship President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat Lok Sabha, Rajya Sabha

STATE GOVERNMENT AND ITS ADMINISTRATION: Governor: Role and Position, CM and Council of ministers State Secretariat: Organization, Structure and Functions.

LOCAL ADMINISTRATION: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation Pachayati raj: Introduction, PRI: Zila Pachayat, Elected officials and their roles, CEO Zila Pachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

ELECTION COMMISSION: Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women

E. TEXT BOOKS

T1. Indian Polity' by Laxmikanth
T2. 'Indian Administration' by Subhash Kashyap

F. REFERENCE BOOKS

R1. 'Indian Constitution' by D.D. Basu
R2. 'Indian Administration' by Avasti and Avasti

H. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Understand the emergence and evolution of Indian Constitution. Understand and analyse federalism in the Indian context	2								2							
[CO2]	Understand and explain the significance of Indian Constitution as the fundamental law of the land.						2			2							
[CO3]	Exercise his fundamental rights in proper sense at the same time identifies his responsibilities in national building.		2														2
[CO4]	Analyse the Indian political system, the powers and functions of the Union, State and Local Governments in detail			2									2				
[CO5]	Understand Electoral Process, Emergency provisions and Amendment procedure.						2				3						

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Engineering Physics Lab

Code: BTE21261

1 Credits | Semester II

Total Lecture: 30

A. Introduction:

- To study the use of physical principles and analysis in various fields of engineering and technology.
- To supplement the theoretical knowledge gained in the lecture by hands-on experience with the equipment. This will develop scientific temper and help to apply the basic concepts and principles in solving engineering problems.
- Demonstrate an ability to make physical measurements & understand the limits of precision measurement.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Understand calculation of specific resistance of wire by Carey Foster bridge

[CO2] Calculate thermal conductivity of poor conductors

[CO3] Measure resonance frequency and quality factor of LCR Circuit & RC circuit with AC current

[CO4] Understand the characteristics of transistors, photoelectric cells and determine operational parameters associated with their performance.

[CO5] Work with laboratory sodium light and lasers. Understand method to measure the wavelength of the light emitted from a laser and Sodium light.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Internal Examination(Assessment)	05
	Assignment	05
	Attendance	05
End Term Exam (Summative)	End Term Examination	35
	Total	50
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

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D. SYLLABUS

Experiment No.	TITLE OF EXPERIMENT
1	To determine the Planck's constant using LED.

2	To study various type of losses that occur in optical fibers and measure loss in dB of two optical patch cords
3	To study the series and parallel resonance with LCR Circuits
4	To determine V-I Characteristics of P-N Junction Diode
5	To the Charge to mass (e/m)ratio of Electron by Lorentz Force Apparatus
7	To determine the number of lines percentimeter of the plane diffraction gratingby using sodium light
8	To find the wave length of sodium light using fresnel's biprism
9	To determine input & output characteristics of a PNP Junction Transistor in CE and CB configuration.
10	To determine input & output characteristics of a NPN Junction Transistor in CE and CB configuration.

E. Text Book:

T1. A Text Book of Engineering Physics Practical by Dr. Ruby Das, C.S. Robinson, Dr. Rajesh Kumar & Prashant Kumar Sahu; Pub University Science Press

T2.Fundamentals of Physics extended volume by Resnick, Halliday and Walker; Pub.:John Wiley & Sons. Inc. Asian Edition.

F. Reference Books:

R1. Advanced level Physics Practical, Michael Nelson and Jon M. Ogborn, Heinemann Educational Publishers.

R2. Engineering Practical Physics, S.Panigrahi & B.Mallick,2015, Cengage Learning India Pvt. Ltd.

G.Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Understand calculation of specific resistance of wire by Carey Foster bridge	**3**															**3**
[CO2]	Calculate thermal conductivity of poor conductors			**1**	**2**												
[CO3]	Measure resonance frequency and quality factor of LCR Circuit & RC circuit with AC current					**3**										**1**	
[CO4]	Understand the characteristics of transistors, photoelectric cells and determine operational parameters associated with their performance.				**3**												
[CO5]	Work with laboratory sodium light and lasers. Understand method to measure the wavelength of the light emitted from a laser and Sodium light.			**3**				**1**							**3**		

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Programming for Problem Solving Lab

Code: BTE21262

Credits- 2 | Semester II

Total Lecture: 60

A. Introduction:

- To work with an IDE to create, edit, compile, run and debug programs
- To analyze the various steps in program development.
- To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.

B. Course Outcomes: At the end of the course, students will be able

[CO1] **F**ormulate simple algorithms for arithmetic and logical problems. To translate the algorithms to programs (in C language).To test and execute the programs and correct syntax and logical errors.

[CO2] Program for solving simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

[CO3] Decompose a problem into functions and synthesize a complete program using divide and conquer approach.

[CO4] Analyze the complexity of problems, modularize the problems into small modules and then convert them into programs.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Internal Examination(Assessment)	05
	Assignment	05
	Attendance	05
End Term Exam (Summative)	End Term Examination	35
	Total	50
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

S.No.	Name of Experiments
1	a) Write a C program to find sum and average of three numbers. b) Write a C program to find the sum of individual digits of a given positive integer

2	a) Write a C program to generate the first n terms of the Fibonacci sequence b) Write a C program to generate prime numbers between 1 to n. c) Write a C program to check if the given number is Armstrong or not
3	a) Write a C program to check whether the given number is perfect or not b) Write a C program to check whether the given number is strong or not.
4	a) Write a C program to find the roots of a quadratic equation. b) Write a C program perform arithmetic operations using switch statement.
5	a) Write a C program to find factorial of a given integer using non-recursive function b) Write a C program to find factorial of a given integer using recursive function
6	a) Write C program to find GCD of two integers by using recursive function. b) Write C program to find GCD of two integers by using non-recursive function
7	a) Write a C program to find the largest and smallest number in a list of integers. b) Write a C program to Sort the Array in an Ascending Order. c) Write a C program to find whether the given matrix is symmetric or not.
8	a) Write a C program to perform addition of two matrices. b) Write a C program using function to perform multiplication of two matrices.
9	a) Write a C program to use function to insert a sub-string in to given main string from a given position. b)Write a C program to swap the values of two variables using (i) Call by value (ii) Call by reference
10	a) Write a C program using user-defined functions to determine whether the given string is palindrome or not. b) Write a C program that displays the position or index in the main string S where the sub string T begins, or - 1 if S doesn't contain T
11	a) Write C program to count the number of lines, words and characters in a given text. b) Write a C program to find the sum of integer array elements using pointers

12	a) Write a C Program to Calculate Total and Percentage marks of a student using structure

E. TEXT BOOKS

T1. C Programming and Data Structures, P.Padmanabham, Third Edition, BS Publications
T2.Computer programming in C.V.RAjaraman, PHI Publishers.
T3.C Programming, E.Balagurusamy, 3rd edition, TMHPublishers.

F. REFERENCE BOOKS

R1. C Programming, M.V.S.S.N Venkateswarlu and E.V.Prasad,S.Chand Publishers.
R2. Mastering C,K.R.Venugopal and S.R.Prasad, TMH Publishers.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	**F**ormulate simple algorithms for arithmetic and logical problems. To translate the algorithms to programs (in C language).To test and execute the programs and correct syntax and logical errors.	2	3												2		
[CO2]	Program for solving simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.			2	2												2
[CO3]	Decompose a problem into functions and synthesize a complete program using divide and conquer approach.					1									1		
[CO4]	Analyze the complexity of problems, modularize the problems into small modules and then convert them into programs.																3

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Engineering Workshop Practice

Code: BTE22267
2 Credits | Semester II

Total Lecture: 60

A. Introduction:

- To understand basic engineering processes for manufacturing and assembly
- To understand, identify, select and use various marking, measuring, and holding, striking and cutting tools and equipment's
- To understand and interpret job drawings, produce jobs, and inspect the job for specified dimension.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Acquire skills in basic engineering practice to identify, select and use various marking, measuring, and holding, striking and cutting tools &equipment's and machines

[CO2] Understand job drawing and complete jobs as per specifications in allotted time

[CO3] Inspect the job for the desired dimensions and shape

[**CO4**] Operate, control different machines and equipment's adopting safety practices

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Internal Assessment (Summative)	Internal Examination(Assessment)	05
	Assignment	05
	Attendance	05
End Term Exam (Summative)	End Term Examination	35
	Total	50
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

Experiment No.	**TITLE OF EXPERIMENT**
1	To make a V- fitting from the given two M.S pieces.

2	To make a T- lap joint
3	To Make a tray by using GI sheet as per given Drawing
4	To make a Butt joint using the given two M.S pieces by arc welding.
5	To make the taper turning operation in cylindrical piece of required angle on lathe machine.
6	To make an internal thread using tap M10x1.5
7	Machining a block on shaper machine.
8	To make a step turning operation on cylindrical M.S. work piece using lathe machine.

E. TEXT BOOKS

T1. Workshop Technology Vol-I,II,III Hajra Choudry., Media Promotors and Publishers P Ltd.

T2.Manufacturing Technology vol 1 by P.N. Rao Mc.Grow Hill.

F. REFERENCE BOOKS

R1. Workshop technology by R.S. Raghuwanshi.Dhanpat Ray & co

R2. Workshop technology by R.S. Khurmi&J.K.Gupta S.Chand co.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Acquire skills in basic engineering practice to identify, select and use various marking, measuring, and holding, striking and cutting tools &equipment's and machines	**2**								**2**							
[CO2]	Understand job drawing and complete jobs as per specifications in allotted time						**2**			**2**							
[CO3]	Inspect the job for the desired dimensions and shape		**2**														**2**
[CO4]	Operate, control different machines and equipment's adopting safety practices			**2**									**2**				

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

ARKA JAIN University Jharkhand

Syllabus of

B.Tech. in Computer Science & Engineering

Semester-III

ARKAJAIN University, Jharkhand
School of Engineering & IT
Department of Engineering
Faculty – Bachelor of Technology in Computer Science Engineering
Scheme of Study (w.e.f Batch 2020-21)

SEMESTER –I

Sr. No.	Name of the Subject	Group	L-T-P	Credit
1	Engineering Mathematics–I	A & B	3-1-0	4
2	Engineering Chemistry	A	3-0-0	3
	Programming for Problem Solving	B	3-0-0	3
3	Basic Electrical Engineering	A	3-1-0	4
	Engineering physics	B	3-1-0	4
4	Engineering Mechanics	A	3-0-0	3
	English for Communication	B	3-0-0	3
5	Constitution of India	B	0-0-0	0
	Practical			
6	Engineering Chemistry Lab	A	0-0-1	1
	Engineering Physics Lab	B	0-0-1	1
7	Basic Electrical Engineering Lab	A	0-0-1	1
	Programming for Problem Solving Lab	B	0-0-2	2
8	Engineering Mechanics Lab	A	0-0-1	1
9	Engineering Graphics & Design	A	0-0-2	2
	Workshop Practices	B	0-0-2	2
	TOTAL	A or B	12-2-5	19

SEMESTER –II

Sr. No.	Name of the Subject	Group	L-T-P	Credit
1	Engineering Mathematics–II	A & B	3-1-0	4
2	Engineering Chemistry	B	3-0-0	3
	Programming for Problem Solving	A	3-0-0	3
3	Basic Electrical Engineering	B	3-1-0	4
	Engineering physics	A	3-1-0	4
4	Engineering Mechanics	B	3-0-0	3
	English for Communication	A	3-0-0	3
5	Constitution of India	A	0-0-0	0
	Practical			
6	Engineering Chemistry Lab	B	0-0-1	1
	Engineering Physics Lab	A	0-0-1	1
7	Basic Electrical Engineering Lab	B	0-0-1	1
	Programming for Problem Solving Lab	A	0-0-2	2
8	Engineering Mechanics Lab	B	0-0-1	1
	Engineering Graphics& Design	B	0-0-2	2
9	Workshop Practices	A	0-0-2	2
	TOTAL	A or B	12-2-5	19

SEMESTER –I (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering Chemistry	BSC	3	3	100	70	20	5	5
2	Engineering Mathematics–I	BSC	4	4	100	70	20	5	5
3	Basic Electrical Engineering	ESC	4	4	100	70	20	5	5
4	Engineering Mechanics	ESC	3	3	100	70	20	5	5
	Practical								
5	Engineering Chemistry Lab	BSC	1	2	50	35	5	5	5
6	Basic Electrical Engineering Lab	ESC	1	2	50	35	5	5	5
7	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
8	Engineering Graphics & Design	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**24**	**600**	**420**	**100**	**40**	**40**

SEMESTER I (Group-B)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering physics	BSC	4	4	100	70	20	5	5
2	Engineering Mathematics –I	BSC	4	4	100	70	20	5	5
3	Programming for Problem Solving	ESC	3	3	100	70	20	5	5
4	English for Communication	HSMC	3	3	100	70	20	5	5
5	Constitution of India	MC	0	2	50	35	10	2.5	2.5
	Practical								
6	Engineering physics Lab	BSC	1	2	50	35	5	5	5
7	Programming for Problem Solving Lab	ESC	2	4	50	35	5	5	5
8	Workshop Practices	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**26**	**600**	**420**	**105**	**37.5**	**37.5**

SEMESTER II (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering physics	BSC	4	4	100	70	20	5	5
2	Engineering Mathematics –II	BSC	4	4	100	70	20	5	5
3	Programming for Problem Solving	ESC	3	3	100	70	20	5	5
4	English for Communication	HSMC	3	3	100	70	20	5	5
5	Constitution of India	MC	0	2	50	35	10	2.5	2.5
	Practical								
6	Engineering physics Lab	BSC	1	2	50	35	5	5	5
7	Programming for Problem Solving Lab	ESC	2	4	50	35	5	5	5
8	Workshop Practices	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**26**	**600**	**420**	**105**	**37.5**	**37.5**

SEMESTER –II (Group-B)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering Chemistry	BSC	3	3	100	70	20	5	5
2	Engineering Mathematics–II	BSC	4	4	100	70	20	5	5
3	Basic Electrical Engineering	ESC	4	4	100	70	20	5	5
4	Engineering Mechanics	ESC	3	3	100	70	20	5	5
	Practical								
5	Engineering Chemistry Lab	BSC	1	2	50	35	5	5	5
6	Basic Electrical Engineering Lab	ESC	1	2	50	35	5	5	5
7	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
8	Engineering Graphics & Design	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**24**	**600**	**420**	**100**	**40**	**40**

SEMESTER-III

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Analog Electronic Circuits	PCC	3	3	100	70	20	5	5
2	Data structure	PCC	3	3	100	70	20	5	5
3	Digital Electronics	PCC	3	3	100	70	20	5	5
4	Engineering Mathematics -III	BSC	4	3	100	70	20	5	5
5	Humanities-I Professional Practice, Law & Ethics Organizational Behavior	HSMC	3	3	100	70	20	5	5
6	Environmental Science	MC	0	2	50	35	10	2.5	2.5
7	Python Programming	PCC	3	3	100	70	20	5	5
	PRACTICAL								
8	Analog Electronic Circuits Lab	PCC	2	4	50	35	5	5	5
9	Data structure Lab	PCC	2	4	50	35	5	5	5
10	Digital Electronics Lab	PCC	2	4	50	35	5	5	5
11	IT Workshop(MAT LAB)	PCC	1	2	50	35	5	5	5
12	Python Programming Lab	PCC	2	4	50	35	5	5	5
	TOTAL		28	38	900	640	155	57.5	57.5

SEMESTER-IV

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Discrete Mathematics	BSC	4	4	100	70	20	5	5
2	Computer Organization & Architecture	PCC	3	3	100	70	20	5	5
3	Operating Systems	PCC	3	3	100	70	20	5	5
4	Design & Analysis of Algorithms	PCC	3	3	100	70	20	5	5
5	Microprocessor & Microcontroller	PCC	3	3	100	70	20	5	5
6	Software Engineering	PCC	3	3	100	70	20	5	5
	PRACTICAL								
6	Operating Systems Lab	PCC	2	4	50	35	5	5	5
7	Design & Analysis of Algorithms Lab	PCC	2	4	50	35	5	5	5
8	Computer Organization & Architecture Lab	PCC	2	4	50	35	5	5	5
	TOTAL		25	31	750	525	135	45	45

SEMESTER V

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory / Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Signals & Systems	PCC	3	3	100	70	20	5	5
2	Database Management Systems	PCC	3	3	100	70	20	5	5
3	Formal Language &Automata Theory	PCC	3	3	100	70	20	5	5
4	Object Oriented Programming	PCC	3	3	100	70	20	5	5
5	Humanities-II Soft Skills and Interpersonal Communication	HSMC	3	3	100	70	20	5	5
6	Elective-1 Graph Theory Image Processing Advanced Algorithms	PEC	3	3	100	70	20	5	5
	PRACTICAL								
7	Database Management Systems Lab	PCC	2	4	50	35	5	5	5
8	Object Oriented Programming Lab	PCC	2	4	50	35	5	5	5
9	Summer Internship-I (3-4 Weeks)	PCC	1	0	50	50	0	0	0
	TOTAL		23	26	750	540	130	40	40

SEMESTER VI

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Compiler Design	PCC	3	3	100	70	20	5	5
2	Computer Networks	PCC	3	3	100	70	20	5	5
3	Advance Java Programming	PCC	3	3	100	70	20	5	5
4	Elective-II Artificial Intelligence Machine Learning Visual Programming	PEC	3	3	100	70	20	5	5
5	Elective-III Web Technology Neural Networks and Deep Learning	PEC	3	3	100	70	20	5	5
6	Open Elective –I Cyber Law and Ethics Human Resource Development and Organizational Behavior Advanced Algorithms	HSMC	3	3	100	70	20	5	5
	Practical								
7	Compiler Design Lab	PCC	2	4	50	35	5	5	5
8	Computer Networks Lab	PCC	2	4	50	35	5	5	5
9	Advance Java Programming Lab	PCC	2	4	50	35	5	5	5
	TOTAL		24	30	750	525	135	45	4

SEMESTER VII

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Elective-IV Cryptography & Network Security Advanced Operating Systems Web and Internet	PEC	3	3	100	70	20	5	5
2	Elective-V Quantum Computing Optimization Techniques Real Time Systems	PEC	3	3	100	70	20	5	5
3	Open Elective-II Electronic Design Automation Computer Graphics Data mining and warehousing Semantic Web and Social Networks	OEC	3	3	100	70	20	5	5
4	Biology For Engineers	BSC	3	3	100	70	20	5	5
5	Data Analytics	PCC	3	3	100	70	20	5	5
	Practical								
5	Minor Project	PROJ	4	8	100	100	0	0	0
6	Industrial Training (Summer Internship-4-6 Week)	PROJ	4	0	100	100	0	0	0
	TOTAL		23	23	700	550	100	25	25

SEMESTER VIII

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Elective-VI CloudComputing Data Mining AdvancedComputerArchitecture	PEC	3	3	100	70	20	5	5
2	Open Elective-III Signals and systems Advanced Operating Systems	OEC	3	3	100	70	20	5	5
3	Open Elective-IV Cyber security Soft Computing	OEC	3	3	100	70	20	5	5
4	VLSI System Design	PCC	3	3	100	70	20	5	5
	PRACTICAL								
5	Major Project	PROJ	6	12	100	0	0	0	0
6	Extra- Curricular/ Co-Curricular Activity	PROJ	0	0	100	70	30	0	0
	Total		18	24	600	35	110	20	20

Distribution of Credit across 8 semesters:

Sl. No	Type of Paper	No. of Paper	Total Credit
1	Humanities and Social Sciences including Management courses **(HSMC)**	5	15
2	Basic Science courses**(BSC)**	9	28
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc**(ESC)**	8	18
4	Professional core courses (**PCC)**	30	77
5	Professional Elective courses relevant to chosen specialization/branch**(PEC)**	5	15
6	Open subjects – Electives from other technical and /or emerging subjects (**OEC)**	3	9
7	Project work, seminar and internship in industry or elsewhere**(PROJ)**	5	14
8	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Knowledge Tradition]**(MC)**	2	0
	Total	66	176

CIA – Continuous Internal Assessment – Based on Projects / Assignment during the semester

Note:
AICTE Activity Points to be earned by students admitted to Degree program (For more details refer to Chapter 6, AICTE, Activity Point Program, Model Internship Guidelines):
Every regular student, who is admitted to the 4 year Degree program, is required to earn 100 activity points in addition to the total credits earned for the program. Students entering 4 years Degree Program through lateral entry are required to earn 75 activity points in addition to the total credits earned for the program. The activity points earned by the student shall be reflected on the students 8th Semester grade card.
The activities to earn the points can be spread over the duration of the course. However, minimum prescribed duration should be fulfilled.
Activity Points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression.
Incase student fail to earn the prescribed activity points, Eight semester Grade Card shall be issued only after earning the required activity Points.
Students shall be eligible for the award of degree only after the release of the Eight Semester grade card.

There are two groups (A & B) in semester 1 & 2. The Group division will be decided by The Dean SoE & IT before commencement of classes

Subject: Analog Electronic Circuits
Code: BTE23027
3 Credits | Semester III

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To illustrate the students different electronic circuit and their application in practice.
- To impart knowledge on assessing performance of electronic circuit through monitoring of sensitive parameters.
- To evaluate the use of computer based analysis tools to review performance of semiconductor device circuit.

.

B. Course Outcomes: At the end of the course, students will be able to
[CO1] Understand the characteristics of transistors.
[CO2] To Design and analyze various rectifier and amplifier circuits.
[CO3] Design sinusoidal and non-sinusoidal oscillators.
[CO4] Understand the functioning of OP-AMP and design OP-AMP based circuits.

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

DIODE CIRCUITS: P-N junction diode, I-V characteristics of a diode; review of half-wave and

Diode Circuits:
P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers. Zener diodes, clamping and clipping circuits.
BJT CIRCUITS:
Structure and I-V characteristics of a BJT; BJT as a switch. BJT as an amplifier: small-signal

model, biasing circuits. Current mirror; common-emitter, common-base and common-collector amplifiers; Small signal equivalent circuits, high-frequency equivalent circuits.

MOSFET CIRCUITS:

MOSFET structure and I-V characteristics. MOSFET as a switch. MOSFET as an amplifier: small-signal model and biasing circuits, common-source, common-gate and common-drain amplifiers; small signal equivalent circuits

- gain, input and output impedances, trans-conductance, high frequency equivalent circuits.

DIFFERENTIAL, MULTI-STAGE

Differential amplifier; power amplifier; direct coupled multi-stage amplifier;

OPERATIONAL AMPLIFIERS

direct coupled multi-stage amplifier; internal structure of an operational amplifier. ideal op-amp, non-idealities in an op-amp (Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product).

LINEAR AND NON LINEAR APPLICATIONS OF OP-AMP:

Idealized analysis of op-amp circuits. Inverting and non-inverting amplifier, differential amplifier, instrumentation amplifier, integrator, active filter, P, PI and PID controllers and lead/lag compensator using an op-amp, voltage regulator, oscillators (Wein bridge and phase shift). Analog to Digital Conversion. Hysteretic Comparator, Zero Crossing Detector, Square-wave and triangular-wave generators. Precision rectifier, peak detector. Monoshot.

E. TEXT BOOKS

T1. Analog Electronic Circuit, B Saha
T2. Analog Electronic Circuits, J B Gupta
T3. Design with Operational Amplifiers and Analog Integrated Circuits, Sergio Franco
T4. Analog Electronics Circuits, S N Ali

F. REFERENCE BOOKS

R1. A. S. Sedra and K. C. Smith, “Microelectronic Circuits”, New York, Oxford University Press, 1998.
R2. J. V. Wait, L. P. Huelsman and G. A. Korn, “Introduction to Operational Amplifier theory and applications”, McGraw Hill U. S., 1992.
R3. J. Millman and A. Grabel, “Microelectronics”, McGraw Hill Education, 1988.
R4. P. Horowitz and W. Hill, “The Art of Electronics”, Cambridge University Press, 1989.
R5. P.R. Gray, R.G. Meyer and S. Lewis, “Analysis and Design of Analog Integrated Circuits”, John Wiley & Sons, 2001.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Understand the characteristics of transistors.	**3**															
[CO2]	To Design and analyze various rectifier and amplifier circuits		**2**	**1**													**3**
[CO3]	Design sinusoidal and non-sinusoidal oscillators.			**2**										**2**			
[CO4]	Understand the functioning of OP-AMP and design OP-AMP based circuits.										**1**					**2**	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Data Structure

Code: BTE23028

3 Credits | Semester III

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To impart the basic concepts of data structures andalgorithms.
- To understand concepts about searching and sorting techniques
- To understand basic concepts about stacks, queues, lists, trees andgraphs.
- To enable them to write algorithms for solving problems with the help of fundamental data structures

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Analyze the algorithms to determine the time and computation complexity and justify thecorrectness.

[CO2] Design and implement data structures related to search problems

[CO3] For a given problem of Stacks, Queues and linked list implementand analyze to determine the time and computationcomplexity.

[CO4] Understand logic behind various sorting algorithms and compute the time complexity

[CO5] Learn and implement Graph search and traversal algorithms and determine the time and computation complexity.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

C. SYLLABUS:

INTRODUCTION

Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. SEARCHING:

Linear Search and Binary Search Techniques and their complexity analysis.

Stacks:
ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation–corresponding algorithms and complexity analysis. Queue:
ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and theiranalysis.

LINKED LISTS:
Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexityanalysis.

Sorting and Hashing: Objective and properties of different sorting algorithms:
Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.

GRAPH
Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysisTrees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis

E. TEXT BOOKS

T1.Fundamentals of Data Structures, Illustrated Edition by Ellis Horowitz, SartajSahni, Computer SciencePress.

F. REFERENCE BOOKS

R1. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition byMark Allen Weiss, Addison-Wesley Publishing Company

R2. How to Solveit by Computer, 2nd Impression by R.G. Dromey, PearsonEducation.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Analyze the algorithms to determine the time and computation complexity and justify the correctness.	**1**			**3**												
[CO2]	Design and implement data structures related to search problems		**2**	**2**													
[CO3]	For a given problem of Stacks, Queues and linked list implement and analyze to determine the time and computation complexity.					**2**											
[CO4]	Understand logic behind various sorting algorithms and compute the time complexity	**1**															
[CO5]	Learn and implement Graph search and traversal algorithms and determine the time and computation complexity.					**2**											

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Digital Electronics

Code: BTE23029

3 Credits | Semester III

Total Lecture: 45 Total Tutorial: 9

A. INTRODUCTION:

- To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.
- To prepare students to perform the analysis and design of various digital electronic circuits.

B. COURSE OUTCOMES: By the end of this course, students will be able to:

[CO1] Understand working of logic families and logicgates.
[CO2] Design and implement Combinational and Sequentiallogiccircuits
[CO3] Understand the process of Analog to Digital conversion and Digital to Analogconversion.
[CO4] Be able to use PLDs to implement the given logicalproblem.
[CO5] Select relevant hydraulic pumps for different applications.

C. ASSESSMENT PLAN:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS:

FUNDAMENTALS OF DIGITAL SYSTEMS AND LOGIC FAMILIES: Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic codes, error detecting and correcting codes. Characteristics of digital ICs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic.

COMBINATIONAL DIGITAL CIRCUITS: Standard representation for logic functions, K-map representation, and simplification of logic functions using K-map, minimization of logical functions. Don't care conditions. Multiplexer, De-Multiplexer/Decoders, Adders, Subtractions, BCD arithmetic, carry look ahead adder, serial adder ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.

SEQUENTIAL CIRCUITS AND SYSTEMS:
A 1-bit memory, the circuit properties of Bitable latch, the clocked SR flip flop, J- K-T and D-typesflip-flops,applicationsofflip-flops,shiftregisters,applications of shift registers. serial to parallel converter, parallel to serial converter, ring counter, sequence generate ripple(Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.

A/D AND D/A CONVERTERS:
Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter lCs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage of frequency and voltage o time conversion, specifications of A/D converters, example of A/D converter ICs

SEMICONDUCTOR MEMORIES AND PROGRAMMABLE LOGIC DEVICES:
Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory(RAM), content addressable memory (CAM), charge de coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array(FPGA).

E. TEXT BOOK

T1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education,2009.
T2. M. M. Mano, "Digital logic and Computer design", Pearson Education India,2016.

F. REFERENCES

R1. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India,2016.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Understand working of logic families and logicgates.		**1**														
[CO2]	Design and implement Combinational and Sequentiallogiccircuits		**2**														
[CO3]	Understand the process of Analog to Digital conversionand Digital to Analogconversion																
[CO4]	Be able to use PLDs to implement the given logicalproblem						**1**										
[CO5]	Select relevant hydraulic pumps for different applications																

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Engineering Mathematics III

Code: BTE23046

4 Credits | Semester III

Total Lecture: 60 Total Tutorial: 12

A. Introduction:

- To introduce the solution methodologies for second order Partial Differential Equations with applications in engineering
- To equip students with the concepts of partial differential equations and how to solve linear partial differential equations with different methods.
- To provide an overview of probability and statistics to engineers.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Understand the concept of partial differential equations.

[CO2] Apply concept of differential equation for solving general engineering problems.

[CO3] Understand the theory of probability and its applications on engineering problems.

[CO4] Apply the concept of statics in data sampling.

[CO5]Understand the theory of data distribution, standard deviation and different charts**.**

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

PARTIAL DIFFERENTIAL EQUATION: Definition of Partial Differential Equations, First order partial differential equations, solutions of first order linear PDEs,Solution to homogenous and non-homogenous linear partial differential equations of second order by complimentary function and particular integral method.

APPLICATION OF DIFFERENTIAL EQUATION: Second-order linear equations and their classification, Initial and boundary conditions, D' Alembert's solution of the wave equation; Duhamel's principle for one dimensional wave equation, Heat diffusion and vibration problems, Separation of variables method to simple problems in Cartesian coordinates. The Laplacian in plane, cylindrical and spherical polar coordinates, solutions with Bessel functions and Legendre functions. One dimensional diffusion equation and its solution by separation of variables.

PROBABILITY THEORY: Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev's Inequality, Continuous random variables and their properties, distribution functions and densities, normal, exponential and gamma densities. Bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule

STATISTICS:

Basic Statistics, Measures of Central tendency: Moments, skewness and Kurtosis – Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation. Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves

SAMPLING OF DATA: Test of significance: Large sample test for single proportion, difference of proportions, Tests for single mean. Difference of means, and difference of standard deviations. Test for ratio of variances - Chi-square test for goodness of fit and independence of attributes

E. TEXT BOOKS

T1.Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
T2.N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

F. REFERENCE BOOKS

R1.P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
R2.S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Understand the concept of partial differential equations	2															
[CO2]	Apply concept of differential equation for solving general engineering problems		2														
[CO3]	Understand the theory of probability and its applications on engineering problems.			2													
[CO4]	Apply the concept of statics in data sampling.		2														
[CO5]	Understand the theory of data distribution, standard deviation and different charts																

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Professional Practice, Law & Ethics

Code: BTE25373

3 Credits | Semester III

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession.
- To develop some ideas of the legal and practical aspects of their profession.

A. Course Outcomes: At the end of the course, students will be able to;

[CO1] Define what constitutes Professional practice and the respective roles of various stakeholders.

[CO2] Make the students execute the types of roles they are expected to play in the society as practitioners of Civil Engineering profession.

[CO3] Examine the utility of Contracts and Contract Management in Civil Engineering, Dispute Resolution mechanisms, and Laws governing Engagement of Labour.

[CO4] Evaluate the different Intellectual Property Rights, Patents etc.

[CO5] Develop good ideas of the legal and practical aspects of their profession.

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

PROFESSIONAL PRACTICE & ETHICS: Professional Practice - Respective roles of various stakeholders: Government (constituting regulatory bodies and standardization organizations, prescribing norms to ensure safety of the citizens); Standardization Bodies (ex. BIS, IRC)(formulating standards of practice); professional bodies (ex. Institution of Engineers(India), Indian Roads Congress, IIA/ COA, ECI, Local Bodies/ Planning Authorities) (certifying professionals and offering platforms for interaction); Clients/ owners (role governed by contracts); Developers (role governed by regulations such as RERA); Consultants (role governed by bodies such as CEAI); Contractors (role governed by contracts and regulatory Acts and Standards); Manufacturers/ Vendors/ Service agencies (role governed by contracts and regulatory Acts and Standards).Professional Ethics- Definition of Ethics, Professional Ethics, Business Ethics, Corporate Ethics, Engineering Ethics, Personal Ethics; Code of Ethics as defined in the website of Institution of Engineers (India); Profession, Professionalism, Professional Responsibility, Professional Ethics; Conflict of Interest, Gift Vs Bribery, Environmental breaches, Negligence, Deficiencies in state-of-the-art; Vigil Mechanism, Whistle blowing, protected disclosures.

GENERAL PRINCIPLES OF CONTRACTS MANAGEMENT: Indian Contract Act, 1972 and amendments covering General principles of contracting; Contract Formation & Law; Privacy of contract; Various types of contract and their features; Valid & Voidable Contracts; Prime and subcontracts; Joint Ventures & Consortium; Complex contract terminology; Tenders, Request For Proposals, Bids & Proposals; Bid Evaluation; Contract Conditions & Specifications; Critical “RedFlag” conditions; Contract award & Notice To Proceed; Variations & Changes in Contracts; Differing site conditions.Cost escalation; Delays, Suspensions & Terminations; Time extensions & Force Majeure; Delay Analysis; Liquidated damages & Penalties; Insurance & Taxation; Performance and Excusable Non-performance; Contract documentation; Contract Notices; Wrong practices in contracting (Bid shopping, Bid fixing, Cartels); Reverse auction; Case Studies; Build- Own-Operate & variations; Public- Private Partnerships; International Commercial Terms.

ARBITRATION, CONCILIATION AND ADR (ALTERNATIVE DISPUTE RESOLUTION) SYSTEM: Arbitration – meaning, scope and types – distinction between laws of 1940 and 1996; UNCITRAL model law –Arbitration and expert determination; Extent of judicial intervention; International commercial arbitration; Arbitration agreements – essential and kinds, validity, reference and interim measures by court; Arbitration tribunal – appointment, challenge, jurisdiction of arbitral tribunal, powers, grounds of challenge, procedure and court assistance. Award including Form and content, Grounds for setting aside an award, Enforcement, Appeal and Revision; Enforcement of foreign awards – New York and Geneva Convention Awards; Distinction between conciliation, negotiation, mediation and arbitration, confidentiality, resort to judicial proceedings, costs; Dispute Resolution Boards; Look Adalats.

ENGAGEMENTOF LABOUR AND LABOUR & OTHER CONSTRUCTION-RELATED LAWS: Role of Labour in Civil Engineering; Methods of engaging labour- on rolls, labour sub-contract, piece rate work; Industrial Disputes Act, 1947; Collective bargaining. Industrial Employment (Standing Orders) Act, 1946; Workmen"s Compensation Act, 1923; Building & Other Construction Workers (regulation of employment and conditions of service) Act (1996) and Rules (1998); RERA Act 2017, NBC 2017.

LAW RELATING TO INTELLECTUAL PROPERTY: Introduction – meaning of intellectual property, main forms of IP, Copyright, Trademarks, Patents and Designs, Secrets; Law relating to

Copyright in India including Historical evolution of Copy Rights Act, 1957, Meaning of copyright – computer programs, Ownership of copyrights and assignment, Criteria of infringement, Piracy in Internet –Remedies and procedures in India, Law relating to Patents under Patents Act, 1970 including Concept and historical perspective of patents law in India, Patentable inventions with special reference to biotechnology products, Patent protection for computer programs, Process of obtaining patent – application, examination, opposition and sealing of patents, Patent cooperation treaty and grounds for opposition, Rights and obligations of patentee, Duration of patents – law and policy considerations, Infringement and related remedies.

E. TEXT BOOKS

T1. B.S. Patil, Legal Aspects of Building and Engineering Contracts, 1974.
T2. The National Building Code, BIS, 2017
T3. RERA Act, 2017
T4. Meena Rao (2006), Fundamental concepts in Law of Contract, 3rd Edn. Professional Offset
T5. NeelimaChandiramani (2000), The Law of Contract: An Outline, 2nd Edn. Avinash Publications Mumbai
T6. Avtarsingh (2002), Law of Contract, Eastern Book Co.
T7. Dutt (1994), Indian Contract Act, Eastern Law House
T8. Anson W.R. (1979), Law of Contract, Oxford University Press
T9.Kwatra G.K. (2005), The Arbitration & Conciliation of Law in India with case law on UNCITRAL Model Law on Arbitration, Indian Council of Arbitration
T10. Wadhera (2004), Intellectual Property Rights, Universal Law Publishing Co.

F. REFERENCE BOOKS

R1. T. Ramappa (2010), Intellectual Property Rights Law in India, Asia Law House
R2. Bare text (2005), Right to Information Act
R3. O.P. Malhotra, Law of Industrial Disputes, N.M. Tripathi Publishers
R4. K.M. Desai(1946), The Industrial Employment (Standing Orders) Act
R5. Rustamji R.F., Introduction to the Law of Industrial Disputes, Asia Publishing House
R6. Vee, Charles &Skitmore, Martin (2003) Professional Ethics in the Construction Industry, Engineering Construction and Architectural management, Vol.10, Iss2,pp 117-127, MCB UP Ltd
R7. American Society of Civil Engineers (2011) ASCE Code of Ethics – Principles Study and Application
R8. Ethics in Engineering- M.W.Martin&R.Schinzinger, McGraw-Hill

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[CO1]	Define what constitutes Professional practice and the respective roles of various stakeholders.								1								2
[CO2]	Make the students execute the types of roles they are expected to play in the society as practitioners of Civil Engineering profession.							1		2							2
[CO3]	Examine the utility of Contracts and Contract Management in Civil Engineering, Dispute Resolution mechanisms, and Laws governing Engagement of Labour.							2			2				2		
[CO4]	Evaluate the different Intellectual Property Rights, Patents etc.															1	
[CO5]	Develop good ideas of the legal and practical aspects of their profession.											1					3

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Organizational Behavior

Code: BTE24060

3 Credits | Semester III

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- What students are expect to learn at the end of the course?

B. Course Outcomes: At the end of the course, students will be able to

[CO1]	Define the key ideas and issues in OB.
[CO2]	Interpret the dynamics of human behavior in work context.
[CO3]	Examine the determinants of work behavior from different levels.
[CO4]	Judge the issues in OB that influence the way people behave in an organizational setting.
[CO5]	Develop competencies of analyzing behavioral issues in the work environment

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

INTRODUCTION: Study of OB: Definition, Meaning, Why Study OB. Learning- Nature of Learning, How learning occurs, Learning and OB.

INDIVIDUAL BEHAVIOUR & MOTIVATION: Foundations of Individual Behaviour: Personality- Meaning and Definition, Determinants o Personality, Personality Traits, Personality and OB. Perception- Meaning and Definition, Perceptual Process, Importance of Perception in OB. Motivation- Nature and Importance, Herzberg"s Two Factor Theory, Maslow"s Need Hierarchy Theory, Alderfer"s ERG Theory, Evaluations.

ORGANISATIONAL BEHAVIOUR PROCESSES: Communication- Importance, Types, Gateways and Barriers to Communication, Communication as a tool for improving interpersonal effectiveness. Groups in Organisations- Nature, Types, Why do people join groups , Group cohesiveness and Group Decision making. Managerial Implications, Effective Team building.

LEADERSHIP & CONFLICT MANAGEMENT: Leadership & Management, Theories of leadership- Trait theory, Leader, Behaviour theory, Contingency Theory, Leadership, Leadership and Followership, How to be an effective leader**.** Conflict- Nature of Conflict and conflict resolution. An introduction to transactionalanalysis.

ORGANISATION CULTURE & HRM: Organizational Culture- Meaning & Definition, Culture and Organizational effectiveness**.** Introduction to Human Resource Management- Selection, Orientation, Training& Development, Performance Appraisal, Incentives. Organizational Changes- Importance of Change, Planned Change and OB techniques. International Organizational Behaviour- Trends in International Business, Cultural Differences and Similarities, Individual and Interpersonal Behaviour in global perspective.

E. TEXT BOOKS

T1.Keith Davis, Organizational Behavior, McGraw Hill
T2.K.Aswathappa, Organizational Behavior, Himalaya Publishing House

F. REFERENCE BOOKS

R1.Stephen P. Robbins, Organizational Behavior, Prentice Hall of India

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PS O 2	PSO 3	PSO 4
[CO1]	Define the key ideas and issues in OB.									**2**	**2**	**2**	**2**				**2**
[CO2]	Interpret the dynamics of human behavior in work context.									**2**	**2**	**2**					**2**
[CO3]	Examine the determinants of work behavior from different levels.									**3**	**3**		**2**				**2**
[CO4]	Judge the issues in OB that influence the way people behave in an organizational setting.									**2**	**2**						
[CO5]	Develop competencies of analyzing behavioral issues in the work environment									**3**	**2**		**2**				**2**

1- Low Correlation; 2- Moderate Correlation; 3- Substantial

Subject: Environmental Science

Code: BTE24085

0 Credits | Semester III

Total Lecture: 30 Total Tutorial: 6

A. INTRODUCTION:

- Solve various engineering problems applying ecosystem to produce eco – friendly products.
- Use relevant air and noise control method to solve domestic and industrial problems.
- Use relevant water and soil control method to solve domestic and industrial problems.
- To recognize relevant energy sources required for domestic and industrial applications.
- Solve local solid and e-waste problems.

B. COURSE OUTCOMES: By the end of this course, students will be:

[CO1] Understand the ecosystem and terminology and solve various engineering problems applying
[CO2] Ecosystem knowledge to produce eco – friendly products
[CO3] Understand the suitable air, extent of noise pollution, and control measures and acts.
[CO4] Understand the water and soil pollution, and control measures and act.
[CO5] Understand different renewable energy resources and efficient process of harvesting.

C. ASSESSMENT PLAN:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS:

INTRODUCTION TO ENVIRONMENTAL SCIENCE: Definition, Principles and scope of Environmental Science,Earth, Man and Environment. Ecosystems, Pathways in Ecosystems.Physico-chemical and Biological factors in the Environment.Geographical classification and zones'.

AIR AND NOISE POLLUTION: Definition of pollution and pollutant, Natural and manmade sources of air pollution (Refrigerants, I.C., Boiler), Air Pollutants: Types, Particulate Pollutants:

Effects and control (Bag filter, Cyclone separator, Electrostatic Precipitator) Gaseous Pollution Control: Absorber, Catalytic Converter,Effects of air pollution due to Refrigerants, I.C., Boiler Noise pollution: sources of pollution, measurement of pollution level, Effects of Noise pollution, Noise pollution (Regulation and Control) Rules, 2000

WATER AND SOIL POLLUTION: Sources of water pollution, Types of water pollutants, Characteristics of water pollutants Turbidity, pH, total suspended solids, total solids BOD and COD: Definition, calculation**,**Waste Water Treatment: Primary methods: sedimentation, froth floatation, Secondary methods: Activated sludge treatment, Trickling filter, Bioreactor, Tertiary Method: Membrane separation technology, RO (reverse osmosis).Causes, Effects and Preventive measures of Soil Pollution: Causes-Excessive use of Fertilizers, Pesticides and Insecticides, Irrigation, E-Waste.

RENEWABLE SOURCES OF ENERGY: Solar Energy: Basics of Solar energy. Flat plate collector (Liquid & Air). Theory of flat plate collector. Importance of coating. Advanced collector. Solar pond. Solar water heater, solar dryer. Solar stills.Biomass: Overview of biomass as energy source. Thermal characteristics of biomass as fuel. Anaerobic digestion. Biogas production mechanism. Utilization and storage of biogas,Wind energy: status and future prospects of wind energy. Wind energy in India. Environmental benefits and problem of wind energy,New Energy Sources: Need of new sources. Different types new energy sources. Applications of (Hydrogen energy, Ocean energy resources, Tidal energy conversion.) Concept, origin andpower plants of geothermal energy.

SOLID WASTE MANAGEMENT, ISO 14000 & ENVIRONMENTAL MANAGEMENT: Solid waste generation- Sources and characteristics of: Municipal solid waste, E- waste, biomedical waste. Metallic wastes and Non-Metallic wastes (lubricants, plastics, rubber) from industries,Collection and disposal: MSW (3R, principles, energy recovery, sanitary landfill), Hazardous waste Air quality act 2004, air pollution control act 1981, water pollution, and control act1996.Structure and role of Central and state pollution control board. Concept of Carbon Credit, Carbon Footprint. Environmental management in fabrication industry. ISO14000: Implementation in industries, Benefits.

E. TEXT BOOK

T1. S.C. Sharma & M.P. Poonia, Environmental Studies,Khanna Publishing House,NewDelhi
T2.C.N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd., 2011.
T3. Arceivala, Soli Asolekar, Shyam, Waste Water Treatment for Pollution Control and
T4. Reuse, Mc-Graw Hill Education India Pvt. Ltd., New York, 2007, ISBN:978-07-062099.
T5. O.P. Gupta, Elements of Environmental Pollution Control, Khanna Publishing House, New Delhi

F. REFERENCES

R1. Rao, C. S., Environmental Pollution Control and Engineering, New Age International Publication,2007, ISBN: 81-224-1835-X.
R2. Rao, M. N.Rao, H.V.N, Air Pollution, Tata Mc-Graw Hill Publication, New delhi, 1988, ISBN: 0-07-451871-8.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Understand the ecosystem and terminology and solve various engineering problems applying		**3**														
[CO2]	Ecosystem knowledge to produce eco – friendly products							**2**									
[CO3]	Understand the suitable air, extent of noise pollution, and control measures and acts.							**2**									
[CO4]	Understand the water and soil pollution, and control measures and act.							**1**									
[CO5]	Understand different renewable energy resources and efficient process of harvesting.							**1**									

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Python Programming

Code: BTE23391

3 Credits | Semester III

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

Following are the objectives of this course:

- To describe the core syntax and semantics of Python programming language.
- To discover the need for working with the strings and functions.
- To illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
- To indicate the use of regular expressions and built-in functions to navigate the file system.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] To interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.
[CO2] The student will be able to express proficiency in the handling of strings and functions.
[CO3] Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.
[CO4] Design and identify the commonly used operations involving file systems and regular expressions.
[CO5] To articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python.

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, The type() Function and Is Operator, Dynamic and Strongly Typed Language

Control Flow Statements: The if Decision Control Flow Statement, The if…else Decision Control Flow Statement, The if…elseif…else Decision Control Statement, Nested if Statement, The while Loop, The for Loop, The continue and break Statements, Catching Exceptions Using try and except Statement

Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.

Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings

Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, The del Statement.

Dictionaries: Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, The del Statement, **Tuples and Sets,** Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Tuple Methods, Using zip() Function, Sets, Set Methods, Traversing of Sets, Frozenset.

Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, The Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules, **Regular Expression Operations:** Using Special Characters, Regular Expression Methods, Named Groups in Python Regular Expressions, Regular Expression with glob Module.

Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data Attributes, Encapsulation, Inheritance, The Polymorphism.

E. TEXT BOOKS

T1. Gowrishankar S, Veena A, "Introduction to Python Programming", 1st Edition, CRC Press/Taylor & Francis, 2018

T2. 2. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", 1st Edition, O'Reilly Media, 2016

F. REFERENCE BOOKS

R1. Wesley J Chun, “Core Python Applications Programming”, 3rd Edition, Pearson Education India, 2015

R2. Miguel Grinberg, “Flask Web Development: Developing Web Applications with Python”, 2nd Edition, O'Reilly Media, 2018

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	To interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.	**3**	**3**	**2**	**1**	**1**											**2**
[CO2]	The students will be able to express proficiency in the handling of strings and functions.		**2**	**2**	**1**												
[CO3]	Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.		**3**										**3**				**1**
[CO4]	Design and identify the commonly used operations involving file systems and regular expressions.	**2**	**1**		**3**												**2**
[CO5]	To articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python.	**2**	**1**														

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Analog Electronics circuit Lab

Code: BTE23033

2 Credits | Semester III

Total Lecture: 60

A. Introduction:

- Work as professionals in the area of Electronics and Allied Engineering fields.
- Pursue higher studies and involve in interdisciplinary research work.
- Exhibit ethics, professional skills and leadership qualities in their profession.

B. **Course Outcomes:** At the end of the course, students will be able to

[CO1] Exhibit competency in embedded system domain
[CO2] Exhibit competency in RF& Signal processing domain
[CO3] Determine the correctness of readings.
[CO4] Design, construct, and take measurement of various analog circuits to compare

.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	5
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	35
Total		50
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

S.NO	Name of Experiment
1.	Study of diode characteristics.
2.	Study of rectifier characteristics.

3.	Study of clipping and clamping circuit.
4.	To study the characteristics of bipolar junction transistor
5.	To study the frequency response of CE amplifier.
6.	To study the frequency response of CC amplifier.
7.	To study the Frequency response of two stages -RC coupled amplifier.
8.	To study the Frequency response of Common source FET amplifier.
9.	To study the frequency response of Hartley oscillator.
10.	To study the frequency response of Colpitt's oscillator.
11.	To study the frequency response of RC Phase - Shift Oscillator.
12.	To study the frequency response of Wein - Bridge Oscillator

E. TEXT BOOKS

T1. Analog Electronic Circuit, B Saha
T2. Analog Electronic Circuits, J B Gupta
T3. Design with Operational Amplifiers and Analog Integrated Circuits, Sergio Franco
T4. Analog Electronics Circuits, S N Ali

F. REFERENCE BOOKS

R1. A. S. Sedra and K. C. Smith, "Microelectronic Circuits", New York, Oxford University Press, 1998.
R2. J. V. Wait, L. P. Huelsman and G. A. Korn, "Introduction to Operational Amplifier theory and applications", McGraw Hill U. S., 1992.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Exhibit competency in embedded system domain	**1**															
[CO2]	Exhibit competency in RF& Signal processing domain	**1**															
[CO3]	Determine the correctness of readings		**2**														
[CO4]	Design, construct, and take measurement of various analog circuits to compare	**2**															

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Data Structures Lab

Code: BTE23034

2 Credits | Semester III

Total Lecture: 60

A. Introduction:

The objective of this lab is to teach students various data structures and to explain them algorithms for performing various operations on these data structures. This lab complements the data structures course. Students will gain practical knowledge by writing and executing programs in C using various data structures such as arrays, linked lists, stacks, queues, trees, graphs, hash tables and search trees.

B. **Course Outcomes:** At the end of the course, students will be able to

[CO1] Design and analyze the time and space efficiency of the data structure.
[CO2] Identity the appropriate data structure for given problem
[CO3] Write complex applications using structured programming methods
[CO4] Understand and apply fundamental algorithmic problems including Tree traversals, Graph traversals.
[CO5] Understand which algorithm or data structure to use in different scenarios.

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	5
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	35
Total		50
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

S. No.	**Name of Experiments**
1	Write C program that uses stack operations to convert a given infix expression into its postfix Equivalent, Implement the stack using an array.

2	Write C programs for implementing the following sorting methods to arrange a list of integers in ascending order: Insertion sort.
3	Write C programs for implementing the following sorting methods to arrange a list of integers in ascending order: Merge sort.
4	Write C programs for implementing the following sorting methods to arrange a list of integers in ascending order: Quick Sort.
5	Write C programs for implementing the following sorting methods to arrange a list of integers in ascending order: Selection Sort.
6	Write a C program for implementing Heap sort algorithm for sorting a given list of integers in ascending order.
7	Write a C program that uses functions to perform the following. 1. Create a binary search tree of integers.
8	Write C programs to implement a double ended queue ADT using i) array. 1. Create a binary search tree of integers.
9	Write a program to implement single linked list.
10	Write a program to implement double linked list.

E. TEXT BOOKS

T1.Fundamentals of Data Structures, Illustrated Edition by Ellis Horowitz, SartajSahni, Computer SciencePress.

F. REFERENCE BOOKS

R1. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition byMark Allen Weiss, Addison-Wesley Publishing Company

R2. How to solve it by Computer, 2nd Impression by R.G. Dromey, PearsonEducation.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Design and analyze the time and space efficiency of the datastructure.	1															
[CO2]	Identity the appropriate data structure for givenproblem		2														
[CO3]	Write complex applications using structured programmingmethods			2													
[CO4]	Understand and apply fundamental algorithmic problems including Tree traversals, Graphtraversals.			2													
[CO5]	Understand which algorithm or data structure to use in differentscenarios.					2											

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Digital Electronics Lab

Code: BTE23035
2 Credits | Semester III

Total Lecture: 60

A. Introduction:

Students will learn and understand the Basics of digital electronics and able to design basic logic circuits, combinational and sequential circuits.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Distinguish between analog and digital systems.
[CO2] Identify the various digital ICs and understand their operation.
[CO3] Apply Boolean laws to simplify the digital circuits.
[CO4] Design simple logic circuits

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	5
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	35
Total		50
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

S.NO	**Name of Experiments**
1.	Introduction to Digital Laboratory Equipment's& IC"s
2.	To study basic gates and verify their truth tables.
3.	To design and construct basic flip-flops
4.	To design and implement encoder and decoder
5.	To design and implement multiplexer
6.	To design and implement DE multiplexer
7.	To Design adder, subtractor circuit using a 4-bit adder IC

8.	To design and construct of Synchronous Counter
9.	To design and construct Asynchronous counter
10.	To realize Basic gates (AND,OR,NOT) From Universal Gates(NAND & NOR)
11.	To study about full adder & verify its truth table.

E. TEXT BOOK

T1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
T2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.

F. REFERENCES

R1. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Distinguish between analog and digital systems.		**1**														
[CO2]	Identify the various digital ICs and understand their operation.				**2**												
[CO3]	Apply Boolean laws to simplify the digital circuits.			**2**													
[CO4]	Design simple logic circuits			**2**													

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: IT Workshop (MATLAB)
Code: BTE23271
1 Credits | Semester III

Total Lecture: 30

A. Introduction:

- To make the students Learn high-performance language for technical computing in mat lab
- It integrates computation, visualization, and programming in an easy-to-use environment in mat lab
- To expressed in familiar mathematical notation in mat lab

B. Course Outcomes: At the end of the course, students will be able to:

[CO1] Understand the need for simulation/implementation for the verification of mathematical functions.
[CO2] Understand the main features of the MATLAB/SCILAB program development environment to enable their usage in the higher learning.
[CO3] Implement simple mathematical functions/equations in numerical computing environment such as MATLAB/SCILAB.
[CO4] Interpret and visualize simple mathematical functions and operations thereon using plots/display.
[CO5] Analyze the program for correctness and determine/estimate/predict the output and verify it under simulation environment using MATLAB/SCILAB tools.

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	5
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	35
Total		50
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

S.No.	Name of Experiments
1	Study of Introduction toMATLAB
2	Study of basic matrixoperations
3	To solve linear equations
4	Solution of Linear equations for Underdetermined and Over determined cases.
5	Determination of Eigen values and Eigen vectors of a Squarematrix.
6	Solution of Difference Equations
7	Solution of Difference Equations using EulerMethod
8	Solution of differential equation using 4th order Runge- Kuttamethod
9	Determination of roots of apolynomial
10	Determination of polynomial using method of Least Square Curve Fitting
11	Determination of polynomial fit, analyzing residuals, exponential fitanderror bounds from the given data.
12	Determination of time response of an R-L-Ccircuit

E. TEXT BOOKS

T1. Desmond J. Higham, Nicholas J. Higham, MATLAB Guide, 3rdedition, SIAM, 2016.
T2. William Palm, MATLAB for Engineering Applications, 3rd edition, McGraw Hill, 2018.

F. REFERENCE BOOKS

R1. Russel Downey, Matlab And Python Programming, UpSkill Learning, 2016.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
[CO1]	Understand the need for simulation/implementation for the verification of mathematical functions.	**3**													**1**		
[CO2]	Understand the main features of the MATLAB/SCILAB programdevelopment environment to enable their usage in the higher learning.	**1**			**2**											**1**	
[CO3]	Implement simple mathematical functions/equations in numerical computing environment such as MATLAB/SCILAB.		**2**	**3**													
[CO4]	Interpret and visualize simple mathematical functions and operations thereon using plots/display.		**2**		**3**												

[CO5]	Analyze the program for correctness and determine/estimate/predict the output and verify it under simulation environment using MATLAB/SCILAB tools.		**2**	**2**		**3**											

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Python Programming Lab

Code: BTE23392
2 Credits | Semester III

Total Lecture: 60

A. Introduction:

- To make the students Learn Syntax and Semantics and create Functions in Python
- To Handle Strings and Files in Python.
- To implement Object Oriented Programming concepts in Python

B. Course Outcomes: At the end of the course, students will be able

[CO1] Toexamine Python syntax and semantics and be fluent in the use of Python flow control andfunctions.
[CO2] The students will demonstrate proficiency in handling Strings and File Systems.
[CO3] Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
[CO4] Understand the basic concepts scripting and the contributions of scripting language

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	5
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	35
Total		50
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

S.No.	**Name of Experiments**
1	Write a Python Program to find GCD of two numbers.
2	Write a Python Program to find first n prime numbers.

3	Write a Python Program to multiply matrices.
4	Write a Python Program to find the maximum from a list of numbers.
5	Write a Python Program to reverse the String.
6	Write a Python Program to find the Square root of a Number using Newton's Method
7	Write a Python program to find the Exponentiation of a number.
8	Write a Python Program to display the Fibonacci sequence upto n-th term
9	Write a Python Program to check if the number is an Armstrong number or not.
10	Write a Python Program to find the factorial of a number.
11	Write a Python Program to find the length of a given string.
12	Write a Python program to display the use of class and objects.
13	Write a Python Program to perform Binary Search.
14	Write a Python program to perform matrix multiplication.

E. TEXT BOOKS

T1. Gowrishankar S, Veena A, "Introduction to Python Programming", 1st Edition, CRC Press/Taylor & Francis, 2018
T2. 2. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", 1st Edition, O'Reilly Media, 2016

F. REFERENCE BOOKS

R1. Wesley J Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education India, 2015
R2. Miguel Grinberg, "Flask Web Development: Developing Web Applications with Python", 2nd Edition, O'Reilly Media, 2018

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
[CO1]	To examine Python syntax and semantics and be fluent in the use of Python flow control and functions.	**2**													**1**		
[CO2]	The students will demonstrate proficiency in handling Strings and File Systems.				**2**											**1**	
[CO3]	Create, run and manipulate Python Programs using core data structures like Lists,Dictionaries and use Regular Expressions.		**2**													**2**	
[CO4]	Understand the basic concepts scripting and the contributions of scripting language		**1**		**2**										**1**		

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

ARKA JAIN
University
Jharkhand

Syllabus of

B.Tech. in Computer Science Engineering

Semester-IV

ARKAJAIN University, Jharkhand
School of Engineering & IT
Department of Engineering
Faculty – Bachelor of Technology in Computer Science Engineering
Scheme of Study (w.e.f Batch 2020-21)

SEMESTER –I

Sr. No.	Name of the Subject	Group	L-T-P	Credit
1	Engineering Mathematics–I	A & B	3-1-0	4
2	Engineering Chemistry	A	3-0-0	3
	Programming for Problem Solving	B	3-0-0	3
3	Basic Electrical Engineering	A	3-1-0	4
	Engineering physics	B	3-1-0	4
4	Engineering Mechanics	A	3-0-0	3
	English for Communication	B	3-0-0	3
5	Constitution of India	B	0-0-0	0
	Practical			
6	Engineering Chemistry Lab	A	0-0-1	1
	Engineering Physics Lab	B	0-0-1	1
7	Basic Electrical Engineering Lab	A	0-0-1	1
	Programming for Problem Solving Lab	B	0-0-2	2
8	Engineering Mechanics Lab	A	0-0-1	1
9	Engineering Graphics & Design	A	0-0-2	2
	Workshop Practices	B	0-0-2	2
	TOTAL	A or B	12-2-5	19

SEMESTER –II

Sr. No.	Name of the Subject	Group	L-T-P	Credit
1	Engineering Mathematics–II	A & B	3-1-0	4
2	Engineering Chemistry	B	3-0-0	3
	Programming for Problem Solving	A	3-0-0	3
3	Basic Electrical Engineering	B	3-1-0	4
	Engineering physics	A	3-1-0	4
4	Engineering Mechanics	B	3-0-0	3
	English for Communication	A	3-0-0	3
5	Constitution of India	A	0-0-0	0
	Practical			
6	Engineering Chemistry Lab	B	0-0-1	1
	Engineering Physics Lab	A	0-0-1	1
7	Basic Electrical Engineering Lab	B	0-0-1	1
	Programming for Problem Solving Lab	A	0-0-2	2
8	Engineering Mechanics Lab	B	0-0-1	1
	Engineering Graphics& Design	B	0-0-2	2
9	Workshop Practices	A	0-0-2	2
	TOTAL	A or B	12-2-5	19

SEMESTER –I (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering Chemistry	BSC	3	3	100	70	20	5	5
2	Engineering Mathematics–I	BSC	4	4	100	70	20	5	5
3	Basic Electrical Engineering	ESC	4	4	100	70	20	5	5
4	Engineering Mechanics	ESC	3	3	100	70	20	5	5
	Practical								
5	Engineering Chemistry Lab	BSC	1	2	50	35	5	5	5
6	Basic Electrical Engineering Lab	ESC	1	2	50	35	5	5	5
7	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
8	Engineering Graphics & Design	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**24**	**600**	**420**	**100**	**40**	**40**

SEMESTER I (Group-B)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering physics	BSC	4	4	100	70	20	5	5
2	Engineering Mathematics –I	BSC	4	4	100	70	20	5	5
3	Programming for Problem Solving	ESC	3	3	100	70	20	5	5
4	English for Communication	HSMC	3	3	100	70	20	5	5
5	Constitution of India	MC	0	2	50	35	10	2.5	2.5
	Practical								
6	Engineering physics Lab	BSC	1	2	50	35	5	5	5
7	Programming for Problem Solving Lab	ESC	2	4	50	35	5	5	5
8	Workshop Practices	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**26**	**600**	**420**	**105**	**37.5**	**37.5**

SEMESTER II (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering physics	BSC	4	4	100	70	20	5	5
2	Engineering Mathematics –II	BSC	4	4	100	70	20	5	5
3	Programming for Problem Solving	ESC	3	3	100	70	20	5	5
4	English for Communication	HSMC	3	3	100	70	20	5	5
5	Constitution of India	MC	0	2	50	35	10	2.5	2.5
	Practical								
6	Engineering physics Lab	BSC	1	2	50	35	5	5	5
7	Programming for Problem Solving Lab	ESC	2	4	50	35	5	5	5
8	Workshop Practices	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**26**	**600**	**420**	**105**	**37.5**	**37.5**

SEMESTER –II (Group-B)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering Chemistry	BSC	3	3	100	70	20	5	5
2	Engineering Mathematics–II	BSC	4	4	100	70	20	5	5
3	Basic Electrical Engineering	ESC	4	4	100	70	20	5	5
4	Engineering Mechanics	ESC	3	3	100	70	20	5	5
	Practical								
5	Engineering Chemistry Lab	BSC	1	2	50	35	5	5	5
6	Basic Electrical Engineering Lab	ESC	1	2	50	35	5	5	5
7	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
8	Engineering Graphics & Design	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**24**	**600**	**420**	**100**	**40**	**40**

SEMESTER-III

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Analog Electronic Circuits	PCC	3	3	100	70	20	5	5
2	Data structure	PCC	3	3	100	70	20	5	5
3	Digital Electronics	PCC	3	3	100	70	20	5	5
4	Engineering Mathematics -III	BSC	4	3	100	70	20	5	5
5	Humanities-I Professional Practice, Law & Ethics Organizational Behavior	HSMC	3	3	100	70	20	5	5
6	Environmental Science	MC	0	2	50	35	10	2.5	2.5
7	Python Programming	PCC	3	3	100	70	20	5	5
	PRACTICAL								
8	Analog Electronic Circuits Lab	PCC	2	4	50	35	5	5	5
9	Data structure Lab	PCC	2	4	50	35	5	5	5
10	Digital Electronics Lab	PCC	2	4	50	35	5	5	5
11	IT Workshop(MAT LAB)	PCC	1	2	50	35	5	5	5
12	Python Programming Lab	PCC	2	4	50	35	5	5	5
	TOTAL		28	38	900	640	155	57.5	57.5

SEMESTER-IV

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Discrete Mathematics	BSC	4	4	100	70	20	5	5
2	Computer Organization & Architecture	PCC	3	3	100	70	20	5	5
3	Operating Systems	PCC	3	3	100	70	20	5	5
4	Design & Analysis of Algorithms	PCC	3	3	100	70	20	5	5
5	Microprocessor & Microcontroller	PCC	3	3	100	70	20	5	5
6	Software Engineering	PCC	3	3	100	70	20	5	5
	PRACTICAL								
6	Operating Systems Lab	PCC	2	4	50	35	5	5	5
7	Design & Analysis of Algorithms Lab	PCC	2	4	50	35	5	5	5
8	Computer Organization & Architecture Lab	PCC	2	4	50	35	5	5	5
	TOTAL		25	31	750	525	135	45	45

SEMESTER V

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory / Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Signals & Systems	PCC	3	3	100	70	20	5	5
2	Database Management Systems	PCC	3	3	100	70	20	5	5
3	Formal Language &Automata Theory	PCC	3	3	100	70	20	5	5
4	Object Oriented Programming	PCC	3	3	100	70	20	5	5
5	Humanities-II Soft Skills and Interpersonal Communication	HSMC	3	3	100	70	20	5	5
6	Elective-1 Graph Theory Image Processing Advanced Algorithms	PEC	3	3	100	70	20	5	5
	PRACTICAL								
7	Database Management Systems Lab	PCC	2	4	50	35	5	5	5
8	Object Oriented Programming Lab	PCC	2	4	50	35	5	5	5
9	Summer Internship-I (3-4 Weeks)	PCC	1	0	50	50	0	0	0
	TOTAL		23	26	750	540	130	40	40

SEMESTER VI

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Compiler Design	PCC	3	3	100	70	20	5	5
2	Computer Networks	PCC	3	3	100	70	20	5	5
3	Advance Java Programming	PCC	3	3	100	70	20	5	5
4	Elective-II Artificial Intelligence Machine Learning Visual Programming	PEC	3	3	100	70	20	5	5
5	Elective-III Web Technology Neural Networks and Deep Learning	PEC	3	3	100	70	20	5	5
6	Open Elective –I Cyber Law and Ethics Human Resource Development and Organizational Behavior Advanced Algorithms	HSMC	3	3	100	70	20	5	5
	Practical								
7	Compiler Design Lab	PCC	2	4	50	35	5	5	5
8	Computer Networks Lab	PCC	2	4	50	35	5	5	5
9	Advance Java Programming Lab	PCC	2	4	50	35	5	5	5
	TOTAL		24	30	750	525	135	45	4

SEMESTER VII

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Elective-IV Cryptography & Network Security Advanced Operating Systems Web and Internet	PEC	3	3	100	70	20	5	5
2	Elective-V Quantum Computing Optimization Techniques Real Time Systems	PEC	3	3	100	70	20	5	5
3	Open Elective-II Electronic Design Automation Computer Graphics Data mining and warehousing Semantic Web and Social Networks	OEC	3	3	100	70	20	5	5
4	Biology For Engineers	BSC	3	3	100	70	20	5	5
5	Data Analytics	PCC	3	3	100	70	20	5	5
	Practical								
5	Minor Project	PROJ	4	8	100	100	0	0	0
6	Industrial Training (Summer Internship-4-6 Week)	PROJ	4	0	100	100	0	0	0
	TOTAL		23	23	700	550	100	25	25

SEMESTER VIII

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Elective-VI CloudComputing Data Mining AdvancedComputerArchitecture	PEC	3	3	100	70	20	5	5
2	Open Elective-III Signals and systems Advanced Operating Systems	OEC	3	3	100	70	20	5	5
3	Open Elective-IV Cyber security Soft Computing	OEC	3	3	100	70	20	5	5
4	VLSI System Design	PCC	3	3	100	70	20	5	5
	PRACTICAL								
5	Major Project	PROJ	6	12	100	0	0	0	0
6	Extra- Curricular/ Co-Curricular Activity	PROJ	0	0	100	70	30	0	0
	Total		18	24	600	35	110	20	20

Distribution of Credit across 8 semesters:

Sl. No	Type of Paper	No. of Paper	Total Credit
1	Humanities and Social Sciences including Management courses **(HSMC)**	5	15
2	Basic Science courses**(BSC)**	9	28
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc**(ESC)**	8	18
4	Professional core courses (**PCC)**	30	77
5	Professional Elective courses relevant to chosen specialization/branch**(PEC)**	5	15
6	Open subjects – Electives from other technical and /or emerging subjects (**OEC)**	3	9
7	Project work, seminar and internship in industry or elsewhere**(PROJ)**	5	14
8	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Knowledge Tradition]**(MC)**	2	0
	Total	66	176

CIA – Continuous Internal Assessment – Based on Projects / Assignment during the semester

Note:
AICTE Activity Points to be earned by students admitted to Degree program (For more details refer to Chapter 6, AICTE, Activity Point Program, Model Internship Guidelines):
Every regular student, who is admitted to the 4 year Degree program, is required to earn 100 activity points in addition to the total credits earned for the program. Students entering 4 years Degree Program through lateral entry are required to earn 75 activity points in addition to the total credits earned for the program. The activity points earned by the student shall be reflected on the students 8th Semester grade card.
The activities to earn the points can be spread over the duration of the course. However, minimum prescribed duration should be fulfilled.
Activity Points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression.
Incase student fail to earn the prescribed activity points, Eight semester Grade Card shall be issued only after earning the required activity Points.
Students shall be eligible for the award of degree only after the release of the Eight Semester grade card.

There are two groups (A & B) in semester 1 & 2. The Group division will be decided by The Dean SoE & IT before commencement of classes

ARKAJAIN University, Jharkhand
School of Engineering & IT
Department of Engineering
Faculty – Bachelor of Technology in Computer Science Engineering
PROGRAM OUTCOMES &PROGRAM SPECIFIC OUTCOMES

PROGRAM OUTCOMES

After completing this undergraduate program, a learner:

[PO.1]. Engineering knowledge: An ability to apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to get the solution of the engineering problems.

[PO.2]. Problem analysis: Ability to Identify, formulates, review research literature, and analyze complex engineering problems.

[PO.3]. Design/Development of Solutions: Ability to design solutions for complex Engineering Problems by considering social, Economic and Environmental aspects.

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge to design, conduct analyse experiments to get valid conclusion**.**

[PO.5]. Modern tool usage: ability to create, select, and apply appropriate techniques, and to model complex engineering activities with an understanding of the limitations.

[PO.6]. The engineer and society: Ability to apply knowledge by considering social health, safety, legal and cultural issues.

[PO.7]. Environment and sustainability: Understanding of the impact of the adopted engineering solutions in social and environmental contexts.

[PO.8]. Ethics: Understanding of the ethical issues of the Computer Scienceand applying ethical principles in engineering practices.

[PO.9]. Individual and teamwork: Ability to work effectively as an individual or in team, as a member or as a leader.

[PO.10]. Communication: An ability to communicate clearly and effectively through different modes of communication.

[PO.11]. Project management and finance: Ability to handle project and to manage finance related issue.

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning.

PROGRAM SPECIFIC OUTCOMES

[PSO.1]. Understand the principles, architecture and organization of computers, embedded systems and computer networks.

[PSO.2]. Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems that include both hardware and software.

[PSO.3]. Apply software design and development practices to develop software applications in emerging areas such as IoT, Data Analytics, Social Networks, Cloud and High Performance Computing.

[PSO.4]. Demonstrate& communicate: Ability to demonstrate the knowledge, skill to analyze the cause and effect on Computer Science Engineering.

Subject: Discrete Mathematics

Code: BTE24065

4 Credits | Semester IV

Total Lecture: 60 Total Tutorial: 12

A. Introduction:

- To use mathematically correct terminology and notation
- To construct correct direct and indirect proofs.
- To apply logical reasoning to solve a variety of problems

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Understand the logic sentence expressed it in terms of predicates, quantifiers, and logical connectives

[CO2] Analyze the problem, derive the solution using deductive logic and prove the solution based on logical inference.

[CO3] Analyze the mathematical problem, classify its algebraic structure

[CO4] Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra

[CO5] Develop the given problem as graph networks and solve with techniques of graph theory

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

SETS, RELATION AND FUNCTION: Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set,
Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem. Principles of Mathematical Induction: The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic.

BASIC COUNTING TECHNIQUES: Inclusion and exclusion, pigeon-hole principle, permutation and combination.

PROPOSITIONAL LOGIC: Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference**.**The use of Quantifiers. Proof Techniques: Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.

ALGEBRAIC STRUCTURES AND MORPHISM: Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups. Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form.

GRAPHS AND TREES: Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks. Graph Coloring, Coloring maps and Planar Graphs, Coloring Vertices, Coloring Edges, List Coloring, Perfect Graph, definition properties and Example, Rooted trees, trees and sorting, weighted trees and prefix codes. Bi-connected component and Articulation Points, Shortest distances.

E. TEXT BOOKS

T1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw – Hill

T2. Susanna S. Epp, Discrete Mathematics with Applications, 4th edition, Wadsworth Publishing Co. Inc.

T3. C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, 3rd Edition by, Tata McGraw – Hill

F. REFERENCE BOOKS

R1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It's Application to Computer Science", TMG Edition, TataMcgraw-Hill

R2. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press. Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson,

R3. Discrete Mathematics, Tata McGraw - Hill

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Understand the logic sentence expressed it in terms of predicates, quantifiers, and logical connectives	**1**															
[CO2]	Analyze the problem, derive the solution using deductive logic and prove the solution based on logical inference.		**2**														
[CO3]	Analyze the mathematical problem, classify its algebraic structure			**2**													
[CO4]	Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra				**2**												
[CO5]	Develop the given problem as graph networks and solve with techniques of graph theory			**2**													

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Computer Organization &Architecture

Code: BTE24066
3 Credits | Semester IV

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To understand how Computer Systems work & the basic principles
- To know the current state of art in memory system design
- To learn concepts of advanced pipelining techniques.
- To learn how I/O devices are accessed and its principles.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Draw the functional block diagram of a single bus architecture of a computer and describe the function of the instruction execution cycle
[CO2] Write assembly language program for specified microprocessor for computing 16 bit multiplication, division and I/O device interface (ADC, Control circuit, serial port communication).fluids
[CO3] Write a flowchart for Concurrent access to memory and cache coherency in Parallel Processors and describe the process.
[CO4] Design a memory module and analyze its operation by interfacing with the CPU

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

C. SYLLABUS

FUNCTIONAL BLOCKS OF A COMPUTER: CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU–registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Case study – instruction sets of some common CPUs. Signed number representation, fixed and floating point representations, character representation. Computer arithmetic – integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. Multiplication – shift-and add, Booth multiplier, carry save multiplier, etc. Division restoring and non-restoring techniques, floating point arithmetic

INTRODUCTION TO X86 ARCHITECTURE: CPU control unit design: hardwired and micro-programmed design approaches, Case study – design of a simple hypothetical CPU. Memory system design: semiconductor memory technologies, memory organization. Peripheral devices and their characteristics: Input-output subsystems, I/O device interface, I/O transfers– program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions.Programs and processes–role of interrupts in process state transitions, I/O device interfaces – SCII, USB

PIPELINING: Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards. Parallel Processors: Introduction to parallel processors, Concurrent access to memory and cache coherency.

MEMORY ORGANIZATION: Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies.

E. TEXT BOOKS

T1. "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.

T2. "Computer Organization and Embedded Systems", 6th Edition by Carl Hamacher, McGraw Hill Higher Education.

F. REFERENCE BOOKS

R1. "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill

R2. "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.

R3. "Computer System Design and Architecture", 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Draw the functional block diagram of a single bus architecture of a computer and describe the function of the instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set	**1**						**1**									
[CO2]	Write assembly language program for specified microprocessor for computing16bit multiplication, division and I/O device interface (ADC, Control circuit, serial port communication).Fluids			**2**				**1**									
[CO3]	Write a flowchart for Concurrent access to memory and cache coherency in Parallel Processors and describe the process.		**1**		**1**												
[CO4]	Design a memory module and analyze its operation by interfacing with the CPU	**1**															

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Operating Systems

Code: BTE24067
3 Credits | Semester IV

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To understand concept and working of various types of Operating System
- To know various logical aspects of scheduling various processes
- To learn different ways of preventing and avoiding deadlocks and ways to manage them

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Identify mechanisms to create processes and threads.
[CO2] Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time
[CO3]For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time
[CO4] Design and implement file management system
[CO5] Develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

INTRODUCTION TO OPERATING SYSTEM: Introduction, Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS-Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.

PROCESSES AND THREADS: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads, Process

Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

INTER-PROCESS COMMUNICATION: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer\ Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc.
DEADLOCKS: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention . Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery

MEMORY MANAGEMENT: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation and Compaction . Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

I/O HARDWARE, FILE/DISK MANAGEMENT: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance.Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks

E. TEXT BOOKS

T1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.

T2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.

F. REFERENCE BOOKS

R1. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
R2. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison Wesley
R3. Design of the Unix Operating Systems, 8 th Edition by Maurice Bach, Prentice-Hall of India
R4. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO1	PSO1	PSO1
[CO1]	Identify mechanisms to create processes and threads.		**1**														
[CO2]	Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time			**2**													
[CO3]	For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time			**1**													
[CO4]	Design and implement file management system			**1**													
[CO5]	Develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.			**1**													

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Design and Analysis of Algorithms

Code: BTE24068

3 Credits | Semester IV

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To understand and analyze asymptotic performance of the algorithm
- To write rigorous correctness proofs for algorithms.
- To learn and synthesize efficient algorithms in common engineering design situations
- Apply important algorithmic design paradigms and methods of analysis

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Formulate simple algorithms for arithmetic and logical problems.

[CO2] Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms.

[CO3] Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.

[CO4] For a given model engineering problem model it using graph and write the corresponding algorithm to solve the problems

[CO5] Decompose a problem into functions and synthesize a complete program using divide and conquer approach.

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

INTRODUCTION TO ALGORITHMS: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior. Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations. Substitution method, Recursion tree method and Masters' theorem

FUNDAMENTAL ALGORITHMIC STRATEGIES: Fundamental Algorithmic Strategies: Brute-Force, Greedy, Dynamic Programming

Branch and-Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving

Bin Packing, Knap Sack TSP. Heuristics – characteristics and their application domains.

GRAPH AND TREE ALGORITHMS: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

TRACTABLE AND INTRACTABLE PROBLEMS: Computability of Algorithms, Computability classes – P, NP NP-complete and NP-hard. Cook's theorem.Standard NP-complete problems and Reduction techniques.

ADVANCED TOPICS: Approximation algorithms, Randomized algorithms,
Class of problems beyond NP – P SPACE.

E. TEXT BOOKS

T1.Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.
T2. Fundamentals of Algorithms – E. Horowitz et al.

F. REFERENCE BOOKS

R1.Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.
R2.Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley
R3.Algorithms—A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Formulate simple algorithms for arithmetic and logical problems		**1**														
[CO2]	Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms.		**1**														
[CO3]	Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.			**1**													
[CO4]	For a given model engineering problem model it using graph and write the corresponding algorithm to solve the problems	**1**															
[CO5]	Decompose a problem into functions and synthesize a complete program using divide and conquer approach				**1**												

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Microprocessor & Microcontroller

Code: BTE24393

3 Credits | Semester IV

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

Following are the objectives of this course:

- To introduce students with the architecture and operation of typical microprocessors andmicrocontrollers.
- To familiarize the students with the programming and interfacing of microprocessors and microcontrollers
- To provide strong foundation for designing real world applications using microprocessors andmicrocontrollers

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Assess and solve basic binary math operations using the microprocessor and explain the microprocessor's and Microcontroller's internal architecture and its operation within the area of manufacturing and performance.

[CO2] Apply knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor and microcontroller.

[CO3] Compare accepted standards and guidelines to select appropriate Microprocessor (8085 & 8086) and Microcontroller to meet specified performance requirements

[CO4] Analyze assembly language programs; select appropriate assemble into machine a cross assembler utility of a microprocessor and microcontroller.

[CO5] Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

Introduction : CPU, Register, memory, Buses, Memory addressing capacity of a CPU.CPU Architecture, Pin configuration, Instructions, Addressing modes, Instruction word size, Languages.

Timing Diagram: Read cycle, write cycle, fetch cycle, Memory read, Memory write, I/O cycle.Programming: Simple programming : 8-bit addition & subtraction, 16-bit addition, Delay subroutine using register, finding lowest & highest no. in data array.

Data transfer schemes, I/O port. 8255, 8251, 8253, 8257 chips, pin diagram, control word, operating modes. Interfacing to ADC, Analog multiplexer, simple & hold.

Intel 8086, 8051 architecture: 8051 micro controller hardware, input/output pins, ports, external memory, counters and timers, instruction set, addressing modes, serial data i/o, interrupts.

Assembly language Programming using 8051 Moving data: External data moves, code memory read only data moves, PUSH and POP opcodes, data exchanges.

E. TEXT BOOKS

T1. Steve Furber, ARM System-On-Chip Architecture, 2nd edition, Addison Wesley.
T2. Wayne Wolf "Computers as Components Principles of Embedded Computer System Design", Second Edition, Elsevier, 2008.

F. REFERENCE BOOKS

R1. Joseph Yiu, "The Definitive Guide to the ARM Cortex-M0 ", 1st edition, Newnes - an imprint of Elsevier,2011.

R2. Lyla B. Das, "Embedded systems An Integrated Approach", 2012.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Assess and solve basic binary math operations using the microprocessor and explain the microprocessor's and Microcontroller's internal architecture and its operation within the area of manufacturing and performance.	2	3	3										1			
[CO2]	Apply knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor and microcontroller.		3	3										2	3		
[CO3]	Compare accepted standards and guidelines to select appropriate Microprocessor		2		2												

	(8085 & 8086) and Microcontroller to meet specified performance requirements																
[CO4]	Analyze assembly language programs; select appropriate assemble into machine a cross assembler utility of a microprocessor and microcontroller.		**3**		**3**												
[CO5]	Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.					**3**									**3**	**3**	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Software Engineering

Code: BTE24394

3 Credits | Semester IV

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

Following are the objectives of this course:

- To inculcate essential technology and software engineering knowledge and skills essential to build reasonably complex usable and maintainable software iteratively.
- To emphasize on structured approach to handle software development.
- To enhance the knowledge about various software testing techniques and methods.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Interpret,plan, and develop the frame work of a software engineering project.
[CO2] Monitor& manage the risk during the design of software project.
[CO3] Calculate the cost of software, using cost estimation models such as COCOMO II.
[CO4] Identifyand apply testing strategies & methods on software projects.
[CO5]Implement clean room techniques to develop as well as maintain software throughout its lifetime.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

Unit 1

Software Process: The Changing Nature of Software – WebApps, Mobile Applications, Cloud Computing, Product Line Software; Software Process - The Process Framework, Umbrella Activities, Process Adaptation.

Process Models: Prescriptive Process Models - The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Concurrent Models; Specialized Process Models -

Component-Based Development, The Formal Methods Model, Aspect-Oriented Software Development; The Unified Process;
Lifecycle, Process Models - Traditional v/s Agile processes, The Capability Maturity Model Integration Model (CMMI)-levels and their significance.PSP and TSP, RAD, Prototyping

Unit 2
Understanding Requirements: Requirements Engineering, Eliciting Requirements, Developing Use Cases, Building the Analysis Model, Negotiating Requirements, Requirements Monitoring, Validating Requirements, Avoiding Common Mistakes.
Scenario-Based Requirements Modeling: Requirements Analysis, Scenario-Based Modeling, UML Models That Supplement the Use Case.
Requirements Modeling for Web and Mobile Apps, Applying requirement engineering on the same, case study of Unit-1.

Unit 3
Design Concepts: The Design Process, Design Concepts, Design Model.
Architectural Design: Software Architecture, Architectural Genres, Architectural Styles, Architectural Considerations, Architectural Decisions, Architectural Design;
User Interface: The Golden Rules of User Interface Analysis and Design, WebApp and Mobile Interface Design; Applying design modeling by taking requirement specification from Unit-2

Unit 4
Software Project Estimation - Observations on Estimation, The Project Planning Process Software Project Estimation, Decomposition Techniques, Empirical Estimation Models, Estimation for Object-Oriented Projects, Estimation for Object-Oriented Projects; Project Scheduling –Scheduling.
Risk Management: Reactive versus Proactive Risk Strategies, Software Risks, Risk Identification, Risk Projection, Risk Refinement, Risk Mitigation, Monitoring, and Management.
Computation of relevant metrics for the case study on current problem statement of software development considered in Unit-1.

Unit 5
Software Testing Techniques: Introduction, Software Testing Fundamental, Testing Principles, White Box Testing, Control Structure Testing, Black Box Testing, Boundary Value Analysis, Testing GUIs, Testing Documentation.

Software Maintenance, Software Supportability, Software Reengineering, Reverse Engineering, Restructuring, Forward Engineering.

E. TEXT BOOKS

T1. Roger S Pressman and Bruce R. Maxim, Software Engineering: A Practitioner's Approach, McGraw-Hill, 2015

T2. Waman S. Jawadekar, Software Engineering – Principles and Practice, Tata McGraw Hill Publication, 2013

F. REFERENCE BOOKS

R1. Ian Sommerville, Software Engineering, 10th Edition,Pearson, 2016
R2. Emilia Mendes, Nile Mosley: Web Engineering, Springer, 2006
R3. David Gustafson: Software Engineering, Schaum's Outline Series, McGraw Hill, 2002

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Interpret, plan, and develop the frame work of a software engineering project.	**3**	**3**	**2**		**2**											
[CO2]	Monitor & manage the risk during the design of software project.		**2**	**3**	**2**			**2**									
[CO3]	Calculate the cost of software, using cost estimation models such as COCOMO II		**3**														
[CO4]	Identify and apply testing strategies & methods on software projects		**3**		**3**								**3**				**2**
[CO5]	Implement clean room techniques to develop as well as maintain software throughout its lifetime.												**3**			**3**	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Operating Systems Lab

Code: BTE24070

2 Credits | Semester IV

Total Lecture: 60

A. Introduction:

- This course will introduce the basic principles in Operating System and providing error detection methods.
- It will cover all the management modules present in the OS like process management, Memory management, File management, Disk management, Network management, I/O management.

B. **Course Outcomes:** At the end of the course, students will be able to

[CO1]Know how data is transmitted and checking of errors
[CO2]Inter process communication including shared memory, pipes andmessages
[CO3]Simulation of CPU Scheduling Algorithms. (FCFS, RR, SJF, Priority, MultilevelQueuing)
[CO4] Simulation of banker's algorithm for deadlock avoidance, preventionProgram for fifo, lru, and optimal page replacement algorithm

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	5
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	35
Total		50
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

S.NO	Name of Experiment
1.	Implementation of various DOS commands
2.	Implementation of various Shell scripting commands
3.	Implementation of FCFS scheduling
4.	Implementation of SJF scheduling
5.	Implementation of priority scheduling
6.	Implementation of round-robin scheduling
7.	Implementation of Banker’s algorithm for deadlock avoidance
8.	Implementation of Page replacement using FIFO
9.	Implementation of Page replacement using LRU
10.	Implementation of Page replacement using NRU
11.	Implementation of disk scheduling (FCFS, SSTF)

E. TEXT BOOKS

T1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.

T2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.

F. REFERENCE BOOKS

R1. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
R2. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison Wesley
R3. Design of the Unix Operating Systems, 8 th Edition by Maurice Bach, Prentice-Hall of India
R4. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

G. Course Articulation Matrix: (Mapping of COs with POs)

STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
Know how data is transmitted and checking of errors	1															
Inter process communication including shared memory, pipes andmessages		2														
Simulation of CPU Scheduling Algorithms. (FCFS, RR, SJF, Priority, Multilevel Queuing)			1													
Simulation of banker's algorithm for deadlock avoidance, prevention Program for fifo, lru, and optimal page replacement algorithm			2													

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Design and Analysis of Algorithms Lab

Code: BTE24071
2 Credits | Semester IV

Total Lecture: 60

A. Introduction:

- The ability to identify and apply the suitable algorithm for the given real world Learn how to analyze a problem and design the solution for the problem.
- Design and implement efficient algorithms for a specified application.
- Strengthen problem solving ability.

B. **Course Outcomes:** At the end of the course, students will be able to

[CO1] Analyze the performance of algorithms.
[CO2] Choose appropriate algorithm design techniques for solving problems.
[CO3] Understand how the choice of data structures and the algorithm designmethods impact the performance of programs.
[CO4] Write rigorous correctness proofs for algorithms.

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	5
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	35
Total		50
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

S.NO	**Name of Experiments**
1.	QUICK SORT a given set of elements using the quick sort method and determine the time required to sort the elements
2.	Repeat the experiment for different values of n, the number of elements in the 1st to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator

3.	Implement merge sort algorithm to sort a given set of elements and determine the time required to sort the elements.
4.	KNAPSACK PROBLEM-Implement 0/1 Knapsack problem using Dynamic Programming.
5.	SHORTEST PATHS ALGORITHM: From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.
6.	QUICK SORT a given set of elements using the quick sort method and determine the time required to sort the elements
7.	Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm.
8.	Implement any scheme to find the optimal solution for the Traveling Sales Person problem and then solve the same problem instance using any approximation algorithm and determine the error in the approximation
9.	Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm
10.	Implement N Queen's problem using Back Tracking

E.

TEXT BOOKS

T1.Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.

T2. Fundamentals of Algorithms – E. Horowitz et al.

F. REFERENCE BOOKS

R1.Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.

R2.Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley

R3.Algorithms—A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Analyze the performance of algorithms.		**2**												**1**		
[CO2]	Choose appropriate algorithm design techniques for solving problems.			**2**												**2**	
[CO3]	Understand how the choice of data structures and the algorithm design methods impact the performance of programs.					**1**									**1**		
[CO4]	Write rigorous correctness proofs for algorithms.					**1**										**1**	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Computer Organization &Architecture Lab

Code: BTE24279

2 Credits | Semester IV

Total Lecture: 60

A. Introduction:

- Discuss the basic concepts and structure of computers.
- Understand concepts of register transfer logic and arithmetic operations.
- Explain different types of addressing modes and memory organization.
- Learn the different types of serial communication techniques.
- Summarize the Instruction execution stages.

B. **Course Outcomes:** At the end of the course, students will be able to

[CO1] Understand the theory and architecture of central processing unit
[CO2] Analyze some of the design issues in terms of speed, technology, cost, performance.
[CO3] Design a simple CPU with applying the theory concepts
[CO4] Use appropriate tools to design verify and test the CPU architecture.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	5
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	35
Total		50
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

S.NO	Name of Experiments
1.	Write the working of 8085 simulator GNUsim8085 and basic architecture of 8085 along with small introduction.

2.	Study the complete instruction set of 8085 and write the instructions in the instruction set of 8085 along with examples
3.	Write an assembly language code in GNUsim8085 to implement data transfer instruction
4.	Write an assembly language code in GNUsim8085 to store numbers in reverse order in memory location.
5.	Write an assembly language code in GNUsim8085 to implement arithmetic instruction.
6.	Write an assembly language code in GNUsim8085 to add two 8 bit numbers stored in memory and also storing the carry.
7.	Write an assembly language code in GNUsim8085 to find the factorial of a number

E. TEXT BOOKS

T1. "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
T2. "Computer Organization and Embedded Systems", 6th Edition by Carl Hamacher, McGraw Hill Higher Education.

F. REFERENCE BOOKS

R1. "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill
R2. "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.
R3. "Computer System Design and Architecture", 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Understand the theory and architecture of central processing unit					**1**											
[CO2]	Analyze some of the design issues in terms of speed, technology, cost, performance.		**2**														
[CO3]	Design a simple CPU with applying the theory concepts			**1**													
[CO4]	Use appropriate tools to design verify and test the CPU architecture.				**1**												

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

ARKA JAIN University Jharkhand

Syllabus of

B.Tech. in Computer Science Engineering

Semester-V

ARKAJAIN University, Jharkhand
School of Engineering & IT
Department of Engineering
Faculty – Bachelor of Technology in Computer Science Engineering
Scheme of Study (w.e.f Batch 2020-21)

SEMESTER –I

Sr. No.	Name of the Subject	Group	L-T-P	Credit
1	Engineering Mathematics–I	A & B	3-1-0	4
2	Engineering Chemistry	A	3-0-0	3
	Programming for Problem Solving	B	3-0-0	3
3	Basic Electrical Engineering	A	3-1-0	4
	Engineering physics	B	3-1-0	4
4	Engineering Mechanics	A	3-0-0	3
	English for Communication	B	3-0-0	3
5	Constitution of India	B	0-0-0	0
	Practical			
6	Engineering Chemistry Lab	A	0-0-1	1
	Engineering Physics Lab	B	0-0-1	1
7	Basic Electrical Engineering Lab	A	0-0-1	1
	Programming for Problem Solving Lab	B	0-0-2	2
8	Engineering Mechanics Lab	A	0-0-1	1
9	Engineering Graphics & Design	A	0-0-2	2
	Workshop Practices	B	0-0-2	2
	TOTAL	A or B	12-2-5	19

SEMESTER –II

Sr. No.	Name of the Subject	Group	L-T-P	Credit
1	Engineering Mathematics–II	A & B	3-1-0	4
2	Engineering Chemistry	B	3-0-0	3
	Programming for Problem Solving	A	3-0-0	3
3	Basic Electrical Engineering	B	3-1-0	4
	Engineering physics	A	3-1-0	4
4	Engineering Mechanics	B	3-0-0	3
	English for Communication	A	3-0-0	3
5	Constitution of India	A	0-0-0	0
	Practical			
6	Engineering Chemistry Lab	B	0-0-1	1
	Engineering Physics Lab	A	0-0-1	1
7	Basic Electrical Engineering Lab	B	0-0-1	1
	Programming for Problem Solving Lab	A	0-0-2	2
8	Engineering Mechanics Lab	B	0-0-1	1
	Engineering Graphics& Design	B	0-0-2	2
9	Workshop Practices	A	0-0-2	2
	TOTAL	A or B	12-2-5	19

SEMESTER –I (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering Chemistry	BSC	3	3	100	70	20	5	5
2	Engineering Mathematics–I	BSC	4	4	100	70	20	5	5
3	Basic Electrical Engineering	ESC	4	4	100	70	20	5	5
4	Engineering Mechanics	ESC	3	3	100	70	20	5	5
	Practical								
5	Engineering Chemistry Lab	BSC	1	2	50	35	5	5	5
6	Basic Electrical Engineering Lab	ESC	1	2	50	35	5	5	5
7	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
8	Engineering Graphics & Design	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**24**	**600**	**420**	**100**	**40**	**40**

SEMESTER I (Group-B)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering physics	BSC	4	4	100	70	20	5	5
2	Engineering Mathematics –I	BSC	4	4	100	70	20	5	5
3	Programming for Problem Solving	ESC	3	3	100	70	20	5	5
4	English for Communication	HSMC	3	3	100	70	20	5	5
5	Constitution of India	MC	0	2	50	35	10	2.5	2.5
	Practical								
6	Engineering physics Lab	BSC	1	2	50	35	5	5	5
7	Programming for Problem Solving Lab	ESC	2	4	50	35	5	5	5
8	Workshop Practices	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**26**	**600**	**420**	**105**	**37.5**	**37.5**

SEMESTER II (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering physics	BSC	4	4	100	70	20	5	5
2	Engineering Mathematics –II	BSC	4	4	100	70	20	5	5
3	Programming for Problem Solving	ESC	3	3	100	70	20	5	5
4	English for Communication	HSMC	3	3	100	70	20	5	5
5	Constitution of India	MC	0	2	50	35	10	2.5	2.5
	Practical								
6	Engineering physics Lab	BSC	1	2	50	35	5	5	5
7	Programming for Problem Solving Lab	ESC	2	4	50	35	5	5	5
8	Workshop Practices	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**26**	**600**	**420**	**105**	**37.5**	**37.5**

SEMESTER –II (Group-B)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering Chemistry	BSC	3	3	100	70	20	5	5
2	Engineering Mathematics–II	BSC	4	4	100	70	20	5	5
3	Basic Electrical Engineering	ESC	4	4	100	70	20	5	5
4	Engineering Mechanics	ESC	3	3	100	70	20	5	5
	Practical								
5	Engineering Chemistry Lab	BSC	1	2	50	35	5	5	5
6	Basic Electrical Engineering Lab	ESC	1	2	50	35	5	5	5
7	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
8	Engineering Graphics & Design	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**24**	**600**	**420**	**100**	**40**	**40**

SEMESTER-III

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Analog Electronic Circuits	PCC	3	3	100	70	20	5	5
2	Data structure	PCC	3	3	100	70	20	5	5
3	Digital Electronics	PCC	3	3	100	70	20	5	5
4	Engineering Mathematics -III	BSC	4	3	100	70	20	5	5
5	Humanities-I Professional Practice, Law & Ethics Organizational Behavior	HSMC	3	3	100	70	20	5	5
6	Environmental Science	MC	0	2	50	35	10	2.5	2.5
7	Python Programming	PCC	3	3	100	70	20	5	5
	PRACTICAL								
8	Analog Electronic Circuits Lab	PCC	2	4	50	35	5	5	5
9	Data structure Lab	PCC	2	4	50	35	5	5	5
10	Digital Electronics Lab	PCC	2	4	50	35	5	5	5
11	IT Workshop(MAT LAB)	PCC	1	2	50	35	5	5	5
12	Python Programming Lab	PCC	2	4	50	35	5	5	5
	TOTAL		28	38	900	640	155	57.5	57.5

SEMESTER-IV

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Discrete Mathematics	BSC	4	4	100	70	20	5	5
2	Computer Organization & Architecture	PCC	3	3	100	70	20	5	5
3	Operating Systems	PCC	3	3	100	70	20	5	5
4	Design & Analysis of Algorithms	PCC	3	3	100	70	20	5	5
5	Microprocessor & Microcontroller	PCC	3	3	100	70	20	5	5
6	Software Engineering	PCC	3	3	100	70	20	5	5
	PRACTICAL								
6	Operating Systems Lab	PCC	2	4	50	35	5	5	5
7	Design & Analysis of Algorithms Lab	PCC	2	4	50	35	5	5	5
8	Computer Organization & Architecture Lab	PCC	2	4	50	35	5	5	5
	TOTAL		25	31	750	525	135	45	45

SEMESTER V

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory / Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Signals & Systems	PCC	3	3	100	70	20	5	5
2	Database Management Systems	PCC	3	3	100	70	20	5	5
3	Formal Language &Automata Theory	PCC	3	3	100	70	20	5	5
4	Object Oriented Programming	PCC	3	3	100	70	20	5	5
5	Humanities-II Soft Skills and Interpersonal Communication	HSMC	3	3	100	70	20	5	5
6	Elective-1 Graph Theory Image Processing Advanced Algorithms	PEC	3	3	100	70	20	5	5
	PRACTICAL								
7	Database Management Systems Lab	PCC	2	4	50	35	5	5	5
8	Object Oriented Programming Lab	PCC	2	4	50	35	5	5	5
9	Summer Internship-I (3-4 Weeks)	PCC	1	0	50	50	0	0	0
	TOTAL		23	26	750	540	130	40	40

SEMESTER VI

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Compiler Design	PCC	3	3	100	70	20	5	5
2	Computer Networks	PCC	3	3	100	70	20	5	5
3	Advance Java Programming	PCC	3	3	100	70	20	5	5
4	Elective-II Artificial Intelligence Machine Learning Visual Programming	PEC	3	3	100	70	20	5	5
5	Elective-III Web Technology Neural Networks and Deep Learning	PEC	3	3	100	70	20	5	5
6	Open Elective –I Cyber Law and Ethics Human Resource Development and Organizational Behavior Advanced Algorithms	HSMC	3	3	100	70	20	5	5
	Practical								
7	Compiler Design Lab	PCC	2	4	50	35	5	5	5
8	Computer Networks Lab	PCC	2	4	50	35	5	5	5
9	Advance Java Programming Lab	PCC	2	4	50	35	5	5	5
	TOTAL		24	30	750	525	135	45	4

SEMESTER VII

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Elective-IV Cryptography & Network Security Advanced Operating Systems Web and Internet	PEC	3	3	100	70	20	5	5
2	Elective-V Quantum Computing Optimization Techniques Real Time Systems	PEC	3	3	100	70	20	5	5
3	Open Elective-II Electronic Design Automation Computer Graphics Data mining and warehousing Semantic Web and Social Networks	OEC	3	3	100	70	20	5	5
4	Biology For Engineers	BSC	3	3	100	70	20	5	5
5	Data Analytics	PCC	3	3	100	70	20	5	5
	Practical								
5	Minor Project	PROJ	4	8	100	100	0	0	0
6	Industrial Training (Summer Internship-4-6 Week)	PROJ	4	0	100	100	0	0	0
	TOTAL		23	23	700	550	100	25	25

SEMESTER VIII

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Elective-VI CloudComputing Data Mining AdvancedComputerArchitecture	PEC	3	3	100	70	20	5	5
2	Open Elective-III Signals and systems Advanced Operating Systems	OEC	3	3	100	70	20	5	5
3	Open Elective-IV Cyber security Soft Computing	OEC	3	3	100	70	20	5	5
4	VLSI System Design	PCC	3	3	100	70	20	5	5
	PRACTICAL								
5	Major Project	PROJ	6	12	100	0	0	0	0
6	Extra- Curricular/ Co-Curricular Activity	PROJ	0	0	100	70	30	0	0
	Total		18	24	600	35	110	20	20

Distribution of Credit across 8 semesters:

Sl. No	Type of Paper	No. of Paper	Total Credit
1	Humanities and Social Sciences including Management courses **(HSMC)**	5	15
2	Basic Science courses**(BSC)**	9	28
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc**(ESC)**	8	18
4	Professional core courses (**PCC)**	30	77
5	Professional Elective courses relevant to chosen specialization/branch**(PEC)**	5	15
6	Open subjects – Electives from other technical and /or emerging subjects (**OEC)**	3	9
7	Project work, seminar and internship in industry or elsewhere**(PROJ)**	5	14
8	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Knowledge Tradition]**(MC)**	2	0
	Total	66	176

CIA – Continuous Internal Assessment – Based on Projects / Assignment during the semester

Note:
AICTE Activity Points to be earned by students admitted to Degree program (For more details refer to Chapter 6, AICTE, Activity Point Program, Model Internship Guidelines):
Every regular student, who is admitted to the 4 year Degree program, is required to earn 100 activity points in addition to the total credits earned for the program. Students entering 4 years Degree Program through lateral entry are required to earn 75 activity points in addition to the total credits earned for the program. The activity points earned by the student shall be reflected on the students 8th Semester grade card.
The activities to earn the points can be spread over the duration of the course. However, minimum prescribed duration should be fulfilled.
Activity Points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression.
Incase student fail to earn the prescribed activity points, Eight semester Grade Card shall be issued only after earning the required activity Points.
Students shall be eligible for the award of degree only after the release of the Eight Semester grade card.

There are two groups (A & B) in semester 1 & 2. The Group division will be decided by The Dean SoE & IT before commencement of classes

ARKAJAIN University, Jharkhand
School of Engineering & IT
Department of Engineering
Faculty – Bachelor of Technology in Computer Science Engineering
PROGRAM OUTCOMES &PROGRAM SPECIFIC OUTCOMES

PROGRAM OUTCOMES

After completing this undergraduate program, a learner:

[PO.1]. Engineering knowledge: An ability to apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to get the solution of the engineering problems.

[PO.2]. Problem analysis: Ability to Identify, formulates, review research literature, and analyze complex engineering problems.

[PO.3]. Design/Development of Solutions: Ability to design solutions for complex Engineering Problems by considering social, Economic and Environmental aspects.

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge to design, conduct analyse experiments to get valid conclusion**.**

[PO.5]. Modern tool usage: ability to create, select, and apply appropriate techniques, and to model complex engineering activities with an understanding of the limitations.

[PO.6]. The engineer and society: Ability to apply knowledge by considering social health, safety, legal and cultural issues.

[PO.7]. Environment and sustainability: Understanding of the impact of the adopted engineering solutions in social and environmental contexts.

[PO.8]. Ethics: Understanding of the ethical issues of the civil engineering and applying ethical principles in engineering practices.

[PO.9]. Individual and teamwork: Ability to work effectively as an individual or in team, as a member or as a leader.

[PO.10]. Communication: An ability to communicate clearly and effectively through different modes of communication.

[PO.11]. Project management and finance: Ability to handle project and to manage finance related issue.

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning.

PROGRAM SPECIFIC OUTCOMES

[PSO.1]. Understand the principles, architecture and organization of computers, embedded systems and computer networks.

[PSO.2]. Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems that include both hardware and software.

[PSO.3]. Apply software design and development practices to develop software applications in emerging areas such as IoT, Data Analytics, Social Networks, Cloud and High Performance Computing.

[PSO.4]. Demonstrate& communicate: Ability to demonstrate the knowledge, skill to analyze the cause and effect on Computer Science Engineering.

Subject: Signals & Systems

Code: BTE25112

3 Credits | Semester V

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- Demonstrate an understanding of the fundamental properties of linear systems, by explaining the properties to others.
- Use linear systems tools, especially transform analysis and convolution, to analyze and predict the behavior of linear systems.
- Gain an appreciation for the importance of linear systems analysis in aerospace systems.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Understand the concepts of continuous time and discrete time systems.

[CO2] Understand sampling theorem and its implications.

[CO3] Analyze systems in complex frequency domain.

[CO4] Understand the concept of Fourier transform and its implementation

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

INTRODUCTION TO SIGNALS AND SYSTEMS: Signals and systems as seen in everyday life, and in various branches of engineering and science. Signal properties: periodicity, absolute integrability, determinism and stochastic character. Some special signals of importance: the unit step, the unit impulse, the sinusoid, the complex exponential, some special time- limited signals; continuous and discrete time signals, continuous and discrete amplitude signals. System properties: linearity: additivity and homogeneity, shift-invariance, causality, stability, realizability. Examples.

BEHAVIOR OF CONTINUOUS AND DISCRETE-TIME LTI SYSTEMS: Impulse response and step response, convolution, input-output behavior with aperiodic convergent inputs, cascade interconnections. Characterization of causality and stability of LTI systems. System representation through differential equations and difference equations. State-space Representation of systems. State-Space Analysis, Multi-input, multi-output representation. State Transition Matrix and its Role. Periodic inputs to an LTI system, the notion of a frequency response and its relation to the impulse response.

FOURIER, LAPLACE AND Z- TRANSFORMS: Fourier series representation of periodic signals, Waveform Symmetries, Calculation of Fourier Coefficients. Fourier Transform, convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality. The Discrete-Time Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT). Parseval's Theorem. Review of the Laplace Transform for continuous time signals and systems, system functions, poles and zeros of system functions and signals, Laplace domain analysis, solution to differential equations and system behavior.The z-Transform for discrete time signals and systems, system functions, poles and zeros of systems and sequences, z-domain analysis.

SAMPLING AND RECONSTRUCTION: The Sampling Theorem and its implications. Spectra of sampled signals. Reconstruction: ideal interpolator, zero-order hold, first-order hold. Aliasing and its effects. Relation between continuous and discrete time systems. Introduction to the applications of signal and system theory: modulation for communication, filtering, feedback control systems.

E. TEXT BOOKS

T1. A. V. Oppenheim, A. S. Willsky and S. H. Nawab, “Signals and systems”, Prentice Hall India, 1997.

T2. J. G. Proakis and D. G. Manolakis, “Digital Signal Processing: Principles, Algorithms, and Applications”, Pearson, 2006.

F. REFERENCE BOOKS

R1. H. P. Hsu, “Signals and systems”, Schaum’s series, McGraw Hill Education, 2010.

R2. S. Haykin and B. V. Veen, “Signals and Systems”, John Wiley and Sons, 2007.

R3. A. V. Oppenheim and R. W. Schafer, “Discrete-Time Signal Processing”, Prentice Hall, 2009.

R4. M. J. Robert “Fundamentals of Signals and Systems”, McGraw Hill Education, 2007.

R5. B. P. Lathi, “Linear Systems and Signals”, Oxford University Press, 2009.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Understand the concepts of continuous time and discrete time systems.	1															
[CO2]	Understand sampling theorem and its implications.		1														
[CO3]	Analyze systems in complex frequency domain.		1														
[CO4]	Understand the concept of Fourier transform and its implementation																

1- **Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**

Subject: Database Management System

Code: BTE25101

3 Credits | Semester V

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database modeling, relational, hierarchical, and network models
- To understand and use data manipulation language to query, update, and manage a database
- To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server
- (Database Server), Data Warehousing.
- To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Describe the fundamental elements of relational database management systems

[CO2] Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.

[CO3] Design ER-models to represent simple database application scenarios

[CO4] Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.

[CO5] Improve the database design by normalization.

[CO6] Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing.

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

DATABASE SYSTEM ARCHITECTURE & DATA MODELS: Data Abstraction, Data Independence, Data DefinitionLanguage (DDL), Data Manipulation Language (DML).Data models:Entity-relationship model, network model, relational and object oriented datamodels. Integrity constraints, data manipulation operations.

RELATIONAL QUERY LANGUAGES, PROCESSING & OPTIMIZATION: Relational query languages:Relational algebra, Tuple and domain relationalcalculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server.Relational database design:Domain and data dependency, Armstrong's axioms,Normal forms, Dependency preservation, Lossless design.Query processing and optimization: Evaluation of relational algebra expressions,Query equivalence, Join strategies, Query optimization algorithms.

STORAGE STRATEGIES: Indices, B-trees, hashing.

TRANSACTION PROCESSING: Concurrency control, ACID property, Serializabilityofscheduling.Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.

DATABASE SECURITY AND ADVANCED TOPICS: Authentication, Authorization and access control, DAC, MAC andRBAC models, Intrusion detection, SQL injection.Object oriented and object relational databases, Logical databases, Webdatabases, Distributed databases, Data warehousing and data mining.

E. TEXT BOOKS

T1. “Database System Concepts”, 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.

T2. “Principles of Database and Knowledge – Base Systems”, Vol 1 by J. D. Ullman, Computer Science Press.

F. REFERENCE BOOKS

R1. “Fundamentals of Database Systems”, 5th Edition by R. Elmasri and S. Navathe, Pearson Education

R2. “Foundations of Databases”, Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Describe the fundamental elements of relational database management systems	**1**													**1**		
[CO2]	Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL		**2**											**1**			
[CO3]	Design ER-models to represent simple database application scenarios			**2**										**2**			
[CO4]	Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.					**1**										**1**	
[CO5]	Improve the database design by normalization					**2**										**1**	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Formal Language and Automata Theory

Code: BTE25102

3 Credits | Semester V

Total Lecture: 45 Total Tutorial: 9

B. Introduction:

- Develop a formal notation for strings, languages and machines. Design finite automata to accept a set of strings of a language.
- Prove that a given language is regular and apply the closure properties of languages.
- Design context free grammars to generate strings from a context free language and convert them into normal forms.
- Prove equivalence of languages accepted by Push Down Automata and languages generated by context free grammars
- Identify the hierarchy of formal languages, grammars and machines.
- Distinguish between computability and non-computability and Decidability and undecidability

C. Course Outcomes: At the end of the course, students will be able to

[CO1] Write a formal notation for strings, languages and machines.
[CO2] Design finite automata to accept a set of strings of a language.
[CO3] Determine whether the given language is regular or not.
[CO4] Design context free grammars to generate strings of context free language.
[CO5] Determine equivalence of languages accepted by Push down Automata and languages generated by context free grammars.
[CO6] Write the hierarchy of formal languages, grammars and machines. Distinguish between computability, non-computability, Decidability and undesirability.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

INTRODUCTION: Alphabet, languages and grammars, productions and derivation, Chomsky hierarchy of languages.

REGULAR LANGUAGES AND FINITE AUTOMATA: Regular expressions and languages, deterministic finite automata (DFA) and equivalence with regular expressions, nondeterministic finite automata (NFA) and equivalence with DFA. regular grammars and equivalence with finite automata, properties of regular languages.pumping lemma for regular languages, minimization of finite automata.

CONTEXT-FREE LANGUAGES AND PUSHDOWN AUTOMATA: Context-free grammars (CFG) and languages (CFL), Chomsky and Greibach normal forms, nondeterministic pushdown automata (PDA) and equivalence with CFG.parse trees, ambiguity in CFG, pumping lemma for context-free languages, deterministic pushdown automata, closure properties of CFLs.

CONTEXT-SENSITIVE LANGUAGES: Context-sensitive grammars (CSG) and languages, linear bounded automata and equivalence with CSG.

TURING MACHINES: The basic model for Turing machines (TM), Turing-recognizable (recursively enumerable) and Turing-decidable (recursive) languages and their closure properties, variants of Turing machines, nondeterministic .TMs and equivalence with deterministic TMs, unrestricted grammars and equivalence with Turing machines, TMs as enumerators.

UNDECIDABILITY: Church-Turing thesis, universal Turing machine, the universal and diagonalization languages.Reduction between languages and Rice’s theorem, undecidable problems about languages.

E. TEXT BOOKS

T1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson Education Asia.
T2. Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory of Computation, Pearson Education Asia.
T3. Dexter C. Kozen, Automata and Computability, Undergraduate Texts in Computer Science, Springer.

F. REFERENCE BOOKS

R1. Michael Sipser, Introduction to the Theory of Computation, PWS Publishing.
R2. John Martin, Introduction to Languages and The Theory of Computation, Tata McGraw Hill.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Write a formal notation for strings, languages and machines		**1**														
[CO2]	Design finite automata to accept a set of strings of a language			**2**													
[CO3]	Determine whether the given language is regular or not.																
[CO4]	Design context free grammars to generate strings of context free language			**2**													
[CO5]	Determine equivalence of languages accepted by Push Down Automata and languages generated by context free grammars		**1**														

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Object Oriented Programming

Code: BTE23030
3 Credits | Semester V

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- The course will introduce standard tools and techniques for software development, using object oriented approach, use of a version control system, an automated build process, an appropriate framework for automated unit and integration tests.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Specify simple abstract data types and design implementations, using abstraction functions to document them.
[CO2] Recognize features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.
[CO3] Name and apply some common object-oriented design patterns and give examples of their use.
[CO4] Design applications with an event-driven graphical user interface

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

INTRODUCTION TO OOP AND JAVA FUNDAMENTALS: Object Oriented Programming – Abstraction – objects and classes – Encapsulation- Inheritance – Polymorphism- OOP in Java – Characteristics of Java – The Java Environment – Java Source File Structure – Compilation. Fundamental Programming Structures in Java – Defining classes in Java – constructors, methods -access specifiers – static members -Comments, Data Types, Variables, Operators, Control Flow, Arrays , Packages – JavaDoc comments

INHERITANCE AND INTERFACES : Inheritance – Super classes- sub classes –Protected members – constructors in sub classes- the Object class – abstract classes and methods- final methods and classes.Interfaces – defining an interface, implementing interface. Differences between classes and interfaces and extending interfaces – Object cloning -inner classes, ArrayLists – Strings.

EXCEPTION HANDLING AND I/O: Exceptions – exception hierarchy – throwing and catching exceptions – built-in exceptions, creating own exceptionsStack Trace Elements. Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files

MULTITHREADING AND GENERIC PROGRAMMING : Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, Inter-thread communication, daemon threads, thread groups. Generic Programming – Generic classes – generic methods – Bounded Types – Restrictions and Limitations.

EVENT DRIVEN PROGRAMMING: Graphics programming – Frame – Components – working with 2D shapes – Using color, fonts, and images – Basics of event handling – event handlers – adapter classes – actions – mouse events – AWT event hierarchy.Introduction to Swing – layout management – Swing Components – Text Fields , Text Areas – Buttons- Check Boxes – Radio Buttons – Lists- choices- Scrollbars – Windows –Menus – Dialog Boxes.

E. TEXT BOOKS

T1. The Complete Reference Java2, Herbert Schildt, Tata McGraw Hill 7th edition
T2. Core Java Volume I- Fundamentals, Cay S. Horstmann, Prentice Hall 11th edition
T3. Head First Java, Kathy Sierra & Bert Bates, O'Reilly publications 2nd edition

F. REFERENCE BOOKS

R1. Java: Programming Basics for Absolute Beginners (1st Edition), Nathan Clark, CreateSpace Independent Publishing

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Specify simple abstract data types and design implementations, using abstraction functions to document them.		**1**														
[CO2]	Recognize features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity			**1**													
[CO3]	Name and apply some common object-oriented design patterns and give examples of their use.			**1**													
[CO4]	Design applications with an event-driven graphical user interface					**1**											

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Soft Skills and Interpersonal Communication

Code: BTE25386

3 Credits | Semester V

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To give each student a realistic perspective of work and work expectations
- To guide students in making appropriate and responsible decisions
- To create a desire to fulfill individual goals
- To educate students about unproductive thinking, self-defeating emotional impulses, and self- defeating behaviors.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] State the Corporate communication culture.
[CO2] Implement Corporate Social Responsibility and Ethics.
[CO3] Acquire corporate email, mobile and telephone etiquette.
[CO4] Judge presentation and entrepreneurial skills of individuals.
[CO5] Develop business reports and proposals expected of a corporate professional.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

LANGUAGE ENHANCEMENTS: English Language Enhancement: Verbs and tenses, Phrasal verbs, Synonyms, Antonyms, Homonyms - Descriptive Words, Combining Sentences, Business Idioms, Indianisms in English

ART OF COMMUNICATION: Art of Communication, Communication process- Non-verbal Communication- Effective Listening. Interpersonal and Intra Personal Communication Skills- Self-Awareness- Self-Esteem and Confidence- Assertiveness and Confidence- Dealing with Emotions-

TEAM CONCEPT: Team Concept- Elements of Teamwork- Stages of Team Formation-Effective Team-Team Player Styles-Leadership

CAMPUS TO COMPANY: Campus to Company- Dressing and Grooming- The Corporate Fit-Business Etiquette Communication; media etiquette

PRESENTATION & ENTREPRENEURIAL SKILLS: Group Discussions, Interviews, and Presentation Skills. Interview handling skills- Effective Resume-- Common Interview Mistakes-Body-language Content Aid, Visual Aids- Entrepreneurial Skills Development. Reading

E. TEXT BOOKS

T1. K.Alex, Soft Skills: Know Yourself & Know The world, S. Chand; 2009.

F. REFERENCE BOOKS

R1 Robert M. Sherfield, Developing Soft Skills, Montgomery and Moody Fourth Edn. Pearson, 2009.

R2. Robert Bramson, Coping with Difficult People, Dell, 2009

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[CO1]	State the Corporate communication culture.	-	-	-	1	-	2	-	2	3	3	1	2	-	-	2	3
[CO2]	Implement Corporate Social Responsibility and Ethics.	-	-	-	1	-	3	1	3	3	2	-	2	-	-	3	2
[CO3]	Acquire corporate email, mobile and telephone etiquette.	-	-	-	1	1	2	-	3	3	3	1	3	-	-	3	3
[CO4]	Judge presentation and entrepreneurial skills of individuals.	-	-	-	-	2	1	1	3	3	3	2	2	-	-	3	3
[CO5]	Develop business reports and proposals expected of a corporate professional.	-	-	-	-	2	1	-	2	3	3	-	3	-	1	3	3

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Graph Theory

Code: BTE26148

3 Credits | Semester V

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- Be familiar with the most fundamental Graph Theory topics and results.
- Be exposed to the techniques of proofs and analysis.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Write precise and accurate mathematical definitions of objects in graph theory.

[CO2] Use mathematical definitions to identify and construct examples and to distinguish examples from non-examples.

[CO3] Validate and critically assess a mathematical proof.

[CO4] Use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

INTRODUCTION: Graphs – Introduction – Isomorphism – Sub graphs – Walks, Paths, Circuits –Connectedness – Components – Euler graphs – Hamiltonian paths and circuits – Trees – Properties of trees – Distance and centers in tree – Rooted and binary trees.

TREES, CONNECTIVITY & PLANARITY: Spanning trees – Fundamental circuits – Spanning trees in a weighted graph – cut sets – Properties of cut set – All cut sets – Fundamental circuits and cut sets .Connectivity and separability – Network flows – 1-Isomorphism – 2-Isomorphism – Combinational and geometric graphs – Planer graphs – Different representation of a planer graph.

COLOURING AND DIRECTED GRAPH: Chromatic number – Chromatic partitioning – Chromatic polynomial – Matching – Covering – Four color problem Directed graphs – Types of directed graphs – Digraphs and binary relations – Directed paths and connectedness – Euler graphs.

MATRIX REPRESENTATION: Adjacency matrix- Incidence matrix- Circuit matrix – Cut-set matrix – Path Matrix- Properties – Related Theorems – Correlations.

GRAPH ALGORITHMS: Graph Algorithms - Connectedness and Components- Spanning Tree- Fundamental Circuits- Cut Vertices- Directed Circuits- Shortest Path – Applications overview.

E. TEXT BOOKS

T1. NarsinghDeo, "Graph Theory: With Application to Engineering and Computer Science", Prentice Hall of India, 2003.
T2. Grimaldi R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", Addison Wesley, 1994.

F. REFERENCE BOOKS

R1.Clark J. and Holton D.A, "A First Look at Graph Theory", Allied Publishers, 1995.
R2. Mott J.L., Kandel A. and Baker T.P. "Discrete Mathematics for Computer Scientists and Mathematicians" , Prentice Hall of India, 1996

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Write precise and accurate mathematical definitions of objects in graph theory.		**2**														
[CO2]	Use mathematical definitions to identify and construct examples and to distinguish examples from non-examples	**1**													**2**		
[CO3]	Validate and critically assess a mathematical proof.				**2**												
[CO4]	Use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory.	**1**															

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Image Processing

Code: BTE27332
3 Credits | Semester V

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To study the image fundamentals and mathematical transforms necessary for image processing.
- To study the image enhancement techniques.
- To study image restoration procedures.
- To study the image compression procedures.

B. Course Outcomes: At the end of the course, students will be able to
[CO1] Review the fundamental concepts of a digital image processing system
[CO2] Analyze images in the frequency domain using various transforms.
[CO3] Evaluate the techniques for image enhancement and image restoration.
[CO4] Categorize various compression techniques.
[CO5] Interpret Image compression standards.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

THE DIGITAL IMAGE PROCESSING FIELD : Introduction, definitions, and applications, Image fundamentals: Models, sampling, quantization, and basic operations, image representation and formats.

IMAGE ENHANCEMENT: Background, Point processing, Histogram equalization and specification, spatial domain filtering: Smoothing, Median, & Sharpening. 1-D and 2-D Discrete .Fourier Transform (DFT), Properties of DFT. Frequency Domain Filtering: Low & high-pass, Color and Multichannel image processing: Color fundamentals, models, transformation, and enhancement.

IMAGE RESTORATION: Degradation and observation models, Inverse filtering, Geometric transformation .

IMAGE COMPRESSION:Fundamentals, information theory and entropy concept,Huffman and run-length coding. Compression Standards, Compression of frame Sequences and color images, GIF and JPEG

IMAGE SEGMENTATION: Detection of discontinuities, point, line and edge detection, Image segmentation: Thresholding, global and optimal. Region-oriented and Motion-based segmentation

REPRESENTATION AND DESCRIPTION, COMPUTER VISION PRINCIPLES LECTURE: PRACTICAL APPLICATIONS: Videoconferencing and Internet applications. Ethics and legal issues in DIM.

E. TEXT BOOKS

T1. Image Processing, Analysis, and Machine Vision, Milan Sonka, Vaclav Hlavac and Roger Boyle, Second Edition, Thomson Learning.
T2. Introduction to Digital Image Processing with Matlab, Alasdair McAndrew, Thomson Course Technology

F. REFERENCE BOOKS

R1. Computer Vision and Image Processing, Adrian Low, Second Edition, B.S.Publications
R2. Digital Image Processing using Matlab, RafealC.Gonzalez, Richard E.Woods, Steven L. Eddins, Pearson Education.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Review the fundamental concepts of a digital image processing system		**2**														
[CO2]	Analyze images in the frequency domain using various transforms.	**1**															
[CO3]	Evaluate the techniques for image enhancement and image restoration.				**2**												
[CO4]	Categorize various compression techniques.		**1**														
[CO5]	Interpret Image compression standards.																

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Advanced Algorithms

Code: BTE26147
3 Credits | Semester V

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- Develop a sound theoretical understanding of advanced algorithms and practical problem solving skills using them.
- Students should develop basic advanced algorithm analysis skills for analyzing the approximation ratio of approximation algorithms and the probability of randomized algorithms.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Analyze a variety of algorithms with practical applications and the resource requirements of each.

[CO2] Determine the most suitable algorithm for any given task and then apply it to the problem.

[CO3] Demonstrate adequate comprehension of the theory of intractability and prove when certain kinds of problems are intractable.

[CO4] Design and analyze programming problem statements.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

ALGORITHMIC PARADIGMS: Dynamic Programming, Greedy, Branch-and-bound; Asymptotic complexity, Amortizedanalysis;

GRAPH ALGORITHMS: Shortest paths, Flow networks; NP-completeness; Approximation algorithms; Randomizedalgorithms

LINEAR PROGRAMMING: Special topics: Geometric algorithms (range searching, convex hulls, segment intersections,closest pairs)Numerical algorithms (integer, matrix and polynomial multiplication, FFT, extendedEuclid's algorithm, modular exponentiation, primality testing, cryptographic computations)

INTERNET ALGORITHMS:Text pattern matching, tries, information retrieval, data compression, web caching. Qubits, superposition, and measurement, quantum Fourier transform, Periodicity Quantum circuits, Factoring as periodicity quantum algorithm for factoring.

E. TEXT BOOKS

T1. S. Dasgupta, C. H. Papadimitriou, and U. V. Vazirani, “Algorithms”TMH Education.
T2. Udi Manber, "Introduction to Algorithms: A Creative Approach", Addison Wesley
T3. M. H. Alsuwaiyel, “Algorithms: Design Techniques and Analysis", World Scientific

F. REFERENCE BOOKS

R1. T. H. Cormen, C. E. Leiserson, R. L. Rivest, C. Stein, “Introduction to Algorithms”, Prentice Hall of India.
R2. Rajeev Motwani and PrabhakarRaghavan, “Randomized Algorithms”, Cambridge University Press

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Analyze a variety of algorithms with practical applications and the resource requirements of each.		**1**											**1**			
[CO2]	Determine the most suitable algorithm for any given task and then apply it to the problem.		**1**												**1**		
[CO3]	Demonstrate adequate comprehension of the theory of intractability and prove when certain kinds of problems are intractable														**2**		
[CO4]	Design and analyze programming problem statements.			**2**											**2**		

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Data Base Management System Lab

Code: BTE25108
2 Credits | Semester V

Total Lecture: 60

A. Introduction:

- The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from aDBMS.

B. **Course Outcomes:** At the end of the course, students will be able to

[CO1] Describe the fundamental elements of relational database management systems
[CO2] Explain the basic concepts of relational data model, entity-relationship model, relationaldatabase design, relational algebra and SQL
[CO3] Design ER-models to represent simple database application scenarios
[CO4] Improve the database design by normalization.

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	5
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	35
Total		50
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

S.No.	**Name of Experiment**
1	Creating &Executing DDL in SQL.
2	Creating &Executing Integrity constraints in SQL.
3	Creating &Executing DML in SQL.
4	Executingrelational, logical and mathematical set operators using SQL
5	Executing group functions
6	Executing string operators &string functions.

7	Executing Date &Time functions.
8	Executing Data Conversion functions.
9	Executing DCL in SQL.
10	Execute 50SQLqueries(operators, functions, clauses, join Concepts)

E. Text Book:

T1. W. L. McCabe, J.C. Smith and P. Harriott, “Unit operations of Chemical Engineering”, McGraw Hill, International Edn.,

F. Reference Books:

R1. G Chandrasekhar, Laboratory Experiments in Chemical and Allied Engineering:, Penram International Publishing (India) Pvt. Ltd.,

F. Course Articulation Matrix: (Mapping of COs with POs)

CO	**STATEMENT**	**CORRELATION WITH PROGRAM OUTCOMES**												**CORRELATION WITH PROGRAM SPECIFIC OUTCOMES**			
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
[CO1]	Describe the fundamental elements of relational database management systems		**1**											**1**			
[CO2]	Explain the basic concepts of relational data model, entity-relationship model, relationaldatabase design, relational algebra and SQL			**1**											**1**		
[CO3]	Design ER-models to represent simple database application scenarios														**1**		
[CO4]	Improve the database design by normalization.					**1**									**2**		

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Object Oriented Programming Lab

Code: BTE23036

2 Credits | Semester V

Total Lecture: 60

- **Introduction:**
  - The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.

- **Course Outcomes:** At the end of the course, students will be able to

[CO1] Demonstrate the Conceptual model of UML and SDLC
[CO2] Define classes modeling techniques and instances modeling techniques
[CO3] Describe interaction diagrams and their modeling techniques.
[CO4] Demonstrate component and deployment diagram.

- **Assessment Plan:**

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	5
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	35
Total		50
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

- **SYLLABUS**

S.No.	List of Experiment
1.	write a program to display default value of all primitive data type of JAVA
2.	write a program to display conditional statements.
3.	write a program to display factorial of a number

4.	write a program to display nested loop.
5.	Write a Java Program to define a class, describe its constructor, overload the Constructors and instantiate its object
6.	Write a Java Program to define a class, define instance methods for setting and Retrieving values of instance variables and instantiate its object
7.	Write a Java Program to define a class, define instance methods and overload them and use them for dynamic method invocation.
8.	Write a Java Program to demonstrate use of sub class.
9.	Write a Java Program to demonstrate use of nested class
10.	Write a Java Program to implement array of objects.
11.	Write a Java Program to implement Wrapper classes and their methods
12.	Write a Java Program to implement inheritance and demonstrate use of method overriding.
13.	Write a program to demonstrate use of implementing interfaces.
14.	Write a Java program to implement the concept of importing classes from user defined package and creating packages
15.	Write a program to implement the concept of threading by implementing Runnable Interface

E. TEXT BOOKS

T1. The Complete Reference Java2, Herbert Schildt, Tata McGraw Hill 7th edition
T2. Core Java Volume I- Fundamentals, Cay S. Horstmann, Prentice Hall 11th edition
T3. Head First Java, Kathy Sierra & Bert Bates, O'Reilly publications 2nd edition

F. REFERENCE BOOKS

R1. Java: Programming Basics for Absolute Beginners (1st Edition), Nathan Clark, CreateSpace Independent Publishing

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Demonstrate the Conceptual model of UML and SDLC																
[CO2]	Define classes modeling techniques and instances modeling techniques					**1**											
[CO3]	Describe interaction diagrams and their modeling techniques.			**1**													
[CO4]	Demonstrate component and deployment diagram.	**2**															

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject:Summer Internship-I (3-4 Weeks)

Code: BTE26312

2 Credits | Semester V

Total Lecture: 60

A. Introduction:

- Following are the intended objectives of internship training:
- Will expose Technical students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry.
- Provide possible opportunities to learn understand and sharpen the real time technical / managerial skills required at the job.
- Exposure to the current technological developments relevant to the subject area of training.
- Experience gained from the 'Industrial Internship' in classroom will be use in classroom discussions.
- Create conditions conducive to quest for knowledge and its applicability on the job

GUIDELINES FOR INTERNSHIP

Summer Internship -1 should be undertaken in an industry/Govt. or Pvt. Certified Agencies which are in social sector/ Govt. Skill Centres/Institutes/Schemes.

S.No.	Suggested Schedule	Suggested Duration (In weeks)	Activities
1	Summer/winter vacation after 2nd/3rd Semester	3-4	Inter/Intra Institutional Activities

Syllabus of

B.Tech. in Computer Science Engineering

Semester-VI

ARKAJAIN University, Jharkhand
School of Engineering & IT
Department of Engineering
Faculty – Bachelor of Technology in Computer Science Engineering
Scheme of Study (w.e.f Batch 2020-21)

SEMESTER –I

Sr. No.	Name of the Subject	Group	L-T-P	Credit
1	Engineering Mathematics–I	A & B	3-1-0	4
2	Engineering Chemistry	A	3-0-0	3
	Programming for Problem Solving	B	3-0-0	3
3	Basic Electrical Engineering	A	3-1-0	4
	Engineering physics	B	3-1-0	4
4	Engineering Mechanics	A	3-0-0	3
	English for Communication	B	3-0-0	3
5	Constitution of India	B	0-0-0	0
	Practical			
6	Engineering Chemistry Lab	A	0-0-1	1
	Engineering Physics Lab	B	0-0-1	1
7	Basic Electrical Engineering Lab	A	0-0-1	1
	Programming for Problem Solving Lab	B	0-0-2	2
8	Engineering Mechanics Lab	A	0-0-1	1
9	Engineering Graphics & Design	A	0-0-2	2
	Workshop Practices	B	0-0-2	2
	TOTAL	A or B	12-2-5	19

SEMESTER –II

Sr. No.	Name of the Subject	Group	L-T-P	Credit
1	Engineering Mathematics–II	A & B	3-1-0	4
2	Engineering Chemistry	B	3-0-0	3
	Programming for Problem Solving	A	3-0-0	3
3	Basic Electrical Engineering	B	3-1-0	4
	Engineering physics	A	3-1-0	4
4	Engineering Mechanics	B	3-0-0	3
	English for Communication	A	3-0-0	3
5	Constitution of India	A	0-0-0	0
	Practical			
6	Engineering Chemistry Lab	B	0-0-1	1
	Engineering Physics Lab	A	0-0-1	1
7	Basic Electrical Engineering Lab	B	0-0-1	1
	Programming for Problem Solving Lab	A	0-0-2	2
8	Engineering Mechanics Lab	B	0-0-1	1
	Engineering Graphics& Design	B	0-0-2	2
9	Workshop Practices	A	0-0-2	2
	TOTAL	A or B	12-2-5	19

SEMESTER –I (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering Chemistry	BSC	3	3	100	70	20	5	5
2	Engineering Mathematics–I	BSC	4	4	100	70	20	5	5
3	Basic Electrical Engineering	ESC	4	4	100	70	20	5	5
4	Engineering Mechanics	ESC	3	3	100	70	20	5	5
	Practical								
5	Engineering Chemistry Lab	BSC	1	2	50	35	5	5	5
6	Basic Electrical Engineering Lab	ESC	1	2	50	35	5	5	5
7	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
8	Engineering Graphics & Design	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**24**	**600**	**420**	**100**	**40**	**40**

SEMESTER I (Group-B)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering physics	BSC	4	4	100	70	20	5	5
2	Engineering Mathematics –I	BSC	4	4	100	70	20	5	5
3	Programming for Problem Solving	ESC	3	3	100	70	20	5	5
4	English for Communication	HSMC	3	3	100	70	20	5	5
5	Constitution of India	MC	0	2	50	35	10	2.5	2.5
	Practical								
6	Engineering physics Lab	BSC	1	2	50	35	5	5	5
7	Programming for Problem Solving Lab	ESC	2	4	50	35	5	5	5
8	Workshop Practices	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**26**	**600**	**420**	**105**	**37.5**	**37.5**

SEMESTER II (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering physics	BSC	4	4	100	70	20	5	5
2	Engineering Mathematics –II	BSC	4	4	100	70	20	5	5
3	Programming for Problem Solving	ESC	3	3	100	70	20	5	5
4	English for Communication	HSMC	3	3	100	70	20	5	5
5	Constitution of India	MC	0	2	50	35	10	2.5	2.5
	Practical								
6	Engineering physics Lab	BSC	1	2	50	35	5	5	5
7	Programming for Problem Solving Lab	ESC	2	4	50	35	5	5	5
8	Workshop Practices	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**26**	**600**	**420**	**105**	**37.5**	**37.5**

SEMESTER –II (Group-B)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering Chemistry	BSC	3	3	100	70	20	5	5
2	Engineering Mathematics–II	BSC	4	4	100	70	20	5	5
3	Basic Electrical Engineering	ESC	4	4	100	70	20	5	5
4	Engineering Mechanics	ESC	3	3	100	70	20	5	5
	Practical								
5	Engineering Chemistry Lab	BSC	1	2	50	35	5	5	5
6	Basic Electrical Engineering Lab	ESC	1	2	50	35	5	5	5
7	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
8	Engineering Graphics & Design	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**24**	**600**	**420**	**100**	**40**	**40**

SEMESTER-III

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Analog Electronic Circuits	PCC	3	3	100	70	20	5	5
2	Data structure	PCC	3	3	100	70	20	5	5
3	Digital Electronics	PCC	3	3	100	70	20	5	5
4	Engineering Mathematics -III	BSC	4	3	100	70	20	5	5
5	Humanities-I Professional Practice, Law & Ethics Organizational Behavior	HSMC	3	3	100	70	20	5	5
6	Environmental Science	MC	0	2	50	35	10	2.5	2.5
7	Python Programming	PCC	3	3	100	70	20	5	5
	PRACTICAL								
8	Analog Electronic Circuits Lab	PCC	2	4	50	35	5	5	5
9	Data structure Lab	PCC	2	4	50	35	5	5	5
10	Digital Electronics Lab	PCC	2	4	50	35	5	5	5
11	IT Workshop(MAT LAB)	PCC	1	2	50	35	5	5	5
12	Python Programming Lab	PCC	2	4	50	35	5	5	5
	TOTAL		28	38	900	640	155	57.5	57.5

SEMESTER-IV

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Discrete Mathematics	BSC	4	4	100	70	20	5	5
2	Computer Organization & Architecture	PCC	3	3	100	70	20	5	5
3	Operating Systems	PCC	3	3	100	70	20	5	5
4	Design & Analysis of Algorithms	PCC	3	3	100	70	20	5	5
5	Microprocessor & Microcontroller	PCC	3	3	100	70	20	5	5
6	Software Engineering	PCC	3	3	100	70	20	5	5
	PRACTICAL								
6	Operating Systems Lab	PCC	2	4	50	35	5	5	5
7	Design & Analysis of Algorithms Lab	PCC	2	4	50	35	5	5	5
8	Computer Organization & Architecture Lab	PCC	2	4	50	35	5	5	5
	TOTAL		25	31	750	525	135	45	45

SEMESTER V

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory / Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Signals & Systems	PCC	3	3	100	70	20	5	5
2	Database Management Systems	PCC	3	3	100	70	20	5	5
3	Formal Language &Automata Theory	PCC	3	3	100	70	20	5	5
4	Object Oriented Programming	PCC	3	3	100	70	20	5	5
5	Humanities-II Soft Skills and Interpersonal Communication	HSMC	3	3	100	70	20	5	5
6	Elective-1 Graph Theory Image Processing Advanced Algorithms	PEC	3	3	100	70	20	5	5
	PRACTICAL								
7	Database Management Systems Lab	PCC	2	4	50	35	5	5	5
8	Object Oriented Programming Lab	PCC	2	4	50	35	5	5	5
9	Summer Internship-I (3-4 Weeks)	PCC	1	0	50	50	0	0	0
	TOTAL		23	26	750	540	130	40	40

SEMESTER VI

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Compiler Design	PCC	3	3	100	70	20	5	5
2	Computer Networks	PCC	3	3	100	70	20	5	5
3	Advance Java Programming	PCC	3	3	100	70	20	5	5
4	Elective-II Artificial Intelligence Machine Learning Visual Programming	PEC	3	3	100	70	20	5	5
5	Elective-III Web Technology Neural Networks and Deep Learning	PEC	3	3	100	70	20	5	5
6	Open Elective –I Cyber Law and Ethics Human Resource Development and Organizational Behavior Advanced Algorithms	HSMC	3	3	100	70	20	5	5
	Practical								
7	Compiler Design Lab	PCC	2	4	50	35	5	5	5
8	Computer Networks Lab	PCC	2	4	50	35	5	5	5
9	Advance Java Programming Lab	PCC	2	4	50	35	5	5	5
	TOTAL		24	30	750	525	135	45	4

SEMESTER VII

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Elective-IV Cryptography & Network Security Advanced Operating Systems Web and Internet	PEC	3	3	100	70	20	5	5
2	Elective-V Quantum Computing Optimization Techniques Real Time Systems	PEC	3	3	100	70	20	5	5
3	Open Elective-II Electronic Design Automation Computer Graphics Data mining and warehousing Semantic Web and Social Networks	OEC	3	3	100	70	20	5	5
4	Biology For Engineers	BSC	3	3	100	70	20	5	5
5	Data Analytics	PCC	3	3	100	70	20	5	5
	Practical								
5	Minor Project	PROJ	4	8	100	100	0	0	0
6	Industrial Training (Summer Internship-4-6 Week)	PROJ	4	0	100	100	0	0	0
	TOTAL		23	23	700	550	100	25	25

SEMESTER VIII

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Elective-VI CloudComputing Data Mining AdvancedComputerArchitecture	PEC	3	3	100	70	20	5	5
2	Open Elective-III Signals and systems Advanced Operating Systems	OEC	3	3	100	70	20	5	5
3	Open Elective-IV Cyber security Soft Computing	OEC	3	3	100	70	20	5	5
4	VLSI System Design	PCC	3	3	100	70	20	5	5
	PRACTICAL								
5	Major Project	PROJ	6	12	100	0	0	0	0
6	Extra- Curricular/ Co-Curricular Activity	PROJ	0	0	100	70	30	0	0
	Total		18	24	600	35	110	20	20

Distribution of Credit across 8 semesters:

Sl. No	Type of Paper	No. of Paper	Total Credit
1	Humanities and Social Sciences including Management courses **(HSMC)**	5	15
2	Basic Science courses**(BSC)**	9	28
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc**(ESC)**	8	18
4	Professional core courses (**PCC)**	30	77
5	Professional Elective courses relevant to chosen specialization/branch**(PEC)**	5	15
6	Open subjects – Electives from other technical and /or emerging subjects (**OEC)**	3	9
7	Project work, seminar and internship in industry or elsewhere**(PROJ)**	5	14
8	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Knowledge Tradition]**(MC)**	2	0
	Total	66	176

CIA – Continuous Internal Assessment – Based on Projects / Assignment during the semester

Note:
AICTE Activity Points to be earned by students admitted to Degree program (For more details refer to Chapter 6, AICTE, Activity Point Program, Model Internship Guidelines):
Every regular student, who is admitted to the 4 year Degree program, is required to earn 100 activity points in addition to the total credits earned for the program. Students entering 4 years Degree Program through lateral entry are required to earn 75 activity points in addition to the total credits earned for the program. The activity points earned by the student shall be reflected on the students 8th Semester grade card.
The activities to earn the points can be spread over the duration of the course. However, minimum prescribed duration should be fulfilled.
Activity Points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression.
Incase student fail to earn the prescribed activity points, Eight semester Grade Card shall be issued only after earning the required activity Points.
Students shall be eligible for the award of degree only after the release of the Eight Semester grade card.

There are two groups (A & B) in semester 1 & 2. The Group division will be decided by The Dean SoE & IT before commencement of classes

ARKAJAIN University, Jharkhand
School of Engineering & IT
Department of Engineering
Faculty – Bachelor of Technology in Computer Science Engineering
PROGRAM OUTCOMES &PROGRAM SPECIFIC OUTCOMES

PROGRAM OUTCOMES

After completing this undergraduate program, a learner:

[PO.1]. Engineering knowledge: An ability to apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to get the solution of the engineering problems.

[PO.2]. Problem analysis: Ability to Identify, formulates, review research literature, and analyze complex engineering problems.

[PO.3]. Design/Development Of Solutions: Ability to design solutions for complex Engineering Problems by considering social, Economical and Environmental aspects.

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge to design, conduct analyse experiments to get valid conclusion**.**

[PO.5]. Modern tool usage: ability to create, select, and apply appropriate techniques, and to model complex engineering activities with an understanding of the limitations.

[PO.6]. The engineer and society: Ability to apply knowledge by considering social health, safety, legal and cultural issues.

[PO.7]. Environment and sustainability: Understanding of the impact of the adopted engineering solutions in social and environmental contexts.

[PO.8]. Ethics: Understanding of the ethical issues of the civil engineering and applying ethical principles in engineering practices.

[PO.9]. Individual and teamwork: Ability to work effectively as an individual or in team, as a member or as a leader.

[PO.10]. Communication: An ability to communicate clearly and effectively through different modes of communication.

[PO.11]. Project management and finance: Ability to handle project and to manage finance related issue.

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning.

PROGRAM SPECIFIC OUTCOMES

[PSO.1]. Understand the principles, architecture and organization of computers, embedded systems and computer networks.

[PSO.2]. Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems that include both hardware and software.

[PSO.3]. Apply software design and development practices to develop software applications in emerging areas such as IoT, Data Analytics, Social Networks, Cloud and High Performance Computing.

[PSO.4]. Demonstrate& communicate: Ability to demonstrate the knowledge, skill to analyze the cause and effect on Computer Science Engineering.

Subject: Compiler Design

Code: BTE26137
3 Credits | Semester VI

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To understand and list the different stages in the process ofcompilation.
- Identify different methods of lexicalanalysis
- Design top-down and bottom-up parsers
- Identify synthesized and inheritedattributes
- Develop syntax directed translationschemes
- Develop algorithms to generate code for a targetmachine

B. Course Outcomes: At the end of the course
[CO1] Develops the lexical analyzer, for a given grammar specification.
[CO2] Design top-down and bottom-up parsers, for a given parser specification.
[CO3] Develop syntax directed translation schemes
[CO4] Develop algorithms to generate code for a target machine

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

INTRODUCTION : Introduction: Phases of compilation and overview. Lexical Analysis (scanner): Regular languages, finite automata, regular expressions, from regular expressions to finite automata, scanner generator (lex, flex).

SYNTAX AND SEMANTIC ANALYSIS: Syntax Analysis (Parser): Context-free languages and grammars, push-down automata, LL(1) grammars and top-down parsing, operator grammars, LR(O), SLR(1), LR(1), LALR(1) grammars and bottom-up parsing, ambiguity and LR parsing, LALR(1) parser generator (yacc, bison). Semantic Analysis: Attribute grammars, syntax directed definition, evaluation and flow of attribute in a syntax tree.

SYMBOL TABLE AND INTERMEDIATE CODE GENERATION: Symbol Table: Its structure, symbol attributes and management. Run-time environment: Procedure activation, parameter passing, value return, memory allocation, and scope. Intermediate Code Generation: Translation of different language features, different types of intermediate forms.

CODE IMPROVEMENT : Code Improvement (optimization): Analysis: control-flow, data-flow dependence etc.; Code improvement local optimization, global optimization, loop optimization, peep-hole optimization etc. Architecture dependent code improvement: instruction scheduling (for pipeline), loop optimization (for cache memory) etc.

REGISTER ALLOCATION AND TARGET CODE GENERATION ADVANCED: Register allocation and target code generation Advanced topics: Type systems, data abstraction, compilation of Object Oriented features and non-imperative programminglanguages.

E. TEXT BOOKS

T1. Aho A .V.Lam, M . Sethir and Ullman J .D., “ Compilers: Principles, Techniques and Tools”, 2nd Ed., Pearson Education.

T2.Tremblay, J.P.and Sorenson, P .G., “ Theory and Practice of Compiler Writing”, SR Publications.

F. REFERENCE BOOKS

R1. Cooper, K .D. and Torczonl, “Engineering a Compiler”, M organ Kaufmann.

R2. Louden, K .C., “Compiler Construction: Principles and Practice”,Course Technology.

R3. Tremblay, J.P. and Sorenson, P.G., “Parsing Techniques: A Practical Guide”, Ellis Horwood.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Develops the lexical analyzer			**2**													
[CO2]	Design top-down and bottom-up parsers			**1**													
[CO3]	Develop syntax directed translation schemes		**1**														
[CO4]	Develop algorithms to generate code for a target machine																

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Computer Networks

Code: BTE26138
3 Credits | Semester VI

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To develop an understanding of modern network architectures from a design and performance perspective.
- To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs(WLANs).
- To provide an opportunity to do networkprogramming
- To provide a WLAN measurementideas.

B. **Course Outcomes:** At the end of the course, students will be able to

[CO1] Explain the functions of the different layer of the OSI Protocol.
[CO2] Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) describe the function of eachblock.
[CO3] Design it based on the market availablecomponent, for a given requirement (small scale) of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs)
[CO4] Develop the network programming, for a given problem related TCP/IP protocol.
[CO5] Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software andtools.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

INTRODUCTION: Data communication Components: Representation of data and its flow Networks , Various Connection Topology, Protocols and Standards, OSI modelTransmission

Media, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spreadspectrum.

DATA LINK LAYER AND MEDIUM ACCESS SUB LAYER: Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC. Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CD,CDMA/CA.

NETWORK LAYER: Network Layer: Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routingprotocols.

TRANSPORT LAYER: Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucketalgorithm.

APPLICATION LAYER: Application Layer: Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography.

E. TEXT BOOKS

T1.Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGraw- Hill.

T2. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice HallIndia.

F. REFERENCE BOOKS

R1. Computer Networks, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition.

R2. Internetworking with TCP/IP, Volume 1, 6th Edition Douglas Comer, Prentice Hall ofIndia.

R3.TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley, United States ofAmerica.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Explain the functions of the different layer of the OSI Protocol.	**1**															
[CO2]	Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) describe the function of eachblock.			**1**													
[CO3]	For a given requirement (small scale) of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) design it based on the market availablecomponent			**1**													
[CO4]	For a given problem related TCP/IP protocol developed the network programming.		**2**														
[CO5]	Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software andtools.			**2**													

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Artificial Intelligence

Code: BTE26139

3 Credits | Semester VI

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To have an appreciation for the engineering issues underlying the design of AI systems.
- To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language.
- To have an understanding of the basic issues of knowledge representation and blind and heuristic search,
- To understanding of other topics such as minimax, resolution, etc.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
[CO2]Apply basic principles of AI in solutions that require problem solving
[CO3]Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models
[CO4]Demonstrate proficiency developing applications in an 'AI language', expert system shell, or data mining tool.
[CO5]Demonstrate proficiency in applying scientific method to models of machine learning.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

Introduction, History, Intelligent Systems, Foundations of AI, Sub areas of AI, Applications. Problem Solving - State-Space Search and Control Strategies: Introduction, General Problem Solving, Characteristics of Problem, Exhaustive Searches, Heuristic Search Techniques, Iterative-

Deepening A*, Constraint Satisfaction. Game Playing, Bounded Look-aheadStrategy and use of Evaluation Functions, Alpha-Beta Pruning

Logic Concepts and Logic Programming: Introduction, Propositional Calculus, Propositional Logic, Natural Deduction System, Axiomatic System, Semantic Tableau System in Propositional Logic, Resolution Refutation in Propositional Logic, Predicate Logic, Logic Programming. Knowledge Representation: Introduction, Approaches to Knowledge Representation, Knowledge Representation using Semantic Network, Extended Semantic Networks for KR,

Expert System and Applications: Introduction, Phases in Building Expert Systems, Expert System Architecture, Expert Systems Vs Traditional Systems, Truth Maintenance Systems, All Application of Expert Systems, List of Shells and Tools. Uncertainty Measure - Probability Theory: Introduction, Probability Theory, Bayesian Belief Networks, Certainty Factor Theory, Dempster-Shafer Theory.

Machine-Learning Paradigms: Introduction. Machine Learning Systems. Supervised and Unsupervised Learning. Inductive Learning. Learning Decision Trees, Deductive Learning. Clustering, Support Vector Machines.

Artificial Neural Networks: Introduction, Artificial Neural Networks, Single-Layer Feed Forward Networks, Multi-Layer Feed-Forward Networks, Radial-Basis Function Networks, Design Issues of Artificial Neural Networks, Recurrent Networks.

Advanced Knowledge Representation Techniques: Case Grammars, Semantic Web Natural Language Processing: Introduction, Sentence Analysis Phases, Grammars and Parsers, Types of Parsers, Semantic Analysis, Universal Networking Knowledge.

E. TEXT BOOKS

T1. Artificial Intelligence by Rich & Knight, Tata McGraw Hills

T2.Artificial Intelligence: A Modern Approach, Stuart J. Russell and Peter Norvik, PearsonEducation

F. REFERENCE BOOKS

R1. Introduction to Artificial Intelligence by Eugene Charniak, PearsonEducation

R2. Artificial Intelligence by G.LUGER, W.A. STUBBLEFIELD, Addison- Wesley Longman,1998

R3. Artificial Intelligence application programming by M. Tim Jones, Dreamtech Press

Programming Lab (AI) Implementation in all algorithms inLISP/Prolog

R4. Introduction to Artificial Intelligence by RajendraAkerkar, PHI

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.	**2**															
[CO2]	Apply basic principles of AI in solutions that require problem solving	**1**															
[CO3]	Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models			**2**													
[CO4]	Demonstrate proficiency developing applications in an 'AI language', expert system shell, or data mining tool.			**1**													
[CO5]	Demonstrate proficiency in applying scientific method to models of machine learning		**1**														

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Machine Learning

Code: BTE26140

3 Credits | Semester VI

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To have an understanding of issues and challenges of Machine Learning.
- Should be able to select data, model selection, model complexity etc.
- Identify synthesized and inherited attributes
- Understanding of the strengths and weaknesses of many popular machine learning approaches.
- Develop algorithms to generate code for a targetmachine

C. Course Outcomes: At the end of the course, students will be able to

[CO1] Demonstrate fundamental understanding of the history of Machine Learning and its foundations.
[CO2]Identify machine learning techniques suitable for a given problem
[CO3]Solve the problems using various machine learning techniques
[CO4]Apply Dimensionality reduction techniques.
[CO5]Design application using machine learning techniques.

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

INTRODUCTION: Brief Introduction to Machine Learning, Well defined learning problems, Designing a Learning System, Issues in Machine Learning; ,Supervised Learning, Unsupervised Learning, Reinforcement Learning, Candidate elimination algorithm, Inductive bias

DECISION TREE LEARNING: Decision tree learning algorithm-Inductive bias- Issues in

Decision tree learning; ARTIFICIAL NEURAL NETWORKS – Perceptrons, Gradient descent and the Delta rule, Adaline, Multilayer networks, Derivation of back propagation rule Back propagation Algorithm Convergence, Generalization

Evaluating Hypotheses: Estimating Hypotheses Accuracy, Basics of sampling Theory, Comparing Learning Algorithms; Bayesian Learning: Bayes theorem, Concept learning, Bayes Optimal Classifier, Naïve Bayes classifier, Bayesian belief networks, EM algorithm;

Computational Learning Theory: Sample Complexity for Finite Hypothesis spaces, Sample Complexity for Infinite Hypothesis spaces, The Mistake Bound Model of Learning; INSTANCE-BASED LEARNING – k-Nearest Neighbor Learning, Locally Weighted Regression, Radial basis function networks, Case-based learning, svm

Genetic Algorithms: an illustrative example, Evolutionary computation,Population based Alogorithms,Idea of Evolutionary Computation,Genetic Representsentation,Search operator,Selection Scemes,Hypothesis space search, Genetic Programming, Models of Learning; Learning first order rules-sequential covering algorithms General to specific beam search-FOIL;

E. TEXT BOOKS

T1. Machine Learning by Tom M. Mitchell, McGraw-Hill Education (India) Private Limited, 2013.

T2.Introduction to Machine Learning (Adaptive Computation and Machine Learning) by EthemAlpaydin,The MIT Press 2004

F. REFERENCE BOOKS

R1. Machine Learning: An Algorithmic Perspective by Stephen Marsland, CRC Press, 2009.
R2. Pattern Recognition and Machine Learning by Bishop, C., Berlin: Springer-Verlag.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Demonstrate fundamental understanding of the history of Machine Learning and its foundations.	**2**															
[CO2]	Identify machine learning techniques suitable for a given problem	**1**															
[CO3]	Solve the problems using various machine learning techniques			**2**													
[CO4]	Apply Dimensionality reduction techniques.			**1**													
[CO5]	Design application using machine learning techniques.		**1**														

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Neural Network and Deep Learning

Code: BTE26313
3 Credits | Semester VI

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- Introduce major deep learning algorithms, the problem settings, and their applications to solve real world problems.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.
[CO2]Implement deep learning algorithms and solve real-world problems.
[CO3] Solve problems in linear algebra, probability, optimization, and machine learning.
[CO4] Evaluate, in the context of a case study, the advantages and disadvantages of deep learning neural network architectures and other approaches.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

INTRODUCTION: Introduction: Various paradigms of earning problems, Perspectives and Issues in deep learning framework, review of fundamental learning techniques. Feedforward neural network: Artificial Neural Network, activation function, multi-layer neural network.

TRAINING NEURAL NETWORKS: Training Neural Network: Risk minimization, loss function, back propagation, regularization, model selection, and optimization. Conditional Random Fields: Linear chain, partition function, Markov network, Belief propagation, Training CRFs, Hidden Markov Model, Entropy.

DEEP LEARNING: Deep Learning: Deep Feed Forward network, regularizations, training deep models, dropouts, Convolution Neural Network, Recurrent Neural Network, Deep Belief Network.

PROBABILISTIC NEURAL NETWORK: Probabilistic Neural Network: Hopfield Net, Boltzmann machine, RBMs, Sigmoid net, Auto encoders.

LEARNING SPATIOTEMPORAL PATTERNS: Deep Learning research: Object recognition, sparse coding, computer vision, natural language processing. Deep Learning Tools: Caffe, Theano, Torch.

E. TEXT BOOKS

T1. Goodfellow, I., Bengio,Y., and Courville, A., Deep Learning, MIT Press, 2016..

T2. Bishop, C. ,M., Pattern Recognition and Machine Learning, Springer, 2006.

F. REFERENCE BOOKS

R1. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.

R2. Golub, G.,H., and Van Loan,C.,F., Matrix Computations, JHU Press,2013.

R3. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.		**3**												**2**		
[CO2]	Implement deep learning algorithms and solve real-world problems.			**2**												**2**	
[CO3]	Solve problems in linear algebra, probability, optimization, and machine learning.			**2**											**1**		
[CO4]	Evaluate, in the context of a case study, the advantages and disadvantages of deep learning neural network architectures and other approaches.		**1**													**2**	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Web Technology

Code: BTE26142
3 Credits | Semester VI

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- On completion of this course, a student will be familiar with client server architecture and able to develop a web application using java technologies. Students will gain the skills and project-based experience needed for entry into web application and development careers

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Develop a dynamic webpage and DHTML.
[CO2] Write a well formed / valid XML document
[CO3] Write a server side java application called Servlet to catch form data sent from client, process it and store it on database.
[CO4] Write a server side java application called Servlet to catch form data sent from client, process it and store it on database.

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

INTERNET PRINCIPLES AND COMPONENTS: Internet Principles and Components: History of the Internet and World Wide Web-HTML ,protocols – HTTP, SMTP, POP3, MIME, IMAP. Domain Name Server, Web Browsers and Web Servers.

HTML, DHTML and XML: HTML, DHTML and XML: List, Tables, Images, Forms, Frames, CSS Document type definition, Dynamic HTML,XML schemes, Object Models, Presenting XML, Using XML Processors: DOM and SAX, Introduction to Java Script, Object in Java Script, Dynamic HTML with Java Script, PHP.

WEB SERVICES: Web Services: Introduction to Web Services, UDDI, SOAP, WSDL, And Web Service Architecture. Developing and deploying web services. Ajax – Improving web page performance using Ajax, Programming inAjax.CORBA

WEB 2.0: Web 2.0: Interactive and social web: Blogs, wikis, and social networking sites the technology behind these applications- AJAX, RSS and syndication, Ruby on Rails,Open APIs.

WEB 3.0: Web 3.0: Semantic Web, Widgets, drag & drop mashups (I Google) - The technology behind these applications-RDF Webbased Information Systems, Search engines, Recommended Systems ,WebMining.

E. TEXT BOOKS

T1. Burdman, "Collaborative Web Development" AddisonWesley

T2. Chris Bates, "Web Programing Building Internet Applications", 2nd Edition, WILEY,Dreamtech

F.REFERENCE BOOKS

R1. Joel Sklar , "Principal of web Design" Vikash and ThomasLearning

R2. Jon Duckett, "Beginning Web Programming with HTML, XHTML, and CSS", Wiley India Pvt Ltd (June2008)

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Develop a dynamic webpage and DHTML.			**2**									**1**				
[CO2]	Write a well formed / valid XML document			**1**										**2**			
[CO3]	Write a server side java application called Servlet to catch form data sent from client, process it and store it on database.					**1**								**2**			
[CO4]	Write a server side java application called Servlet to catch form data sent from client, process it and store it on database.					**1**							**1**				

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Advanced Java Programming

Code: BTE26144
3 Credits | Semester VI

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- Develop error-free, well-documented Java programs; test Java servlets while developing Java programs which incorporate advanced graphic functions. Learn how to write, test, and debug advanced-level Object-Oriented programs using Java.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Develop Swing-based GUI
[CO2]Organizing and Managing a Small Business.
[CO3]Understand the Financial Planning and Control.
[CO4] Think and introduce New Product or Service Development..
[CO5] Execute Strategic Marketing Planning.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

INTRODUCTION TO ENTREPRENEURSHIP AND START – UPS: Definitions, Traits of an entrepreneur, Entrepreneurship, Motivation.Types of Business Structures, Similarities/differences between entrepreneurs and managers

BUSINESS IDEAS AND THEIR IMPLEMENTATION: Discovering ideas and visualizing the businessActivity map and Business Plan.

IDEA TO START-UP: Market Analysis – Identifying the target market, Marketing and accounting, Competition evaluation and Strategy Development, Risk analysis.

MANAGEMENT OF START-UP:Company's Organization Structure.Recruitment and management of talent, financial organization and management.

FINANCING AND PROTECTION OF IDEAS: Financing methods available for start-ups in IndiaCommunication of Ideas to potential investors – Investor Pitch, Patenting and Licenses

E. TEXT BOOKS

T1. Core Java Volume II: Advanced Features ,Cay S. Horstmann, Gary Cornell, Prentice Hall 9th edition
T2. Java Performance: The Definitive Guide, Scott Oaks, O'Reilly publications

F. REFERENCE BOOKS

R1. Core Java Volume I- Fundamentals, Cay S. Horstmann, Prentice Hall 11th edition
R2. Head First Java, Kathy Sierra & Bert Bates, O'Reilly publications 2nd edition

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Develop Swing-based GUI			3													
[CO2]	Organizing and Managing a Small Business.					2											
[CO3]	Understand the Financial Planning and Control.																
[CO4]	Think and introduce New Product or Service Development							1									
[CO5]	Execute Strategic Marketing Planning.				1												

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Human Resource Development &Organizational Behavior

Code: BTE26387

3 Credits | Semester VI

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- What students are expect to learn at the end of the course?

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Understand the dynamics of human behaviour in work context.
[CO2]Understand the determinants of work behaviour from different levels.
[CO3]Develop competencies of analyzing behavioral issues in the work environment
[CO4] Expose students to key ideas and issues in OB that influence the way people behave in organizational setting

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

INTRODUCTION: Study of OB: Definition, Meaning, Why Study OB.Learning- Nature of Learning, How learning occurs, Learning and OB.

INDIVIDUAL BEHAVIOUR & MOTIVATION: Foundations of Individual Behaviour: Personality- Meaning and Definition, Determinants of Personality, Personality Traits, Personality and OB.Perception- Meaning and Definition, Perceptual Process, Importance of Perception in OB.Motivation- Nature and Importance, Herzberg's Two Factor Theory, Maslow's Need Hierarchy Theory, Alderfer's ERG Theory, Evaluations.

ORGANISATIONAL BEHAVIOUR PROCESSES: Communication- Importance, Types, Gateways and Barriers to Communication, Communication as a tool for improving interpersonal effectiveness.Groups in Organisations- Nature, Types, Why do people join groups, Group cohesiveness and Group Decision making. Managerial Implications, Effective Team building.

LEADERSHIP & CONFLICT MANAGEMENT:Leadership & Management, Theories of leadership- Trait theory, Leader, Behaviour theory, Contingency Theory, Leadership, Leadership and Followership, How to be an effective leader**.**Conflict- Nature of Conflict and conflict resolution.An introduction to transactional analysis

ORGANISATION CULTURE & HRM: Organisational Culture- Meaning & Definition, Culture and Organisational effectiveness**.**Introduction to Human Resource Management- Selection, Orientation, Training& Development, Performance Appraisal, Incentives.Organisational Changes- Importance of Change, Planned Change and OB techniques.International Organisational Behaviour- Trends in International Business, Cultural Differences and Similarities, Individual and Interpersonal Behaviour in global perspective.

E. TEXT BOOKS

T1.Keith Davis, Organizational Behavior, McGraw Hill
T2.K.Aswathappa, Organizational Behavior, Himalaya Publishing House

G. REFERENCE BOOKS

R1.Stephen P. Robbins, Organizational Behavior, Prentice Hall of India

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[CO1]	Understand the dynamics of human behaviour in work context.							**1**									
[CO2]	Understand the determinants of work behaviour from different levels.									**1**							
[CO3]	Develop competencies of analyzing behavioral issues in the work environment								**1**								
[CO4]	Expose students to key ideas and issues in OB that influence the way people behave in organizational setting								**1**								

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Advanced Algorithm

Code: BTE26147
3 Credits | Semester VI

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

Following are the objectives of this course:

- To introduce students with the analysis of various algorithms and their complexity.
- To familiarize the students with the programming aspects related to graph theory and string matching.
- To provide strong foundation for designing real world applications using advanced algorithms.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Understand and devise recurrence relations and amortized cost of various operations
[CO2] Illustrate graph algorithms such as Bellman-Ford, Shortest path, and bipartite matching, B-trees, Red-Black trees and hashing techniques.
[CO3]Identify the methods for solving modular linear equations, Chinese remainder theorem and RSA cryptosystem, Describe types of heaps such as Binomial and Fibonacci heaps.
[CO4] Assess the string-matching algorithms such as Boyer-Moore and Knuth-Morris-Pratt algorithm.
[CO5] Compose mathematical models, objective functions and constraints to solve algorithmic puzzles.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. Syllabus:

Unit I
Analysis Techniques: Growth of Functions, Asymptotic notations, Standard notations and common functions, Recurrences and Solution of Recurrence equations – The Substitution method, The recurrence – tree method, The master method, Amortized Analysis: Aggregate, Accounting and Potential Methods.

Unit II

Graph Algorithms: Bellman-Ford Algorithm, Single source shortest paths in a DAG, Johnson's Algorithm for sparse graphs, Maximum bipartite matching. Trees: B-trees, Red- Black trees.

Unit III

Number – Theoretic Algorithms: Elementary notations, GCD, Modular Arithmetic, Solving modular linear equations, The Chinese remainder theorem, Powers of an element, RSA cryptosystem. Heaps: Heaps, Priority Queues, Binomial Heaps, Fibonacci Heaps.

Unit IV

String Matching Algorithms: Naïve string matching, Rabin – Karp algorithm, String matching with finite automata, Knuth-Morris-Pratt algorithm, Boyer-Moore Algorithms.

Unit V

Algorithmic Puzzles: Magic Square, n-queens problem, Glove Selection, Ferrying Soldiers, Jigsaw Puzzle Assembly, A Stack of Fake Coins, Maximum Sum Descent, Hats of Two Colors, Pluses and Minuses, Searching for a Pattern, Locker Doors, Palindrome Counting

E. TEXT BOOKS

T1. T H Cormen, C E Leiserson, R L Rivest and C Stein: Introduction to Algorithms, 3rd edition, PHI, 2011.

T2. . Mark Allen Weiss: Data Structures and Algorithm Analysis in C++, 3rd Edition, Pearson Education, 2011.

F. REFERENCE BOOKS

R1.Ellis Horowitz, SartajSahni, S Rajasekharan: Fundamentals of Computer Algorithms, University Press, 2007.

R2. Alfred V Aho, John E Hopcroft, J D Ullman: The Design and Analysis of Computer Algorithms, Pearson Education, 2011.

G. Course Articulation Matrix: (Mapping of COs with POs)

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
[CO1]	Understand and devise recurrence relations and amortized cost of various operations	**3**	**2**	**3**													
[CO2]	Illustrate graph algorithms such as Bellman-Ford, Shortest path, and bipartite matching, B-trees, Red-Black trees and hashing techniques.	**2**	**3**	**3**	**2**										**3**	**1**	
[CO3]	Identify the methods for solving modular linear equations, Chinese remainder theorem and RSA cryptosystem, Describe types of heaps such as Binomial and Fibonacci heaps.		**3**	**3**											**3**	**1**	
[CO4]	Assess the string-matching algorithms such as Boyer-Moore and Knuth-Morris-Pratt algorithm.		**2**		**3**										**3**		
[CO5]	Compose mathematical models, objective functions and constraints to solve algorithmic puzzles.		**2**	**2**		**3**									**3**		

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Visual Programming

Code: BTE26141

3 Credits | Semester 6

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

Following are the objectives of this course:

- To provide the skills and knowledge required to use essential features and capabilities of Visual Programming.
- To produce Graphical User Interfaces and applications in a Windows environment. It includes basic programming concepts, problem solving, programming logic, and the design of event-driven programming.
- To familiarize the students with the programming aspects related to graph theory and string matching.
- To provide strong foundation for designing real world applications using advanced toolkits.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Understand and demonstrate knowledge of programming terminology and how applied using Visual Programming.
[CO2] Illustrate and develop a Graphical User Interface (GUI) based on problem description.
[CO3]Identify the methods for solving critical problems over a GUI based IDE.
[CO4] Develop and debug applications using principles of OOP in Visual Programming.
[CO5] Develop programs that retrieve input from a file as opposed to input only provided by the user.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. Syllabus:

UNIT 1 Introduction to VB.NET: Event Driven Programming, NET as better Programming Platform, NET Framework, NET Architecture, The Just-In-Time Compiler, NET Framework class library, VB.NET Development Environment: Creating Applications, Building Projects, Using simple components, Running VB.NET applications

UNIT 2: Mastering VB Language: Data, Operators, Conditionals and Loops, Procedures, Error Handling, Classes and Objects.
Windows Applications in VB .NET: Windows Forms, Text Boxes, Buttons, Labels, Check Boxes, and Radio Buttons, List Boxes, Combo Boxes, Picture Boxes, Scrollbars, Splitters, Timer Menus, Built-in Dialogs, Image List, Tree Views, List Views, Toolbars, Status Bar and Progress bars.

UNIT 3: Object Oriented Programming in VB .NET: Class and Object, Properties, methods, Constructors and Destructors, Method overloading, Inheritance, Access modifiers Overloading and Overriding, Interfaces, Polymorphism.

UNIT 4: Attributes, Delegates and events: Introduction to Attributes, Creating Custom Attributes, Events in VB.NET, Events and Event handler, Adding Events to a class, Writing Event handlers, AddHandler and RemoveHandler, Delegates, Multicast delegates

UNIT 5: File handling: File handling using FileStream, StreamWriter, StreamReader, BinaryReader, BinaryWriter classes, File and Directory Classes.

E. TEXT BOOKS

T1. Anne Boehm, Murach’s Visual Basic, 6th edition, Murach Publications, 2015.
T2. Beth Brown, Bruce Presley, An Introduction to Programming Using Microsoft Visual Basic Versions 5 and 6,3rd Edition, Lawrenceville publication

F. REFERENCE BOOKS

R1. Kogent Learning Solutions Inc., Visual Basic .NET programming Black Book, Dreamtech Press, 2010.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Understand and demonstrate knowledge of programming terminology and how applied using Visual Programming.	3	3	2	1	1											2
[CO2]	Illustrate and develop a Graphical User Interface (GUI) based on problem description		2	2	1												
[CO3]	Identify the methods for solving critical problems over a GUI based IDE.		3										3				1
[CO4]	Develop and debug applications using principles of OOP in Visual Programming	2	1		3												2
[CO5]	Develop programs that retrieve input from a file as opposed to input only provided by the user.	2	1														

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Cyber Laws and Ethics

Code: BTE26145

3 Credits | Semester VI

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- Cyber Security is to achieve these three elements (Confidentiality, Integrity and Availability) and also knows as CIA Triad. For any organization, it's essential to protect its data, information using security tools.
- Implement Cyber Security Best Practices and Risk Management

B. **Course Outcomes:** At the end of the course, students will be able to

[CO 1] Conduct a cyber security risk assessment
[CO 2] Measure the performance and troubleshoot cyber security systems.
[CO 3] Implement cyber security solutions.
[CO 4] Use cyber security, information assurance, and cyber/computer forensics software/tools.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

BASIC OF COMPUTER AND CYBER SECURITY: History of Computers, Areas of Application Computers and its components, Application Software and System Software
Introduction to Operating System. Basics of Networks and internet, Types of Network, Definition of Cyber Security, Search Engines, E –mails and WWW; Internetworking Devices, Internet Service provider, IP Address, Working of Email system, Domain Name System, Blogs, Peer to peer sharing, Computer & Cyber Security:(a) Types of Attacks,(b) Network Security(c) Overview of Security threats,(d) Hacking Techniques,(e) Password cracking(f) Insecure Network connections,(g) Malicious code(h) Concept of Fire wall Security

INFORMATION TECHNOLOGY LAW(CYBER LAW): Evolution of the IT Act, Genesis and Necessity. Salient features of the IT Act, 2000, various authorities under IT Act and their powers. ; Penalties & Offences, amendments. Different kinds of cyber law in Indian history.

CYBER SPACE JURISDICTION: Introduction to Operating System. Basics of Networks and internet, Types of Network, Definition of Cyber Security, Search Engines, E –mails and WWW;

Internetworking Devices, Internet Service provider, IP Address, Working of Email system, Domain Name System, Blogs, Peer to peer sharing, Computer & Cyber Security:(a) Types of Attacks,(b) Network Security(c) Overview of Security threats,(d) Hacking Techniques,(e) Password cracking(f) Insecure Network connections,(g) Malicious code(h) Concept of Fire wall Security

CYBER CRIME AND INVESTIGATION PROCEDURES: Cyber Forensic and Computer Crimes and types. Crimes targeting Computers:Definition of Cyber Crime & Computer related Crimes, Classification & Differentiation between traditional crime and cybercrimes. (a) Data Theft (b) Hacking (c) Spreading Virus & Worms (d) Phishing (e) Cyber Stalking / Bullying (f) Identity Theft & Impersonation (g) Credit card & Online Banking Frauds, Reasons for Cyber Crimes. Cyber Criminal Mode and Manner of Committing Cyber Crime Prevention of Cyber Crimes & Frauds Critical analysis & loop holes of The IT Act,2000Cyber Crimes: Freedom of speech in cyber space & human right issue Investigation of Cyber Crimes, Investigation of malicious applications, Agencies for investigation in India, their powers and their constitution as per Indian Laws

E. TEXT BOOKS

T1.Cyber Law & Cyber Crimes by Advocat Prashant Mali; Snow White publications, Mumbai
T2. Cyber Law in India by Farooq Ahmad; Pioneer Books
T3. Information Technology Law and Practice by Vakul Sharma; Universal Law Publishing Co. Pvt. Ltd.
T4 The Indian Cyber Law by Suresh T. Vishwanathan; Bharat Law House New Delhi
T5. Guide to Cyber and E – Commerce Laws by P.M. Bukshi and R.K. Suri; Bharat Law House, New Delhi
T6. Guide to Cyber Laws by Rodney D. Ryder; Wadhwa and Company, Nagpur
T7. The Information Technology Act, 2000; Bare Act – Professional Book Publishers, New Delhi

F. REFERENCE BOOKS

R1. Computer Forensics: Principals and Practices by Linda Volonino, Reynaldo Anzaldua and Jana Godwin; Pearson Prentice – Hall 2007
R2. First Responder's Guide to Computer Forensics by Richard Nolan rt al; Carnegi Mellon, 2005.
R3. Digital Evidence and Computer Crime, 2nd Ed. By Eoghan Casey; Academic Press, 2004.
R4.The Regulation of Cyberspace by Andrew Murray, 2006; Rutledge – Cavendish.
R5. Scene of the Cybercrime: Computer Forensics Handbook by Syngress.
R6. Security and Incident Response by Keith J. Jones, Richard Bejtloich and Curtis W.Rose

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS 03	PS0 4
[CO1]	Conduct a cyber security risk assessment	**3**	**3**		**2**									**3**			
[CO2]	Measure the performance and troubleshoot cyber security systems.	**2**	**2**		**2**									**2**	**1**		
[CO3]	Implement cyber security solutions.		**2**					**3**		**2**				**3**			
[CO4]	Use cyber security, information assurance, and cyber/computer forensics software/tools.					**2**	**3**	**3**									

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Computer Networking Lab

Code: BTE26151
2 Credits | Semester VI

Total Lecture: 60

A. Introduction:

- To make students aware about various types of cables used in guided media like coaxial cable, optical fiber cable, twisted pair cables and its categories.
- To understand the working difference between straight cable and crossover cable.
- To use the packet tracer to simulate various networks.

B. **Course Outcomes:** At the end of the course, students will be able to

[CO1] Understand the network simulator Packet Tracer.
[CO2] Create straight through and cross over cables.
[CO3] Understand the structure and organization of computer networks; including the division into network layers, role of each layer, and relationships between the layers
[CO4] Understand the basic concepts of application layer protocol design; including client/server models, peer-to-peer models, and network naming.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	5
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	35
Total		50
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

S.NO	LIST OF PRACTICALS
1.	Networks Cabling (Theoretical)
2.	Networks Cabling (Practical)
3.	IP Addressing

4.	Introduction to Packet Tracer 5.3 & Simple 5 PC's network
5.	Building a LAN with HUPs and Switches
6.	Router Configuration Using Packet Tracer 1
7.	Router Configuration Using Packet Tracer 2
8.	Static Route Configuration on Router-Part 1
9.	Static Route Configuration on Router-Part 2
10.	Standard access control list (ACL) configuration in packet tracer
11.	Extended access control list (ACL) configuration in packet tracer
12.	Wireless connection using packet tracer

E. TEXT BOOKS

T1.Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGraw- Hill.

T2. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice HallIndia.

F. REFERENCE BOOKS

R1. Computer Networks, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition.

R2. Internetworking with TCP/IP, Volume 1, 6th Edition Douglas Comer, Prentice Hall ofIndia.

R3.TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley, United States ofAmerica.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Understand the network simulator Packet Tracer.	**2**													**1**		
[CO2]	Create straight-through and cross overcables.			**3**										**3**			
[CO3]	Understand the structure and organization of computer networks; including the division into network layers, role of each layer, and relationships between the layers			**2**											**2**		
[CO4]	Understand the basic concepts of application layer protocol design; including client/server models, peer to peer models, and network naming.		**2**													**1**	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Compiler Design Lab

Code: BTE26150

2 Credits | Semester VI

Total Lecture: 60

A. Introduction:

- Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 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.
- 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.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Understand and implement computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient analysis and design of computer-based systems of varying complexity

[CO2]Apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success

[CO3] Understand modern computer languages, environments, and platforms in creating innovative career paths, to be an entrepreneur, and a zest for higher studies.

[CO4] Understand the target machine's run time environment, its instruction set for code generation and techniques used for code optimization

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	5
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	35
Total		50
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

S.NO	LIST OF PRACTICALS
1.	Design a lexical analyzer for given language and the lexical analyzer should ignore redundant spaces, tabs and new lines. It should also ignore comments. Although the syntax specification states that identifiers can be arbitrarily long, you may restrict the length to some reasonable value. Simulate the same in C language.
2.	Write a C program to identify whether a given line is a comment or not.
3.	Write a C program to recognize strings under 'a', 'a*b+', 'abb'.
4.	Write a C program to test whether a given identifier is valid or not.
5.	Write a C program to simulate lexical analyzer for validating operators
6.	Implement the lexical analyzer using JLex, flex or other lexical analyzer generating tools.
7.	Write a C program for implementing the functionalities of predictive parser for the mini language specified in Note 1.
8.	a) *Write a C program for constructing of LL (1) parsing. b) *Write a C program for constructing recursive descent parsing.
9.	Write a C program to implement LALR parsing.
10.	a) *Write a C program to implement operator precedence parsing. b) *Write a C program to implement Program semantic rules to calculate the expression that takes an expression with digits, + and * and computes the value.
11.	Convert the BNF rules into Yacc form and write code to generate abstract syntax tree for the mini language specified in Note 1.
12.	Write a C program to generate machine code from abstract syntax tree generated by the parser. The instruction set specified in Note 2 may be considered as the target code.

E. TEXT BOOKS

T1. Aho A .V.Lam, M .Sethir and Ullman J .D., “ Compilers: Principles, Techniques and Tools”, 2^{nd} Ed., Pearson Education.
T2.Tremblay, J.P.and Sorenson, P .G., “ Theory and Practice of Compiler Writing”, SR Publications.

F. REFERENCE BOOKS

R1. Cooper, K .D. and Torczonl, “Engineering a Compiler”, M organ Kaufmann.
R2. Louden, K .C. “Compiler Construction: Principles and Practice”, Course Technology.
R3. Tremblay, J.P. and Sorenson, P.G., “Parsing Techniques: A Practical Guide”, Ellis Harwood.

F. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Understand and implement computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient analysis and design of computer-based systems of varying complexity												**2**	**1**			
[CO2]	Apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success			**1**											**3**		
[CO3]	Understand modern computer languages, environments, and platforms in creating innovative career paths, to be an entrepreneur, and a zest for higher studies.					**2**								**2**			
[CO4]	Understand the target machine's run time environment, its instruction set for code generation and techniques used for code optimization						**2**							**2**			

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Advanced Java Programming Lab

Code: BTE26395

1 Credits | Semester VI

Total Lecture: 30

A. Introduction:

- To make the students Learn Syntax and Functions in Advanced java programming
- To handle jdbc connectivity in advanced java programming.
- To implement advance Programming concepts in Advanced java programming

B. Course Outcomes: At the end of the course, students will be able to:

[CO1] Understand the use of OOPs concepts.
[CO2] Understand the use of abstraction.
[CO3]Develop and implement exception handling, multithreaded applications with synchronization.
[CO4] Understand the use of Collection Framework.
[CO5] Design GUI based applications and develop applets for web applications.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	5
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	35
Total		50
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

S.No.	Name of Experiments
1	WAP on Network Programming i.e. Client-Server Programming.
2	WAP on Multithreading using runnable interface.
3	WAP to Create a New Data Source for Ms. Access
4	WAP to show connectivity with database using JDBC/ODBC driver.

5	WAP to get Information about database using Database Meta Data
6	WAP to get Information about particular table using Result Set Meta Data
7	WAP to implement the concept of swings.
8	WAP to develop an RMI application
9	WAP in Servlets to get and display value from an HTML page.
10	WAP in JSP to get and display value from an HTML page.

E. TEXT BOOKS

T1. Herbert Schildt: Java The Complete Reference, 8th Edition, Tata McGraw Hill, 2013.
T2. Y. Daniel Liang: Introduction to JAVA Programming, 7th Edition, Pearson Education, 2012.

F. REFERENCE BOOKS

R1. Jim Keogh: J2EE The Complete Reference, first edition, Tata McGraw Hill, 2011.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
[CO1]	Understand the use of OOPs concepts.	**3**															
[CO2]	Understand the use of Data Abstraction.	**2**		**1**	**2**											**2**	
[CO3]	Develop and implement exception handling, multithreaded applications with synchronization.		**2**	**3**												**2**	
[CO4]	Understand the use of Collection Framework.		**2**		**3**												
[CO5]	Design GUI based applications and develop applets for web applications.		**2**	**2**		**3**											

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Syllabus of

B.Tech. in Computer Science Engineering

Semester-VII

ARKAJAIN University, Jharkhand
School of Engineering & IT
Department of Engineering
Faculty – Bachelor of Technology in Computer Science Engineering
Scheme of Study (w.e.f Batch 2020-21)

SEMESTER –I

Sr. No.	Name of the Subject	Group	L-T-P	Credit
1	Engineering Mathematics–I	A & B	3-1-0	4
2	Engineering Chemistry	A	3-0-0	3
	Programming for Problem Solving	B	3-0-0	3
3	Basic Electrical Engineering	A	3-1-0	4
	Engineering physics	B	3-1-0	4
4	Engineering Mechanics	A	3-0-0	3
	English for Communication	B	3-0-0	3
5	Constitution of India	B	0-0-0	0
	Practical			
6	Engineering Chemistry Lab	A	0-0-1	1
	Engineering Physics Lab	B	0-0-1	1
7	Basic Electrical Engineering Lab	A	0-0-1	1
	Programming for Problem Solving Lab	B	0-0-2	2
8	Engineering Mechanics Lab	A	0-0-1	1
9	Engineering Graphics & Design	A	0-0-2	2
	Workshop Practices	B	0-0-2	2
	TOTAL	A or B	12-2-5	19

SEMESTER –II

Sr. No.	Name of the Subject	Group	L-T-P	Credit
1	Engineering Mathematics–II	A & B	3-1-0	4
2	Engineering Chemistry	B	3-0-0	3
	Programming for Problem Solving	A	3-0-0	3
3	Basic Electrical Engineering	B	3-1-0	4
	Engineering physics	A	3-1-0	4
4	Engineering Mechanics	B	3-0-0	3
	English for Communication	A	3-0-0	3
5	Constitution of India	A	0-0-0	0
	Practical			
6	Engineering Chemistry Lab	B	0-0-1	1
	Engineering Physics Lab	A	0-0-1	1
7	Basic Electrical Engineering Lab	B	0-0-1	1
	Programming for Problem Solving Lab	A	0-0-2	2
8	Engineering Mechanics Lab	B	0-0-1	1
	Engineering Graphics& Design	B	0-0-2	2
9	Workshop Practices	A	0-0-2	2
	TOTAL	A or B	12-2-5	19

SEMESTER –I (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering Chemistry	BSC	3	3	100	70	20	5	5
2	Engineering Mathematics–I	BSC	4	4	100	70	20	5	5
3	Basic Electrical Engineering	ESC	4	4	100	70	20	5	5
4	Engineering Mechanics	ESC	3	3	100	70	20	5	5
	Practical								
5	Engineering Chemistry Lab	BSC	1	2	50	35	5	5	5
6	Basic Electrical Engineering Lab	ESC	1	2	50	35	5	5	5
7	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
8	Engineering Graphics & Design	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**24**	**600**	**420**	**100**	**40**	**40**

SEMESTER I (Group-B)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering physics	BSC	4	4	100	70	20	5	5
2	Engineering Mathematics –I	BSC	4	4	100	70	20	5	5
3	Programming for Problem Solving	ESC	3	3	100	70	20	5	5
4	English for Communication	HSMC	3	3	100	70	20	5	5
5	Constitution of India	MC	0	2	50	35	10	2.5	2.5
	Practical								
6	Engineering physics Lab	BSC	1	2	50	35	5	5	5
7	Programming for Problem Solving Lab	ESC	2	4	50	35	5	5	5
8	Workshop Practices	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**26**	**600**	**420**	**105**	**37.5**	**37.5**

SEMESTER II (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering physics	BSC	4	4	100	70	20	5	5
2	Engineering Mathematics –II	BSC	4	4	100	70	20	5	5
3	Programming for Problem Solving	ESC	3	3	100	70	20	5	5
4	English for Communication	HSMC	3	3	100	70	20	5	5
5	Constitution of India	MC	0	2	50	35	10	2.5	2.5
	Practical								
6	Engineering physics Lab	BSC	1	2	50	35	5	5	5
7	Programming for Problem Solving Lab	ESC	2	4	50	35	5	5	5
8	Workshop Practices	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**26**	**600**	**420**	**105**	**37.5**	**37.5**

SEMESTER –II (Group-B)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering Chemistry	BSC	3	3	100	70	20	5	5
2	Engineering Mathematics–II	BSC	4	4	100	70	20	5	5
3	Basic Electrical Engineering	ESC	4	4	100	70	20	5	5
4	Engineering Mechanics	ESC	3	3	100	70	20	5	5
	Practical								
5	Engineering Chemistry Lab	BSC	1	2	50	35	5	5	5
6	Basic Electrical Engineering Lab	ESC	1	2	50	35	5	5	5
7	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
8	Engineering Graphics & Design	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**24**	**600**	**420**	**100**	**40**	**40**

SEMESTER-III

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Analog Electronic Circuits	PCC	3	3	100	70	20	5	5
2	Data structure	PCC	3	3	100	70	20	5	5
3	Digital Electronics	PCC	3	3	100	70	20	5	5
4	Engineering Mathematics -III	BSC	4	3	100	70	20	5	5
5	Humanities-I Professional Practice, Law & Ethics Organizational Behavior	HSMC	3	3	100	70	20	5	5
6	Environmental Science	MC	0	2	50	35	10	2.5	2.5
7	Python Programming	PCC	3	3	100	70	20	5	5
	PRACTICAL								
8	Analog Electronic Circuits Lab	PCC	2	4	50	35	5	5	5
9	Data structure Lab	PCC	2	4	50	35	5	5	5
10	Digital Electronics Lab	PCC	2	4	50	35	5	5	5
11	IT Workshop(MAT LAB)	PCC	1	2	50	35	5	5	5
12	Python Programming Lab	PCC	2	4	50	35	5	5	5
	TOTAL		28	38	900	640	155	57.5	57.5

SEMESTER-IV

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Discrete Mathematics	BSC	4	4	100	70	20	5	5
2	Computer Organization & Architecture	PCC	3	3	100	70	20	5	5
3	Operating Systems	PCC	3	3	100	70	20	5	5
4	Design & Analysis of Algorithms	PCC	3	3	100	70	20	5	5
5	Microprocessor & Microcontroller	PCC	3	3	100	70	20	5	5
6	Software Engineering	PCC	3	3	100	70	20	5	5
	PRACTICAL								
6	Operating Systems Lab	PCC	2	4	50	35	5	5	5
7	Design & Analysis of Algorithms Lab	PCC	2	4	50	35	5	5	5
8	Computer Organization & Architecture Lab	PCC	2	4	50	35	5	5	5
	TOTAL		25	31	750	525	135	45	45

SEMESTER V

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory / Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Signals & Systems	PCC	3	3	100	70	20	5	5
2	Database Management Systems	PCC	3	3	100	70	20	5	5
3	Formal Language &Automata Theory	PCC	3	3	100	70	20	5	5
4	Object Oriented Programming	PCC	3	3	100	70	20	5	5
5	Humanities-II Soft Skills and Interpersonal Communication	HSMC	3	3	100	70	20	5	5
6	Elective-1 Graph Theory Image Processing Advanced Algorithms	PEC	3	3	100	70	20	5	5
	PRACTICAL								
7	Database Management Systems Lab	PCC	2	4	50	35	5	5	5
8	Object Oriented Programming Lab	PCC	2	4	50	35	5	5	5
9	Summer Internship-I (3-4 Weeks)	PCC	1	0	50	50	0	0	0
	TOTAL		23	26	750	540	130	40	40

SEMESTER VI

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Compiler Design	PCC	3	3	100	70	20	5	5
2	Computer Networks	PCC	3	3	100	70	20	5	5
3	Advance Java Programming	PCC	3	3	100	70	20	5	5
4	Elective-II Artificial Intelligence Machine Learning Visual Programming	PEC	3	3	100	70	20	5	5
5	Elective-III Web Technology Neural Networks and Deep Learning	PEC	3	3	100	70	20	5	5
6	Open Elective –I Cyber Law and Ethics Human Resource Development and Organizational Behavior Advanced Algorithms	HSMC	3	3	100	70	20	5	5
	Practical								
7	Compiler Design Lab	PCC	2	4	50	35	5	5	5
8	Computer Networks Lab	PCC	2	4	50	35	5	5	5
9	Advance Java Programming Lab	PCC	2	4	50	35	5	5	5
	TOTAL		24	30	750	525	135	45	4

SEMESTER VII

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Elective-IV Cryptography & Network Security Advanced Operating Systems Web and Internet	PEC	3	3	100	70	20	5	5
2	Elective-V Quantum Computing Optimization Techniques Real Time Systems	PEC	3	3	100	70	20	5	5
3	Open Elective-II Electronic Design Automation Computer Graphics Data mining and warehousing Semantic Web and Social Networks	OEC	3	3	100	70	20	5	5
4	Biology For Engineers	BSC	3	3	100	70	20	5	5
5	Data Analytics	PCC	3	3	100	70	20	5	5
	Practical								
5	Minor Project	PROJ	4	8	100	100	0	0	0
6	Industrial Training (Summer Internship-4-6 Week)	PROJ	4	0	100	100	0	0	0
	TOTAL		23	23	700	550	100	25	25

SEMESTER VIII

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Elective-VI CloudComputing Data Mining AdvancedComputerArchitecture	PEC	3	3	100	70	20	5	5
2	Open Elective-III Signals and systems Advanced Operating Systems	OEC	3	3	100	70	20	5	5
3	Open Elective-IV Cyber security Soft Computing	OEC	3	3	100	70	20	5	5
4	VLSI System Design	PCC	3	3	100	70	20	5	5
	PRACTICAL								
5	Major Project	PROJ	6	12	100	0	0	0	0
6	Extra- Curricular/ Co-Curricular Activity	PROJ	0	0	100	70	30	0	0
	Total		18	24	600	35	110	20	20

Distribution of Credit across 8 semesters:

Sl. No	Type of Paper	No. of Paper	Total Credit
1	Humanities and Social Sciences including Management courses **(HSMC)**	5	15
2	Basic Science courses**(BSC)**	9	28
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc**(ESC)**	8	18
4	Professional core courses (**PCC)**	30	77
5	Professional Elective courses relevant to chosen specialization/branch**(PEC)**	5	15
6	Open subjects – Electives from other technical and /or emerging subjects (**OEC)**	3	9
7	Project work, seminar and internship in industry or elsewhere**(PROJ)**	5	14
8	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Knowledge Tradition]**(MC)**	2	0
	Total	66	176

CIA – Continuous Internal Assessment – Based on Projects / Assignment during the semester

Note:
AICTE Activity Points to be earned by students admitted to Degree program (For more details refer to Chapter 6, AICTE, Activity Point Program, Model Internship Guidelines):
Every regular student, who is admitted to the 4 year Degree program, is required to earn 100 activity points in addition to the total credits earned for the program. Students entering 4 years Degree Program through lateral entry are required to earn 75 activity points in addition to the total credits earned for the program. The activity points earned by the student shall be reflected on the students 8th Semester grade card.
The activities to earn the points can be spread over the duration of the course. However, minimum prescribed duration should be fulfilled.
Activity Points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression.
Incase student fail to earn the prescribed activity points, Eight semester Grade Card shall be issued only after earning the required activity Points.
Students shall be eligible for the award of degree only after the release of the Eight Semester grade card.

There are two groups (A & B) in semester 1 & 2. The Group division will be decided by The Dean SoE & IT before commencement of classes

ARKAJAIN University, Jharkhand
School of Engineering & IT
Department of Engineering
Faculty – Bachelor of Technology in Computer Science Engineering
PROGRAM OUTCOMES &PROGRAM SPECIFIC OUTCOMES

PROGRAM OUTCOMES

After completing this undergraduate program, a learner:

[PO.1]. Engineering knowledge: An ability to apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to get the solution of the engineering problems.

[PO.2]. Problem analysis: Ability to Identify, formulates, review research literature, and analyze complex engineering problems.

[PO.3]. Design/Development Of Solutions: Ability to design solutions for complex Engineering Problems by considering social, Economical and Environmental aspects.

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge to design, conduct analyse experiments to get valid conclusion**.**

[PO.5]. Modern tool usage: ability to create, select, and apply appropriate techniques, and to model complex engineering activities with an understanding of the limitations.

[PO.6]. The engineer and society: Ability to apply knowledge by considering social health, safety, legal and cultural issues.

[PO.7]. Environment and sustainability: Understanding of the impact of the adopted engineering solutions in social and environmental contexts.

[PO.8]. Ethics: Understanding of the ethical issues of the civil engineering and applying ethical principles in engineering practices.

[PO.9]. Individual and teamwork: Ability to work effectively as an individual or in team, as a member or as a leader.

[PO.10]. Communication: An ability to communicate clearly and effectively through different modes of communication.

[PO.11]. Project management and finance: Ability to handle project and to manage finance related issue.

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning.

PROGRAM SPECIFIC OUTCOMES

[PSO.1]. Understand the principles, architecture and organization of computers, embedded systems and computer networks.

[PSO.2]. Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems that include both hardware and software.

[PSO.3]. Apply software design and development practices to develop software applications in emerging areas such as IoT, Data Analytics, Social Networks, Cloud and High Performance Computing.

[PSO.4]. Demonstrate& communicate: Ability to demonstrate the knowledge, skill to analyze the cause and effect on Computer Science Engineering.

Subject: Cryptography and Network Security

Code: BTE27182
3 Credits | Semester VII

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To master the basic principles, knowledge, and skills about network security.
- To apply cryptography as a tool for maintaining confidentiality along with hash functions and digital signatures
- To design solutions for network management and security problems

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Acquire professional/academic knowledge and skills
[CO2] Describe some common problems or attacks on network security
[CO3] Describe some network security services and mechanisms
[CO4] Analyze some cryptographic algorithms with their relation with real life.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

INTRODUCTION TO NETWORK SECURITY: Network Security, Attacks on network security- passive and active attacks, Services used to handle these attacks and related Mechanisms. Conventional Encryption , Classical Techniques- substitution and transposition ciphers, study of basic cryptanalysis possible on classical ciphers, Modern Techniques- block and stream ciphers, Block cipher Design Principles, Feistel structure, Shannon's principles of diffusion and confusion, Encryption algorithms, The Data Encryption Standard (DES) block cipher algorithm with its strength and weaknesses.

ASYMMETRIC CRYPTOGRAPHY: Public Key Encryption, The RSA algorithm, its strengths, possible cryptanalysis attacks possible on RSA such as timing attacks and CCA, Diffie – Hellman Key Exchange algorithm, Introduction to cryptographic hash algorithms

MESSAGE AUTHENTICATION: Authentication Requirements, Authentication Functions, Message Authentication Codes, Digital Signatures and Authentication Protocols
Digital Signature Standard (DSS), Key distribution and Management using symmetric and asymmetric encryption, X. 509 certificates

NETWORK SECURITY: Electronic Mail Security-PGP and S/MIME, IP Security, IP security Overview, IP Security Architecture, Authentication Header (AH).
Encapsulating Security Payload (ESP), Firewalls, Firewall Design Principles, Trusted Systems. System Security: Intruders, Viruses and related threads, firewall design principals.

E. TEXT BOOKS

T1. B. Forouzan, Cryptography and Network Security, TMH

T2. Applied Cryptography by Bruce Schneier, John Wiley and Sons.

F. REFERENCE BOOKS

R1. William Stallings, “Cryptography and Network Security: Principals and Practice”, Prentice Hall.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Acquire Professional/Academic Knowledge And Skills	**3**												**1**			
[CO2]	Describe some common problems or attacks on network security		**1**												**1**		
[CO3]	Describe some network security services and mechanisms				**1**										**2**		
[CO4]	Analyze some cryptographic algorithms with their relation with real life.		**2**													**3**	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Advanced Operating System

Code: BTE27334
3 Credits | Semester VII

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To understand various types of operating system and their characteristics
- To infer challenges in creating advanced operating system
- To apply knowledge to implement various algorithms related to advanced operating systems

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Comparative analysis of various operating systems
[CO2] Express the challenges and its solutions in distributed operating system
[CO3] Analyze the interprocess communications and its challenges
[CO4]Develop an understanding for clocks and time stamps in distributed environment

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

OVERVIEW: Introduction, Functions of OS, Design approaches, Types of advanced OS.

ARCHITECTURE OF DISTRIBUTED OS: Introduction, Motivations, System Architecture Types, Distributed OS.Issues in distributed OS, Communication Networks and Primitives

INTERPROCESS COMMUNICATION: APIs for Internet Protocols, External Data Representations, Client-Server Communication**.** Group Communication, Distributed Objects, Process synchronization . Distributed File Systems: Introduction, Architecture, Design Issues, Case Studies: Sun Network File System, Andrew File System.

TIME AND GLOBAL STATE: Physical and Logical Time, Internal and External Synchronization protocols like Cristian's Algorithm, Berkeley Algorithm, Network Time Protocol, Lamport's Logical Clocks, Vector Clocks, Casual Ordering of Message. Global State, Cuts of a Distributed Computation, Termination Detection.

DISTRIBUTED MUTUAL EXCLUSION AND ELECTION: Simple and Multicast based Mutual Exclusion Algorithms: Centralized, Ring based, RicartAgrawala's Algorithm, Maekawa's Algorithm. Election Algorithms: Ring based, Bully's Algorithm, Multicast Communication

E. TEXT BOOKS

T1. G. Coulouris, J. Dollimore, and T. Kindberg, "Distributed Systems: Concepts and Design", Pearson Education

T2. M. Signal & N. Shivaratri, Advanced Concepts in Operating Systems: Distributed, Database and Multiprocessor Operating Systems, McGraw Hill International Edition.

F. REFERENCE BOOKS

R1. R.K. Sinha, "Distributed Operating Systems", Prentice Hall

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Comparative analysis of various operating systems	**2**	**3**											**1**			
[CO2]	Express the challenges and its solutions in distributed operating system	**1**	**2**	**2**											**1**		
[CO3]	Analyze the interprocess communications and its challenges	**1**	**2**	**3**	**2**										**2**		
[CO4]	Develop an understanding for clocks and time stamps in distributed environment			**3**	**2**	**2**								**3**			

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Web and Internet

Code: BTE27335
3 Credits | Semester VII

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To base material needed to create and deploy secure, usable database driven web applications
- To write rigorous codes on Technologies and languages like HTML, JavaScript, Document Object Model(DOM), PHP, MySQL, XML
- To learn and synthesize efficient programs for web services

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Formulate and create dynamic web documents and implement and execute program scripts.
[CO2] Implement an appropriate planning strategy for developing websites
[CO3] Locate, evaluate and critically assess current & emerging technologies for developing websites
[CO4]Use current techniques, skills, and tools appropriate for immediate employment in computing technology

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

WEB FUNDAMENTALS: Web fundamentals, Programming Languages for Web, Internet and its architecture, Client Server Networking - Creating an Internet Client,
Application Protocols and http, Presentation aspects html, CSS and JavaScript

EVENT DRIVEN PROGRAMMING: JavaScript Event driven Programming, Creating a web server .Serving Dynamic Content- CGI – overview of technologies like PHP – applets – JSP.

Implementation examples: XML: Structure in Data – Name spaces – DTD – Vocabularies – DOM methods

WEB SERVER ARCHITECTURE: Web server architecture, Programming threads in C, Shared memory synchronization, Performance measurement and workload models. Comparison using existing benchmarks. Servlet Overview Architecture, Handling HTTP Requests, Get and post requests

WEB DEVELOPMENT FRAMEWORKS: Web development frameworks – Detailed study of one open source web framework - Ruby Scripting, Ruby on rails –Design, Implementation and Maintenance aspects

ADVANCED TOPICS: Service Oriented Architecture – SOAP. Web 2.0 technologies. – AJAX. Development using Web2.0 technologies . Introduction to semantic web

E. TEXT BOOKS

T1. Web Application Design and Implementation:Apache2, PHP5, MYSQL, Javascript, and LINUX/UNIX, Steven A. Gabarro, John Wiley and Sons

T2. Programming Ruby: The Pragmatic Programmer's Guide, Dave Thomas, Chad Fowler and Andy Hunt, Pragmatic Programmers

F. REFERENCE BOOKS

R1.Web Protocols and Practice: HTTP/1.1, Networking Protocols, Caching, and Traffic Measurement, Balachander Krishnamurthy and Jennifer Rexford, Addison Wesley Professional

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Formulate and create dynamic web documents and implement and execute program scripts.			**2**													
[CO2]	Implement an appropriate planning strategy for developing websites				**2**												
[CO3]	Locate, evaluate and critically assess current & emerging technologies for developing websites					**2**											
[CO4]	Use current techniques, skills, and tools appropriate for immediate employment in computing technology					**1**											

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Quantum Computing

Code: BTE27336
3 Credits | Semester VII

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- The focus of the course is on convex optimization though some techniques will be covered for non-convex function optimization
- Understanding of linear algebra and probability theory
- Learn efficient computational procedures to solve optimization problems

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Understand and explain the basic notions of Quantum Computing-including Quantum Bits and registers, Quantum Evolution, Quantum Circuits, Quantum Teleportation and the basic Quantum Algorithms known at the present time.
[CO2] Identify the essential difference between the classical paradigm and the quantum paradigm of computation and appreciate why quantum computers can solve currently intractable problems
[CO3] Work with Quantum Simulator like Revkit 1.3, JQuantumetc to design and verify different quantum circuits.
[CO4] Understand the classes of problems that can be expected to be solved well by quantum computers.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

INTRODUCTION: Fundamental Concepts: Global Perspectives, Quantum Bits, Quantum Computation. Quantum Algorithms, Quantum Information, Postulates of Quantum Mechanisms. Quantum Computation: Quantum Circuits – Quantum algorithms, Single Orbit operations, Control Operations, Measurement, Universal Quantum Gates, Simulation of Quantum Systems, Phase estimation, Applications, Quantum search algorithms – Quantum counting – Speeding up the solution of NP – complete problems – Quantum Search for an unstructured database.

QUANTUM COMPUTERS: Guiding Principles, Conditions for Quantum Computation, Harmonic Oscillator Quantum Computer. Optical Photon Quantum Computer – Optical cavity Quantum electrodynamics, Ion traps, Nuclear Magnetic resonance

QUANTUM INFORMATION: Quantum noise and Quantum Operations – Classical Noise and Markov Processes, Quantum Operations, Examples of Quantum noise and Quantum Operations – Applications of Quantum operations. Limitations of the Quantum operations formalism, Distance Measures for Quantum information.

QUANTUM ERROR CORRECTION: Introduction, Short code, Theory of Quantum Error – Correction, Constructing Quantum Codes, Stabilizer codes, Fault – Tolerant Quantum Computation, Entropy and information – Shannon Entropy, Basic properties of Entropy, Von Neumann, Strong Sub Additivity, Data Compression, Entanglement as a physical resource.

E. TEXT BOOKS

T1. C. T.Bhunia ,"Introduction To Quantum Computing" , Publisher New Age International Pvt Ltd Publishers

F. REFERENCE BOOKS

R1. Quantum Computing, Sahni, Tata McGraw-Hill Education
R2. Quantum Computing Explained, David McMahon, Wiley.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Understand and explain the basic notions of Quantum Computing-including Quantum Bits and registers, Quantum Evolution, Quantum Circuits, Quantum Teleportation and the basicQuantum Algorithms known at the present time.	2													1		
[CO2]	Identify the essential difference between the classical paradigm and the quantum paradigm of computation and appreciate why quantum computers can solve currently intractable problems		1											2			
[CO3]	Work with Quantum Simulator like Revkit 1.3, JQuantumetc to design and verify different quantum circuits.				2										2		
[CO4]	Understand the classes of problems that can be expected to be solved well by quantum computers.				2										3		

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Optimization Techniques

Code: BTE27337

3 Credits | Semester VII

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- The focus of the course is on convex optimization though some techniques will be covered for non-convex function optimization
- Understanding of linear algebra and probability theory
- Learn efficient computational procedures to solve optimization problems

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Cast engineering minima/maxima problems into optimization framework.
[CO2] Learn efficient computational procedures to solve optimization problems.
[CO3] Use Matlab to implement important optimization methods
[CO4] Find the appropriate algorithm for allocation of resources to optimize the process of assignment.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

MATHEMATICAL PRELIMINARIES: Central Problem of linear Programming, definitions including Statements of basic theorem and also their properties, Simplex methods
Primal and dual simplex method, Transport problem, Tic-Tac problem and its solution
Graphical Method Formulation, Linear Programming Problem.

UNCONSTRAINED OPTIMIZATION: One-dimensional search methods, Gradient-based methods. Conjugate direction and quasi-Newton methods

CONSTRAINED OPTIMIZATION: Lagrange theorem, FONC, SONC, and SOSC conditions. Queuing Theory: Characteristics of queuing system, Classification of Queuing Model Single Channel Queuing Theory

NON-LINEAR PROBLEMS: Non-linear constrained optimization models. KKT conditions, Projection methods

INVENTORY THEORY: Cost involved in inventory problem, Single item deterministic model economics. Long size model without shortage and with shortage, having production rate infinite and finite.

E. TEXT BOOKS

T1. An introduction to Optimization by Edwin P K Chong, Stainslaw Zak

T2. Optimization Techniques, Chander Mohan, Kusum Deep, New age science

F. REFERENCE BOOKS

R1. Nonlinear Programming by Dimitri Bertsekas

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[CO1]	Cast engineering minima/maxima problems into optimization framework.	**2**												**1**			
[CO2]	Learn efficient computational procedures to solve optimization problems					**2**									**2**		
[CO3]	Use Matlab to implement important optimization methods.				**2**										**3**		
[CO4]	Find the appropriate algorithm for allocation of resources to optimize the process of assignment.			**3**											**3**		

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Computer Graphics

Code: BTE27192

3 Credits | Semester VII

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- Principles of Computer Graphics to convey the information in the graphics for month display screen
- Concepts of windowing &clipping Concepts of Line, circle & polygon generation

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Describe file structure of display & graphics file formats.
[CO2] Apply the algorithms to draw lines, circles and polygons.
[CO3] Use transformation techniques to scale, rotate and translate the object.
[CO4] Select the methods of enlarging visible portion of drawing
[CO5] Develop the logic for drawing the natural objects using different algorithms for curved lines

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

INTRODUCTION TO COMPUTER GRAPHICS: Overview of computer graphics, representing pictures, Visualization & Image processing, RGB Color model,direct coding,3D viewing devices, Plotters, printers, digitizers, Light pens etc.; Active & Passive graphics devices, Raster scan display:Framebuffers: Rotatingmemoryframebuffer, Shiftregisterframebuffer, Randomaccessframebuffer, Multipleplaneframebuffer, Displaydevices:Constructionan Random candisplay,Workingoffollowingdevices:CRT, Beam penetration CRT,ShadowmaskCRT, DVST,Plasmapanel,Liquidcrystal display, TheDisplay-fileinterpreter,Displayfilestructure, Graphicsfileformats:generalexplanation,advantages,disadvantages:BMP, GIF, JPEG, TIFF, PCX.

LINE, CIRCLE AND POLYGON: Basicconceptsinlinedrawing,Linedrawingalgorithms:DDAalgorithms,Bresenham's Line drawing algorithm, Bresenham'salgorithmCirclegeneratingalgorithms:Symmetryofcircle,DDAcircleDrawingalgorithm, Ellipse generating algorithm, Bresenham's circle drawing algorithm,MidpointcirclealgorithmPolygons–Typesofpolygons,Polygon representation,Enteringpolygons,inside–outsidetest, polygon filling, Flood fill,scan linealgorithm.Sample problemso illustrateabovealgorithms

TRANSFORMATIONS: 2D transformation: scaling, Reflection, shearing, Rotation,Translation,Rotationaboutan arbitrary point, matrix representations & homogeneous coordinate, 3D Transformation: scaling,rotation,translation,rotationaboutArbitrary axis, Sampleproblemswithsamplecoordinateso illustrateabovealgorithm.

WINDOWING &CLIPPING: Viewingtransformation,NormalizationtransformationLine clipping: Cohen-Sutherland, Line clipping algorithm, Midpoint subdivisional algorithm Polygon clipping: Sutherland – Hodgeman Polygon clippingalgorithm.Sample problemswithsamplecoordinateso illustrateabovealgorithms, Curves and fractalsCurve generation: arc generation using DDA algorithm,Interpolation,B-Spline,Bezier curves:Properties,CubicBezier curvesFractals:Hilbert'sCurve,Koch curve,Fractal lines,FractalSurfaces.

RASTER GRAPHICS AND INTERACTIVE GRAPHICS: Needforgraphicsstandards,Graphicsstandards: CORE, GKS, PHIGS, IGES, CGM, VDI, Depth comparison, Z-buffer algorithm, Back face detection, BSP tree method, the Printer's algorithm, scan-line algorithm; Hidden line elimination, wire frame methods.

E. TEXT BOOKS

T1. ComputerGraphicsby Hearn & Baker, Pearson Education.

T2. ComputerGraphics using open GL by Hill, Pearson Education

T3. ComputerGraphics by StevenHarington, McGrawHill Publication

F. REFERENCE BOOKS

R1. Introduction to Computer Graphicsby Mukherjee Arup, Vikas Publication.

R2. PrinciplesofInteractiveComputerGraphics by NewmanandSproull, TataMcGrawHill

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Describe file structure of display& graphics file formats.	**2**															
[CO2]	Apply the algorithms to draw lines, circles and polygons.					**2**											
[CO3]	Use transformation techniques to scale, rotate and translate the object.				**2**												
[CO4]	Select the methods of enlarging visible portion of drawing																
[CO5]	Develop the logic for drawing the natural objects using different algorithms for curvedlines		**1**														

Subject: Real Time Systems

Code: BTE27186

3 Credits | Semester VII

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To study issues related to the design and analysis of systems with real-time constraints.
- To study the various Uni processor and Multiprocessor scheduling mechanisms.
- To study the difference between traditional and real time databases

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Understand the use of multi-tasking techniques in real time systems.
[CO2] Evaluate the performance of soft and hard real time systems.
[CO3] Analyze multi task scheduling algorithms for periodic, aperiodic and sporadic tasks.
[CO4] Analyse real time systems with regard to keeping time and resource restrictions.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

INTRODUCTION: Introduction to real time computing - Concepts; Example of real-time applications – Structure of a real time system – Characterization of real time systems and tasks - Hard and Soft timing constraints -, Design Challenges - Performance metrics - Prediction of Execution Time : Source code analysis, Micro-architecture level analysis. Cache and pipeline issues- Programming Languages for Real-Time Systems

TREADS AND SCHEDULING: Real time OS – Threads and Tasks – Structure of Microkernel – Time services . Scheduling Mechanisms Communication and Synchronization – Event Notification and Software interrupt.

APPROACHES TO SCHEDULING: Approaches to Hard Real-Time Scheduling, Clock-Driven Scheduling, Priority-Driven Scheduling of Periodic Tasks, Scheduling Aperiodic and Sporadic Jobs in Priority- Driven Systems.

QUANTUM ERROR CORRECTION: Real Time Communication -Network topologies and architecture issues – protocols – contention based, token based, polled bus, deadline based protocol, Fault tolerant routing. RTP and RTCP. Real time Databases – Transaction priorities – Concurrency control issues – Disk scheduling algorithms – Two phase approach to improve predictability.

E. TEXT BOOKS

T1.C.M. Krishna, Kang G. Shin – " Real Time Systems", International Edition, McGraw Hill

F. REFERENCE BOOKS

R1. Jane W.S. Liu, Real-Time Systems, Pearson Education India

R2. Philip.A.Laplante, Real Time System Design and Analysis, 3rd Edition, PHI

H. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Understand the use of multi-tasking techniques in real time systems.	2															
[CO2]	Evaluate the performance of soft and hard real time systems.		2														
[CO3]	Analyze multi task scheduling algorithms for periodic, aperiodic and sporadic tasks.		2														
[CO4]	Analyse real time systems with regard to keeping time and resource restrictions.																

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Biology for Engineers

Code: BTE23018

3 Credits | Semester VII

Total Lecture: 45 Total Tutorial: 9

A. Introduction:
- To understand Biological concepts from an engineering perspective
- To understand the inter-connection between biology and future technologies
- To motivate technology application for biological and life science challenges

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Understand the biological concepts from an engineering perspective

[CO2] Understand the concepts of biological sensing and its challenges

[CO3] Understand development of artificial systems mimicking human action

[CO4] Integrate biological principles for developing next generation technologies

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

INTRODUCTION: Discuss how biological observations of 18^{th} Century that lead to major discoveries. Examples from Brownian motion and the origin of thermodynamics by referring to the original observation of Robert Brown and Julius Mayor. These examples will highlight the fundamental importance of observations in any scientific inquiry. Engineering designs inspired by examples in biology-- Micro- to Macro- scales. Comparing natural vs. human-made machines. Biosensor. Engineering aspects of some Nobel Prizes in Physiology and Medicine & Chemistry recent advances in Biology

TOOLS AND TECHNIQUES: Biosafety laboratory practices, Buffers in biology, buffering capacity and pKa, Observing cell surface and intracellular contents using light and/or fluorescence microscopy, Measuring mechanical strength of cells - osmolality and elasticity of biological membranes

CLASSIFICATION: A common thread weaves this hierarchy Classification. Discuss classification based on (a) cellularity- Unicellular or multicellular (b) ultrastructure- prokaryotes or eucaryotes. (c) energy and Carbon utilization -Autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitata- acquatic or terrestrial (f) Molecular taxonomy- three major kingdoms of life. A given organism can come under different category based on classification. Model organisms for the study of biology come from different groups. E. coli, S. cerevisiae, D. Melanogaster, C. elegance, A. Thaliana, M. musculus

BIO MOLECULES: Discuss about sugars, starch and cellulose. Amino acids and proteins. Nucleotides and DNA/RNA. Two carbon units and lipids.Enzymology: How to monitor enzyme catalyzed reactions. How does an enzyme catalyze reactions. Enzyme classification. Mechanism of enzyme action. Discuss at least two examples. Enzyme kinetics and kinetic parameters. Why should we know these parameters to understand biology? RNA catalysis

GENETICS AND INFORMATION TRANSFER: Molecular Genetics covering, Structures of DNA and RNA; Concept of Gene, Gene regulation, e.g., Operon concept; Mendel's laws, Concept of segregation and independent assortment. Concept of allele. Gene mapping, Gene interaction, Epistasis.Teach meiosis and Mitosis as a part of genetics. Meiosis and Mitosis be taught as a part of genetics.Emphasis to be give not to themechanics of cell division nor the phases but how genetic material passes from parent to offspring. Concepts of recessivenessand dominance. Concept of mapping of phenotype to genes. Discuss about the single gene disorders in humans. Discuss the concept of complementation using human genetics. Concept of genetic code. Universality and degeneracy of genetic code. Define gene in terms of complementation and recombination.

E. TEXT BOOKS

T1. Molecular Genetics (Second edition),Stent, G.S.; and Calendar, R.W.H.Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher

T2. Microbiology, Prescott, L.MJ.P.HarleyandC.A.Klein1995.

F. REFERENCE BOOKS

R1. Biology:Aglobalapproach:Campbell,N.A.;Reece,J.B.;Urry,Lisa;Cain,M,L.;Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B.PearsonEducationLtd

R2. Outlines of Biochemistry, Conn, E.E;Stumpf, P.K;Bruening,G;Doi,R.H.,JohnWileyand Sons

R3. Principles of Biochemistry (VEdition),ByNelson, D.L.;andCox,M.M.W.H.Freemanand Company

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3	PS O 4
[CO1]	Understand the biological concepts from an engineering perspective	3	1	1	1	-	-	-	-	-	1	1	1	3	1	1	1
[CO2]	Understand the concepts of biological sensing and its challenges	2	2	1	1	-	-	-	-	-	2	1	1	2	2	1	1
[CO3]	Understand development of artificial systems mimicking human action	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
[CO4]	Integrate biological principles for developing next generation technologies	2	2	1	1	-	-	-	-	-	2	1	1	2	2	1	1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Semantic Web and Social Networks

Code: BTE27397

3 Credits | Semester VII

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To learn Web Intelligence
- To learn Knowledge Representation for the Semantic Web
- To learn Ontology Engineering
- To learn Semantic Web Applications, Services and Technology
- To learn Social Network Analysis and semantic web
- To understand the role of ontology and inference engines in semantic web
- To explain the analysis of the social Web and the design of a new class of applications that

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Understand and knowledge representation for the semantic web
[CO2] Create ontology.
[CO3] Build a blogs and social networks.
[CO4] Analyze Social network performance

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

THINKING AND INTELLIGENT: Thinking and intelligentWeb Applications, The Information Age, The World Wide Web, Limitations of Today's Web, The Next Generation Web.Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

ONTOLOGIES: Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web –Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL),UML,XML/XML Schema.Ontology Engineering, Constructing Ontology,

Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping.

LOGIC: Logic, Rule and Inference Engines. Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base.

XLM: XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods,What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks.

BLOG: Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features.

E. TEXT BOOKS

T1.Thinking on the Web - Berners Lee, Godel and Turing, Wiley interscience,2008.
T2. Social Networks and the Semantic Web, Peter Mika,Springer,2007.

F. REFERENCE BOOKS

R1.Semantic Web Technologies, Trends and Research in Ontology Based Systems, J.Davies, Rudi Studer, Paul Warren, John Wiley & Sons.

R2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)

R3. Information Sharing on the semantic Web - Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.

R4. Programming the Semantic W eb, T.Segaran, C.Evans, J.Taylor,O'Reilly, SPD.

R2. Dimitris N. Chorafas, "Cloud Computing Strategies"CRC Press; 1 edition[ISBN: 1439834539],201

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Understand and knowledge representation for the semantic web	**3**														**2**	
[CO2]	Create ontology.		**2**											**1**			
[CO3]	Build a blogs and socialnetworks.					**3**	**1**										**1**
[CO4]	Analyze Social network performance					**2**											**2**

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Data Analytics

Code: BTE27396

3 Credits | Semester VII

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

Following are the objectives of this course:

- To provide the skills and knowledge required to use essential features and capabilities of Visual Programming.
- To produce Graphical User Interfaces and applications in a Windows environment. It includes basic programming concepts, problem solving, programming logic, and the design of event-driven programming.
- To familiarize the students with the programming aspects related to graph theory and string matching.
- To provide strong foundation for designing real world applications using advanced toolkits.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Understand and demonstrate knowledge of programming terminology and how applied using Visual Programming.
[CO2] Illustrate and develop a Graphical User Interface (GUI) based on problem description.
[CO3]Identify the methods for solving critical problems over a GUI based IDE.
[CO4] Develop and debug applications using principles of OOP in Visual Programming.
[CO5] Develop programs that retrieve input from a file as opposed to input only provided by the user.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. Syllabus:

Unit I

Data Science in a Big world: Benefits and uses of Data Science in Big data, Facets of data, Big data ecosystem and Data Science, Data Science process, Introduction to big data: Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting.

Unit II

Linear Regression: Simple Linear Regression, Multiple Linear Regression, Considerations for linear regression model, Comparison of Linear regression with k-nearest neighbors Classification: Logistic Regression, Linear Discriminant analysis, Comparison of Classification methods.

Unit III

Mining data streams : Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications – Case Studies - Real Time Sentiment Analysis- Stock Market Predictions.

Unit IV

Analytics beyond Hadoop: Berkeley Big-data Analytics (BDA) Stack: Motivation, Design and Architecture, Real-time Analytics with Storm, Graph Lab: Processing Large Graphs.

Unit V

Data Visualization: Context of Data Visualization, Taxonomy of data visualization methods, choosing the appropriate chart type. Comparison of Categories: Dot Plots, Bar Charts, Floating bar (or Gantt chart), Pixelated bar chart, Histogram, Slope graph (or bumps chart or table chart), Radial chart, Glyph chart, Sankey diagram, Area size chart, Small multiples (or trellis chart), Word cloud.

E. TEXT BOOKS

T1. Cielen, D., Meysman, A., & Ali, M. (2016). Introducing data science: big data, machine learning, and more, using Python tools. Manning Publications Co.

T2. James, G., Witten, D., Hastie, T., & Tibshirani, R. (2013). An introduction to statistical learning, springer.

T3. Leskovec, J., Rajaraman, A., & Ullman, J. D. (2014). Mining of massive datasets. Cambridge university press.

F. REFERENCE BOOKS

R1. Friedman, J., Hastie, T., & Tibshirani, R. (2001). The elements of statistical learning (Vol. 1, pp. 337-387). New York: Springer series in statistics.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Understand and demonstrate knowledge of programming terminology and how applied using Visual Programming.	3	3	2	1	1								1	1		2
[CO2]	Illustrate and develop a Graphical User Interface (GUI) based on problem description.		2	2	1												
[CO3]	Identify the methods for solving critical problems over a GUI based IDE.	2	3			2											
[CO4]	Develop and debug applications using principles of OOP in Visual Programming.		1		3											3	2
[CO5]	Develop programs that retrieve input from a file as opposed to input only provided by the user.		2	2	1											2	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Data Mining and Warehousing

Code: BTE25105
3 Credits | Semester VII

A. Introduction:

- Be familiar with mathematical foundations of data mining tools.
- Understand and implement classical models and algorithms in data warehouses and data mining.
- Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.

B. Course Outcomes: At the end of the course, students will be able to

[CO1]Understand Data Warehouse fundamentals, Data Mining Principles
[CO2] Design data warehouse with dimensional modelling and apply OLAP operations.
[CO3] Identify appropriate data mining algorithms to solve real world problems.
[CO4] Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining.
[CO5] Describe complex data types with respect to spatial and web mining.

C. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

DATA MINING: Data Mining definition, tools and applications, Data Mining Functionalities, Classification of Data Mining Systems, data mining query languages and Architectures of Data Mining Systems., Data Mining issues.

DATA WAREHOUSING: Definition, usage and trends, , Data Warehouse Architecture, Data Warehouse Implementation, Development of Data cube technology, Data Warehousing to Data Mining.

ARCHITECTURE: OLTP vs. OLAP, ROLAP vs. MOLAP, types of OLAP, servers, 3-Tier data warehouse architecture, distributed and virtual data warehouses, data warehouse manager

IMPLEMENTATION: Data warehouse implementation, computation of data cubes, modeling OLAP data, OLAP queries manager, data warehouse back end tools, complex aggregation at multiple granularities, tuning and testing of data warehouse

MINING ASSOCIATION RULES: Data mining techniques, Association rules, mining single-dimensional Boolean Association rules from transaction databases, Mining multi-level Association rules from transaction databases. Mining multidimensional Association rules from relational databases and Data warehouses, Association Mining to correlation analysis, Constraint based association mining.

CLUSTER ANALYSIS: What is cluster analysis, Types of data in cluster analysis, a categorization of major clustering methods, Partitioning methods, Hierarchical Methods, Density based methods, Grid based methods, Modal based clustering methods.

APPLICATIONS IN DATA MINING: Data mining in market analysis, medical etc.

E. TEXT BOOKS

T1. “Data Mining Concepts and Techniques” by Jiawei Han, Micheline Kamber, Elesevier
T2. “Data Warehousing, Data Mining and OLTP” by Alex BersonMcGraw Hill
T3. Data warehousing System by Mallach, McGraw Hill

F. REFERENCE BOOKS

R1. “Data Warehousing in the Real World” by Sam Anahory& Dennis Murray, Pearson
R2. “Building the Data Warehouse” by W.H. Inman, John Wiley & Sons
R3. “Data Mining: A tutorial-based Primer”, by Richard J. Roiger, Michael W. Geatz, Pearson Education

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[CO1]	Understand Data Warehouse fundamentals, Data Mining Principles	**2**															
[CO2]	Design data warehouse with dimensional modelling and apply OLAP operations.			**3**													
[CO3]	Identify appropriate data mining algorithms to solve real world problems		**2**														
[CO4]	Describe complex data types with respect to spatial and web mining. Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining				**1**												
[CO5]	Describe complex data types with respect to spatial and web mining.				**1**												

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Electronic Design Automation

Code: BTE27192

3 Credits | Semester VII

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- The key themes, ideas, and techniques in producing correct/efficient/(optimal) mappings of some semantic computation onto a physical computational substrate
- Understanding many of the fundamental problems are more widely applicable in engineering than simply mapping computations
- The student will know where to look for further details and is aware of the major intellectual tools and analysis developed in this area.

B. Course Outcomes: At the end of the course, students will be able to

[CO1]Understand how to decompose large mapping problem into pieces, including the traditional decomposition for EDA.

[CO2] Learn How to evaluate the quality of a design mapping and mapping approach

[CO3] Identify Freedom that exists in design mappings and how that freedom can be exploited to reduce design costs

[CO4] Traditional design objectives and how to abstract cost functions from physical phenomena

[CO5] Design &implement automation algorithms

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

MOSFET: MOSFET small signal model, MOSFET parasitic capacitance value and modification in model. Scaling of MOS structure; SPICE level -1, level-2 and level 3 model; BSIM and CSIM models; Comparison between models. Layout generation, Design checking rules, Lamda, beta rule, routing: auto routing

Programming: Advance programming using VHDL. Component level programming. Library files, type\ declaration and usage, parameter types and overloading, types and type related issues, predefined and user defined attributes, package declaration and usage.

CADENCE: Introduction to CADENCE, Use of CADENCE, Basic modeling using CADENCE, Layout generation using CADENCE. Introduction to low power IC design using CAD tools

Delta: Delta delay modeling, insertion and transport delay. Use of signal drivers. Multiple processes

Device floor planning basics, Case study of a low power OPAMP design and layout generation.

E. TEXT BOOKS

T1. Electronics Design Automation: Synthesis, verification & Test (System on Silicon)- LaungTerng Wang, Morgan Kaufmann,2009

F. REFERENCE BOOKS

R1. “Essential Electronics design Automation (EDA)- Mark D.Birnbaum, Prentice Hall,2004
Course-pack from Bob's copy shop (required)

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Understand how to decompose large mapping problem into pieces, including the traditional decomposition for EDA.	**2**															
[CO2]	Learn How to evaluate the quality of a design mapping and mapping approach			**3**													
[CO3]	Identify Freedom that exists in design mappings and how that freedom can be exploited toreduce design costs		**2**	**1**											**1**		
[CO4]	Traditional design objectives and how to abstract cost functions from physical phenomena				**1**	**2**											
[CO5]	Design &implement automation algorithms	**1**		**2**													**1**

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject:Summer Internship-II

Code: BTE27349

4 Credits | Semester VII

Total Lecture: 120

A. Introduction:

- Following are the intended objectives of internship training:
- Will expose Technical students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry.
- Provide possible opportunities to learn understand and sharpen the real time technical / managerial skills required at the job.
- Exposure to the current technological developments relevant to the subject area of training.
- Experience gained from the 'Industrial Internship' in classroom will be use in classroom discussions.
- Create conditions conducive to quest for knowledge and its applicability on the job

B. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Continuous Internal Assessment (CIA)	Internal Examination	30
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

GUIDELINES FOR INTERNSHIP

Summer Internship –II should be undertaken in an industry only

S.No.	Suggested Schedule	Suggested Duration (In weeks)	Activities
1	Summer/winter vacation after 4th Semester	4-6	Inter/Intra Institutional Activities

Subject:Minor Project

Code: BTE27348

4 Credits | Semester VII

Total Lecture: 120

A. Introduction: The objective of this course is to prepare students to use applications of the theory and practical learned during the course. It will also help students to develop an industry or research oriented project. This course helps students how to carry out project/studies in the field of interest of the student or as given by the industry.

B.Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	30
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

GUIDELINES FOR PROJECT

Minor Project should be based on real/ live problems of the Industry/Govt./NGO/ MSME/Rural Sector or an innovative idea having the potential of a Startup and this project to be carried over to next semester.

ARKA JAIN University Jharkhand

Syllabus of

B.Tech. in Computer Science Engineering

Semester-VIII

ARKAJAIN University, Jharkhand
School of Engineering & IT
Department of Engineering
Faculty – Bachelor of Technology in Computer Science Engineering
Scheme of Study (w.e.f Batch 2020-21)

SEMESTER –I

Sr. No.	Name of the Subject	Group	L-T-P	Credit
1	Engineering Mathematics–I	A & B	3-1-0	4
2	Engineering Chemistry	A	3-0-0	3
	Programming for Problem Solving	B	3-0-0	3
3	Basic Electrical Engineering	A	3-1-0	4
	Engineering physics	B	3-1-0	4
4	Engineering Mechanics	A	3-0-0	3
	English for Communication	B	3-0-0	3
5	Constitution of India	B	0-0-0	0
	Practical			
6	Engineering Chemistry Lab	A	0-0-1	1
	Engineering Physics Lab	B	0-0-1	1
7	Basic Electrical Engineering Lab	A	0-0-1	1
	Programming for Problem Solving Lab	B	0-0-2	2
8	Engineering Mechanics Lab	A	0-0-1	1
9	Engineering Graphics & Design	A	0-0-2	2
	Workshop Practices	B	0-0-2	2
	TOTAL	A or B	12-2-5	19

SEMESTER –II

Sr. No.	Name of the Subject	Group	L-T-P	Credit
1	Engineering Mathematics–II	A & B	3-1-0	4
2	Engineering Chemistry	B	3-0-0	3
	Programming for Problem Solving	A	3-0-0	3
3	Basic Electrical Engineering	B	3-1-0	4
	Engineering physics	A	3-1-0	4
4	Engineering Mechanics	B	3-0-0	3
	English for Communication	A	3-0-0	3
5	Constitution of India	A	0-0-0	0
	Practical			
6	Engineering Chemistry Lab	B	0-0-1	1
	Engineering Physics Lab	A	0-0-1	1
7	Basic Electrical Engineering Lab	B	0-0-1	1
	Programming for Problem Solving Lab	A	0-0-2	2
8	Engineering Mechanics Lab	B	0-0-1	1
	Engineering Graphics& Design	B	0-0-2	2
9	Workshop Practices	A	0-0-2	2
	TOTAL	A or B	12-2-5	19

SEMESTER –I (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering Chemistry	BSC	3	3	100	70	20	5	5
2	Engineering Mathematics–I	BSC	4	4	100	70	20	5	5
3	Basic Electrical Engineering	ESC	4	4	100	70	20	5	5
4	Engineering Mechanics	ESC	3	3	100	70	20	5	5
	Practical								
5	Engineering Chemistry Lab	BSC	1	2	50	35	5	5	5
6	Basic Electrical Engineering Lab	ESC	1	2	50	35	5	5	5
7	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
8	Engineering Graphics & Design	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**24**	**600**	**420**	**100**	**40**	**40**

SEMESTER I (Group-B)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering physics	BSC	4	4	100	70	20	5	5
2	Engineering Mathematics –I	BSC	4	4	100	70	20	5	5
3	Programming for Problem Solving	ESC	3	3	100	70	20	5	5
4	English for Communication	HSMC	3	3	100	70	20	5	5
5	Constitution of India	MC	0	2	50	35	10	2.5	2.5
	Practical								
6	Engineering physics Lab	BSC	1	2	50	35	5	5	5
7	Programming for Problem Solving Lab	ESC	2	4	50	35	5	5	5
8	Workshop Practices	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**26**	**600**	**420**	**105**	**37.5**	**37.5**

SEMESTER II (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering physics	BSC	4	4	100	70	20	5	5
2	Engineering Mathematics –II	BSC	4	4	100	70	20	5	5
3	Programming for Problem Solving	ESC	3	3	100	70	20	5	5
4	English for Communication	HSMC	3	3	100	70	20	5	5
5	Constitution of India	MC	0	2	50	35	10	2.5	2.5
	Practical								
6	Engineering physics Lab	BSC	1	2	50	35	5	5	5
7	Programming for Problem Solving Lab	ESC	2	4	50	35	5	5	5
8	Workshop Practices	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**26**	**600**	**420**	**105**	**37.5**	**37.5**

SEMESTER –II (Group-B)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Engineering Chemistry	BSC	3	3	100	70	20	5	5
2	Engineering Mathematics–II	BSC	4	4	100	70	20	5	5
3	Basic Electrical Engineering	ESC	4	4	100	70	20	5	5
4	Engineering Mechanics	ESC	3	3	100	70	20	5	5
	Practical								
5	Engineering Chemistry Lab	BSC	1	2	50	35	5	5	5
6	Basic Electrical Engineering Lab	ESC	1	2	50	35	5	5	5
7	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
8	Engineering Graphics & Design	ESC	2	4	50	35	5	5	5
	TOTAL		**19**	**24**	**600**	**420**	**100**	**40**	**40**

SEMESTER-III

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Analog Electronic Circuits	PCC	3	3	100	70	20	5	5
2	Data structure	PCC	3	3	100	70	20	5	5
3	Digital Electronics	PCC	3	3	100	70	20	5	5
4	Engineering Mathematics -III	BSC	4	3	100	70	20	5	5
5	Humanities-I Professional Practice, Law & Ethics Organizational Behavior	HSMC	3	3	100	70	20	5	5
6	Environmental Science	MC	0	2	50	35	10	2.5	2.5
7	Python Programming	PCC	3	3	100	70	20	5	5
	PRACTICAL								
8	Analog Electronic Circuits Lab	PCC	2	4	50	35	5	5	5
9	Data structure Lab	PCC	2	4	50	35	5	5	5
10	Digital Electronics Lab	PCC	2	4	50	35	5	5	5
11	IT Workshop(MAT LAB)	PCC	1	2	50	35	5	5	5
12	Python Programming Lab	PCC	2	4	50	35	5	5	5
	TOTAL		28	38	900	640	155	57.5	57.5

SEMESTER-IV

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Discrete Mathematics	BSC	4	4	100	70	20	5	5
2	Computer Organization & Architecture	PCC	3	3	100	70	20	5	5
3	Operating Systems	PCC	3	3	100	70	20	5	5
4	Design & Analysis of Algorithms	PCC	3	3	100	70	20	5	5
5	Microprocessor & Microcontroller	PCC	3	3	100	70	20	5	5
6	Software Engineering	PCC	3	3	100	70	20	5	5
	PRACTICAL								
6	Operating Systems Lab	PCC	2	4	50	35	5	5	5
7	Design & Analysis of Algorithms Lab	PCC	2	4	50	35	5	5	5
8	Computer Organization & Architecture Lab	PCC	2	4	50	35	5	5	5
	TOTAL		25	31	750	525	135	45	45

SEMESTER V

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory / Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Signals & Systems	PCC	3	3	100	70	20	5	5
2	Database Management Systems	PCC	3	3	100	70	20	5	5
3	Formal Language &Automata Theory	PCC	3	3	100	70	20	5	5
4	Object Oriented Programming	PCC	3	3	100	70	20	5	5
5	Humanities-II Soft Skills and Interpersonal Communication	HSMC	3	3	100	70	20	5	5
6	Elective-1 Graph Theory Image Processing Advanced Algorithms	PEC	3	3	100	70	20	5	5
	PRACTICAL								
7	Database Management Systems Lab	PCC	2	4	50	35	5	5	5
8	Object Oriented Programming Lab	PCC	2	4	50	35	5	5	5
9	Summer Internship-I (3-4 Weeks)	PCC	1	0	50	50	0	0	0
	TOTAL		23	26	750	540	130	40	40

SEMESTER VI

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Compiler Design	PCC	3	3	100	70	20	5	5
2	Computer Networks	PCC	3	3	100	70	20	5	5
3	Advance Java Programming	PCC	3	3	100	70	20	5	5
4	Elective-II Artificial Intelligence Machine Learning Visual Programming	PEC	3	3	100	70	20	5	5
5	Elective-III Web Technology Neural Networks and Deep Learning	PEC	3	3	100	70	20	5	5
6	Open Elective –I Cyber Law and Ethics Human Resource Development and Organizational Behavior Advanced Algorithms	HSMC	3	3	100	70	20	5	5
	Practical								
7	Compiler Design Lab	PCC	2	4	50	35	5	5	5
8	Computer Networks Lab	PCC	2	4	50	35	5	5	5
9	Advance Java Programming Lab	PCC	2	4	50	35	5	5	5
	TOTAL		24	30	750	525	135	45	4

SEMESTER VII

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Elective-IV Cryptography & Network Security Advanced Operating Systems Web and Internet	PEC	3	3	100	70	20	5	5
2	Elective-V Quantum Computing Optimization Techniques Real Time Systems	PEC	3	3	100	70	20	5	5
3	Open Elective-II Electronic Design Automation Computer Graphics Data mining and warehousing Semantic Web and Social Networks	OEC	3	3	100	70	20	5	5
4	Biology For Engineers	BSC	3	3	100	70	20	5	5
5	Data Analytics	PCC	3	3	100	70	20	5	5
	Practical								
5	Minor Project	PROJ	4	8	100	100	0	0	0
6	Industrial Training (Summer Internship-4-6 Week)	PROJ	4	0	100	100	0	0	0
	TOTAL		23	23	700	550	100	25	25

SEMESTER VIII

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Elective-VI CloudComputing Data Mining AdvancedComputerArchitecture	PEC	3	3	100	70	20	5	5
2	Open Elective-III Signals and systems Advanced Operating Systems	OEC	3	3	100	70	20	5	5
3	Open Elective-IV Cyber security Soft Computing	OEC	3	3	100	70	20	5	5
4	VLSI System Design	PCC	3	3	100	70	20	5	5
	PRACTICAL								
5	Major Project	PROJ	6	12	100	0	0	0	0
6	Extra- Curricular/ Co-Curricular Activity	PROJ	0	0	100	70	30	0	0
	Total		18	24	600	35	110	20	20

Distribution of Credit across 8 semesters:

Sl. No	Type of Paper	No. of Paper	Total Credit
1	Humanities and Social Sciences including Management courses **(HSMC)**	5	15
2	Basic Science courses**(BSC)**	9	28
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc**(ESC)**	8	18
4	Professional core courses (**PCC)**	30	77
5	Professional Elective courses relevant to chosen specialization/branch**(PEC)**	5	15
6	Open subjects – Electives from other technical and /or emerging subjects (**OEC)**	3	9
7	Project work, seminar and internship in industry or elsewhere**(PROJ)**	5	14
8	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Knowledge Tradition]**(MC)**	2	0
	Total	66	176

CIA – Continuous Internal Assessment – Based on Projects / Assignment during the semester

Note:

AICTE Activity Points to be earned by students admitted to Degree program (For more details refer to Chapter 6, AICTE, Activity Point Program, Model Internship Guidelines):

Every regular student, who is admitted to the 4 year Degree program, is required to earn 100 activity points in addition to the total credits earned for the program. Students entering 4 years Degree Program through lateral entry are required to earn 75 activity points in addition to the total credits earned for the program. The activity points earned by the student shall be reflected on the students 8th Semester grade card.

The activities to earn the points can be spread over the duration of the course. However, minimum prescribed duration should be fulfilled.

Activity Points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression.

Incase student fail to earn the prescribed activity points, Eight semester Grade Card shall be issued only after earning the required activity Points.

Students shall be eligible for the award of degree only after the release of the Eight Semester grade card.

There are two groups (A & B) in semester 1 & 2. The Group division will be decided by The Dean SoE & IT before commencement of classes

ARKAJAIN University, Jharkhand
School of Engineering & IT
Department of Engineering
Faculty – Bachelor of Technology in Computer Science Engineering
PROGRAM OUTCOMES &PROGRAM SPECIFIC OUTCOMES

PROGRAM OUTCOMES

After completing this undergraduate program, a learner:

[PO.1]. Engineering knowledge: An ability to apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to get the solution of the engineering problems.

[PO.2]. Problem analysis: Ability to Identify, formulates, review research literature, and analyze complex engineering problems.

[PO.3]. Design/Development of Solutions: Ability to design solutions for complex Engineering Problems by considering social, Economic and Environmental aspects.

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge to design, conduct analyse experiments to get valid conclusion**.**

[PO.5]. Modern tool usage: ability to create, select, and apply appropriate techniques, and to model complex engineering activities with an understanding of the limitations.

[PO.6]. The engineer and society: Ability to apply knowledge by considering social health, safety, legal and cultural issues.

[PO.7]. Environment and sustainability: Understanding of the impact of the adopted engineering solutions in social and environmental contexts.

[PO.8]. Ethics: Understanding of the ethical issues of the civil engineering and applying ethical principles in engineering practices.

[PO.9]. Individual and teamwork: Ability to work effectively as an individual or in team, as a member or as a leader.

[PO.10]. Communication: An ability to communicate clearly and effectively through different modes of communication.

[PO.11]. Project management and finance: Ability to handle project and to manage finance related issue.

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning.

PROGRAM SPECIFIC OUTCOMES

[PSO.1]. Understand the principles, architecture and organization of computers, embedded systems and computer networks.

[PSO.2]. Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems that include both hardware and software.

[PSO.3]. Apply software design and development practices to develop software applications in emerging areas such as IoT, Data Analytics, Social Networks, Cloud and High Performance Computing.

[PSO.4]. Demonstrate& communicate: Ability to demonstrate the knowledge, skill to analyze the cause and effect on Computer Science Engineering.

Subject: Cloud Computing

Code: BTE27194

3 Credits | Semester VIII

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- The fundamental ideas behind Cloud Computing, the evolution of the paradigm, its applicability;benefits, as well as current and future challenges;
- The basic ideas and principles in data center design;cloud management techniques and cloud software deployment considerations
- Cloud storage technologies and relevant distributed file systems and object storage
- The variety of programming models and develop working experience in several of them.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Explain thecore concepts of the cloud computing paradigm: how and why this paradigm shift cameabout, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.

[CO2] Illustratethe fundamental concepts of cloud storage and demonstrate their use in storage systems such as Amazon S3 and HDFS

[CO3] Analyzevarious cloud programming models and apply them to solve problems on the cloud.

[CO4] Discuss system, network and storage virtualization and outline their role in enabling the cloud computing system model.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

CLOUD COMPUTING BASICS: Cloud Computing Overview, Applications, Intranets and the Cloud, First Movers in the Cloud.Organization and Cloud Computing -When You Can Use Cloud Computing, Benefits, Limitations, Security Concerns,Regulatory Issues. Cloud Computing with the Titans – Google, EMC, NetApp, Microsoft, Amazon, Salesforce.com, IBM,Partnerships,The Business Case for Going to the Cloud-Cloud Computing Services, How

Those Applications Help Your Business, Deleting Your Datacenter, Salesforce.com, Thomson Reuters

HARDWARE AND INFRASTRUCTURE: Clients, Security, Network, Services.Accessing the Cloud –Platforms, Web Applications, Web APIs, and Web Browsers.Cloud Storage –Overview, Cloud Storage Providers,Standards –Application, Client, Infrastructure, Service.

SOFTWARE AS A SERVICE: Overview, Driving Forces, Company Offerings, Industries Software plus Services –Overview, Mobile Device Integration, Providers, Microsoft Online.Developing Applications – Google, Microsoft, Intuit QuickBase, Cast Iron Cloud, and Bungee Connect,Development, Troubleshooting, Application Management.

LOCAL CLOUDS AND THIN CLIENTS: Virtualization in Your Organization, Server Solutions, Thin Clients,Case Study: McNeilusSteel.Migrating to the Cloud -Cloud Services for Individuals, Cloud Services Aimed at the Mid-Market,Enterprise-Class Cloud Offerings, Migration.Best Practices and the Future of Cloud Computing-AnalyzeYour Service, Best Practices, How Cloud Computing Might Evolve.

E. TEXT BOOKS

T1. Gautama Shroff, “Enterprise Cloud Computing Technology Architecture Applications”, CambridgeUniversity Press; 1 edition,[ISBN: 978-0521137355],2010. 7SRM-M.TechCloud Computing 2015 –162.

F. REFERENCE BOOKS

R1. Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing, A Practical Approach”McGraw-Hill Osborne Media; 1 edition[ISBN: 0071626948],2009.

R2. Dimitris N. Chorafas, “Cloud Computing Strategies”CRC Press; 1 edition[ISBN: 1439834539],201

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Explain thecore concepts of the cloud computing paradigm: how and why this paradigm shift cameabout, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.	**1**												**2**			
[CO2]	Illustrate the fundamental concepts of cloud storage and demonstrate their use in storage systems such as Amazon S3 and HDFS				**1**										**2**		
[CO3]	Analyze various cloud programming models and apply them to solve problems on the cloud.		**2**												**1**		
[CO4]	Discuss system, network and storage virtualization and outline their role in enabling the cloud computing system model.			**2**												**3**	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Data Mining

Code: BTE25105
3 Credits | Semester VIII

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- Be familiar with mathematical foundations of data mining tools.
- Understand and implement classical models and algorithms in data warehouses and data mining.
- Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.

B. Course Outcomes: At the end of the course, students will be able to

[CO1]Understand Data Warehouse fundamentals, Data Mining Principles
[CO2] Design data warehouse with dimensional modelling and apply OLAP operations.
[CO3] Identify appropriate data mining algorithms to solve real world problems.
[CO4] Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining.
[CO5] Describe complex data types with respect to spatial and web mining.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

DATA MINING: Data Mining definition, tools and applications, Data Mining Functionalities, Classification of Data Mining Systems, data mining query languages and Architectures of Data Mining Systems., Data Mining issues.

DATA WAREHOUSING: Definition, usage and trends, , Data Warehouse Architecture, Data Warehouse Implementation, Development of Data cube technology, Data Warehousing to Data Mining.

ARCHITECTURE: OLTP vs. OLAP, ROLAP vs. MOLAP, types of OLAP, servers, 3-Tier data warehouse architecture, distributed and virtual data warehouses, data warehouse manager

IMPLEMENTATION: Data warehouse implementation, computation of data cubes, modeling OLAP data, OLAP queries manager, data warehouse back end tools, complex aggregation at multiple granularities, tuning and testing of data warehouse

MINING ASSOCIATION RULES: Data mining techniques, Association rules, Mining single-dimensional Boolean Association rules from transaction databases, Mining multi level Association rules from transaction databases. Mining multidimensional Association rules from relational databases and Data warehouses, Association Mining to correlation analysis, Constraint based association mining.

CLUSTER ANALYSIS: What is cluster analysis, Types of data in cluster analysis, A categorization of major clustering methods, Partitioning methods, Hierarchical Methods, Density based methods, Grid based methods, Modal based clustering methods.

APPLICATIONS IN DATA MINING: Data mining in market analysis, medical etc.

E. TEXT BOOKS

T1. "Data Mining Concepts and Techniques" by Jiawei Han, Micheline Kamber, Elesevier
T2. "Data Warehousing, Data Mining and OLTP" by Alex BersonMcGraw Hill
T3. Data warehousing System by Mallach, McGraw Hill

F. REFERENCE BOOKS

R1. "Data Warehousing in the Real World" by Sam Anahory& Dennis Murray, Pearson
R2. "Building the Data Warehouse" by W.H. Inman, John Wiley & Sons
R3. "Data Mining: A tutorial-based Primer", by Richard J. Roiger, Michael W. Geatz, Pearson Education

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Understand Data Warehouse fundamentals, Data Mining Principles	2												1			
[CO2]	Design data warehouse with dimensional modelling and apply OLAP operations.			3											2		
[CO3]	Identify appropriate data mining algorithms to solve real world problems		2												2		
[CO4]	Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining				1									3			
[CO5]	Describe complex data types with respect to spatial and web mining.				1										1		

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Advanced Computer Architecture

Code: BTE27190
3 Credits | Semester VIII

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To emphasize on the concept of a complete system consisting of asynchronous interactions between concurrently executing hardware components and device driver software in order to illustrate the behavior of a computer system as a whole.
- To understand the advanced concepts of computer architecture and exposing the major differentials of RISC and CISC architectural characteristics

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Understand the classes of computers, and new trends and developments in computer architecture
[CO2] Understand pipelining, instruction set architectures, memory addressing.
[CO3] Understand the performance metrics of microprocessors, memory, networks, and disks
[CO4] Understand the various techniques to enhance a processors ability to exploit Instruction-level parallelism (ILP), and its challenges.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

PERFORMANCE & INSTRUCTION SET: Performance: CPU Performance, Evaluating Performance. Instruction Set: Instruction Set Architectures, Operand Addressing, MIPS Instruction Set Architecture.

PIPELINING:Datapath and Control, Linear, Nonlinear pipelining, arithmetic pipelining, Processor pipelining, Instruction pipeline, Pipeline scheduling, Pipeline hazards: Structural hazard, Data hazard, Control hazard, Branch prediction, Speculation: control speculation, data speculation, Exceptions

PARALLELISM: Instruction Level Parallelism: Concepts and Challenges, Basic Compiler Techniques for Exposing ILP, Exploiting ILP Using Multiple Issue and Scheduling: Superscalar, VLIW, Super Pipelining

MEMORY: Caches and Memory Hierarchy, Improving Cache Performance: miss rate reduction, optimizing miss penalty, improving hit ratio, cache coherence, Snoopy protocols, Directory based protocols

MULTIPROCESSORS AND CLUSTERS: Multiprocessors, Flynn's classification, Interconnection network, Processor clusters, SMPS multiprocessors, Chip Multiprocessors and Multithreading.

STORAGE & DATA FLOW MACHINES: Storage: Storage systems, RAID.Data Flow Machines: Static dataflow model, Dynamic DFM.

E. TEXT BOOKS

T1. "Computer Architecture: A Quantitative Approach "by John L Hennessy & David A Patterson, Morgan Kaufmann Publishers

F. REFERENCE BOOKS

R1. "Advanced Computer Architecture, Parallelism, Scalability, Programmability "by K.HWANG, McGraw Hills

R2. "Computer Organization & Design: A Harware/Software Interface", by David A Patterson & John L Hennessy, Morgan Kaufmann Publishers

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Understand the classes of computers, and new trends and developments in computer architecture		**2**													**2**	
[CO2]	Understand pipelining, instruction set architectures, memory addressing.		**2**												**1**		
[CO3]	Understand the performance metrics of microprocessors, memory, networks, and disks			**1**											**1**		
[CO4]	Understand the various techniques to enhance a processors ability to exploit Instruction-level parallelism (ILP), and its challenges	**1**													**2**		
[CO5]	Understand virtual memory and virtual machines		**1**													**3**	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: VLSI System Design

Code: BTE28362

3 Credits | Semester VIII

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To Understand the vlsi technology and design of circuits based on technology like cmosbicmos etc.
- To Understand the designing layouts of logic gates.
- To understanding the combinational logic networks and its optimization.
- To understanding the sequential systems and its optimization
- To get knowledge on floor plan design

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Design VLSI circuits starting from pmos, nmos, cmos, and bicmos technology based design.
[CO2] Understand the designing tools to draw layouts for the transistor structures
[CO3] Understand the design of logic gates
[CO4] Understand the design of sequential systems

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

REVIEW OF MICROELECTRONICS AND INTRODUCTION TO MOS TECHNOLOGIES: MOS, CMOS, BiCMOSTechnology.Basic Electrical Properties of MOS, CMOS &BiCMOS Circuits: Ids – Vds relationships, Threshold Voltage VT, Gm, Gds and ωo, Pass Transistor, MOS, CMOS & Bi CMOS Inverters, Zpu/Zpd, MOS Transistor circuit model, Latch-up in CMOS circuits

LAYOUT DESIGN AND TOOLS: Transistor structures, Wires and Vias, Scalable Design rules, Layout Design tools. Logic gates and layouts : Static Complementary Gates, Switch Logic, Alternative Gate circuits, Low power gates, Resistive and Inductive interconnect delays

COMBINATIONAL LOGIC NETWORKS: Layouts, Simulation, Network delay, Interconnect design, Power optimization, Switch logic networks, Gate and Network testing

SEQUENTIAL SYSTEMS: Memory cells and Arrays, Clocking disciplines, Design, Power optimization, Design validation and testing

FLOOR PLANNING: Floor planning methods, Global Interconnect, Floor Plan Design, Off-chip connections.

E. TEXT BOOKS

T1. Essentials of VLSI Circuits and Systems, K. EshraghianEshraghian. D, A. Pucknell, 2005,PHI.

T2. Modern VLSI Design – Wayne Wolf, 3rd Ed., 1997, Pearson Education.

F. REFERENCE BOOKS

R1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press, 2011.

R2.Principals of CMOS VLSI Design – N.H.E Weste, K. Eshraghian, 2nd Ed., Addison Wesley

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Design vlsi circuits starting from pmos, nmos, cmos, and bicmos technology based design.	**3**													**2**		
[CO2]	Understand designing tools to draw layouts for the transistor structures			**2**											**2**		
[CO3]	Analyze the design of logic gates		**1**													**3**	
[CO4]	Understand the design of sequential systems		**1**											**2**			

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Advanced Operating System

Code: BTE27334
3 Credits | Semester VIII

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- This course provides students basic knowledge and understandings about design issues of Advanced Operating systems. It enables the students to understand basic concepts and need of Distributed operating systems along with working of various scheduling algorithms with their comparative analysis.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Understand of design issues of advanced operating systems and compare different types of operating systems.
[CO2] Analyze design aspects and data structures used for different subsystems of Advanced OS.
[CO3] Demonstrate understanding of different architectures used in Distributed OS and analyze their design issues.
[CO4] Demonstrate understanding of different architectures used in Multiprocessor OS and their scheduling algorithms.
[CO5] Classify Real Time OS and analyze various real time scheduling algorithms.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

Multi-Processor and Distributed Operating System: Introduction,Architecture, Organization, Resource sharing, Load Balancing, Availability and Fault Tolerance, Design and

Development Challenges, Inter-process Communication, Distributed Applications - Logical Clock, Mutual Exclusion, Distributed File System.

Real Time and Embedded Operating Systems: Introduction, Hardware Elements, Structure - Interrupt Driven, Nanokernel, Microkernel and Monolithic kernel based models. Scheduling – Periodic,Aperiodic and Sporadic Tasks, Introduction to Energy Aware CPU Scheduling.

Cluster and Grid Computing: Introduction to Cluster Computing and MOSIX OS, Introduction to the Grid, Grid Architecture, **Computing Platforms**: Operating Systems and Network Interfaces, Grid Monitoring and Scheduling, Performance Analysis, Case Studies.

Cloud Computing: Introduction to Cloud, Cloud Building Blocks, Cloud as IaaS, PaaS and SaaS, Hardware and software virtualization, Virtualization of OS – Hypervisor KVM, SAN and NAS back-end concepts.

Mobile Computing: Introduction, Design Principles, Structure, Platform and Features of Mobile Operating Systems (Android, IOS, Windows Mobile OS).

E. TEXT BOOKS

T1. Distributed Computing: Principles and Applications by M. L. Liu, Pearson.

T2. The Grid-Core technologies by Mark Baker and Maozhen Li, John Wiley & sons

F. REFERENCE BOOKS

R1. Operating Systems by Sibasankar Haldar,Alex A. Arvind,Pearson Education Inc.

R2. Distributed Systems: Principles and Paradigms by Tanenbaum and Van Steen, Pearson.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Understand of design issues of advanced operating systems and compare different types of operating systems.	2	3											1			
[CO2]	Analyze design aspects and data structures used for different subsystems of Advanced OS	1	2	2											2		
[CO3]	Demonstrate understanding of different architectures used in Distributed OS and analyze their design issues.	1	2	3	2										2		
[CO4]	Demonstrate understanding of different architectures used in Multiprocessor OS and their scheduling algorithms.			3	2	2										3	
[CO5]	Classify Real Time OS and analyze various real time scheduling algorithms.			2	3									1			

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Cyber Security

Code: BTE28363
3 Credits | Semester VIII

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- This course provides students basic knowledge and skills in the fundamental theories and practices of Cyber Security.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Understand cyber-attack, types of cybercrimes, cyber laws
[CO2] Understand the technique to protect them self and ultimately society from such attacks
[CO3] Design, develop, test and evaluate secure software.
[CO4] Analyze and resolve security issues in networks and computer systems to secure an infrastructure.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

SYSTEMS VULNERABILITY SCANNING: Overview of vulnerability scanning, Open Port / Service Identification, Banner / Version Check, Traffic Probe, Vulnerability Probe, Vulnerability Examples, OpenVAS, Metasploit. Networks Vulnerability Scanning –Netcat, Socat, understanding Port and Services tools –Datapipe, Fpipe, WinRelay, Network Reconnaissance – Nmap, THC-Amap and System tools. Network Sniffers and Injection tools –Tcpdump and Windump, Wire shark, Ettercap

NETWORK DEFENSE TOOLS: Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs Firewall, How a Firewall Protects a Network, Packet Characteristic to Filter, Stateless Vs Stateful Firewalls, Network Address Translation (NAT) and Port Forwarding, the basic of Virtual Private Networks, Linux Firewall, Windows Firewall, Snort: Introduction Detection System

WEB APPLICATION TOOLS: Scanning for web vulnerabilities tools: Nikto, W3af, HTTP utilities -Curl, OpenSSL and Stunnel, Application Inspection tools –Zed Attack Proxy, Sqlmap. DVWA, Webgoat, Password Cracking and Brute-Force Tools – John the Ripper, L0htcrack, PW dump, HTC-Hydra

INTRODUCTION TO CYBER CRIME AND LAW: Cyber Crimes, Types of Cybercrime, Hacking, Attack vectors, Cyberspace and Criminal Behavior, Clarification of Terms, Traditional Problems Associated with Computer Crime, Introduction to Incident Response, Digital Forensics, Computer Language, Network Language, Realms of the Cyber world, A Brief History of the Internet, Recognizing and Defining Computer Crime, Contemporary Crimes, Computers as Targets, Contaminants and Destruction of Data, Indian IT ACT 2000 .

E. TEXT BOOKS

T1. Anti-Hacker Tool Kit (Indian Edition) by Mike Shema, Publication Mc Graw Hill.

F. REFERENCE BOOKS

R1. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole and SunitBelpure, Publication Wiley

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	**STATEMENT**	**CORRELATION WITH PROGRAM OUTCOMES**												**CORRELATION WITH PROGRAM SPECIFIC OUTCOMES**			
		PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
[CO1]	Understand cyber-attack, types of cybercrimes, cyber laws	**2**												**1**			
[CO2]	Understand the technique to protect them self and ultimately society from such attacks			**2**											**2**		
[CO3]	Design, develop, test and evaluate secure software.		**1**												**3**		
[CO4]	Analyze and resolve security issues in networks and computer systems to secure an infrastructure.				**3**									**2**			

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Soft Computing

Code: BTE28236

3 Credits | Semester VIII

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To conceptualize the working of human brain using ANN.
- To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inference systems.
- To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience.
- To provide the mathematical background for carrying out the optimization and familiarizing genetic algorithm for seeking global optimum in self-learning situation

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Analyze and appreciate the applications, which can use fuzzy logic.
[CO2] Understand the designing inference systems.

[CO3] Understand the difference between learning and programming and explore practical applications of Neural Networks (NN).

[CO4] Understand the importance of optimizations and its use in computer engineering fields and other domains

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

MACHINE LEARNING & AI : Introduction, hierarchical perspective and foundations. Rote Learning, Learning by Advice, learning in problem solving:inductive learning, explanation based learning, learning from observation and discovery, learning by analogy, and introduction to formal learning theory. Biological neurons and brain, models of biological neurons, artificial neurons and neural networks, Early adaptive nets Hopfield nets, back error propagation competitive learning lateral inhibition and feature maps, Stability -Plasticity and noise saturation dilemma, ART nets, cognition and recognition.

ARCHITECTURE & APPLICATIONS: Neural nets as massively parallel, connectionist architecture, Application in solving problems from various are as e.g. AI, Computer Hardware, networks, pattern recognition sensing and control etc.

BASICS OF FUZZY SETS: Fuzzy Relations –Fuzzy logic and approximate reasoning –Design Methodology of FuzzyControl Systems –Basic structure and operation of fuzzy logic control systems

NETWORKS: Networks –Feedback networks –Supervised and unsupervised learning approaches –Neural Networks in Control Systems.

GENETIC ALGORITHM: Basics of Genetic Algorithms: Evolution of Genetic Algorithm Applications.

E. TEXT BOOKS

T1. P H Winston –“Artificial Intelligence”-Pearson Education
T2. E Charniak and W Midermott –“Introduction to Artificial Intelligence”-Pearson Education

F. REFERENCE BOOKS

R1.Cohen, “Empirical Methods for AI”, PHI
R2. Haykin, “Neural Network”, Pearson Education/PHI
R3. “Artificial Neural Network”, Vikas Bose
R4.“Neural Network Fundamentals with graphs, Algorithmsand Applications”,–TMH

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	nalyze and appreciate the applications which can use fuzzy logic.		**1**											**1**			
[CO2]	Understand the designing inference systems.			**2**											**2**		
[CO3]	Understand the difference between learning and programming and explore practical applications of Neural Networks (NN).	**1**													**1**		
[CO4]	Understand the importance of optimizations and its use in computer engineering fields and other domains		**2**													**3**	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Signals and Systems

Code: BTE25294

3 Credits | Semester VIII

Total Lecture: 45 Total Tutorial: 9

A. Introduction:

- To explain signals and systems representations/classifications and also describe the time and frequency domain analysis of continuous time signals with Fourier series, Fourier transforms and Laplace transforms

B. Course Outcomes: At the end of the course, students will be able to

[CO1]Recognize sampling theorem and its implications.

[CO2] Understand the concepts of continuous time and discrete time systems.

[CO3] Solve systems in complex frequency domain.

[CO4] Analyze the discrete time signals and system using different transform domain techniques.

[CO5] Evaluate the various signal responses.

[CO6]Design and implement LTI filters for filtering different real world signals.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal Assessment (CIA)	Internal Examination	20
	Attendance	5
	Assignment	5
End Semester Examination(ESE)	End Semester Examination	70
Total		100
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

D. SYLLABUS

INTRODUCTION TO SIGNALS AND SYSTEMS: Signals and systems as seen in everyday life, and in various branches of engineering and science. Signal properties: periodicity, absolute integrability, determinism and stochastic character. Some special signals of importance: the unit step, the unit impulse, the sinusoid, the complex exponential, some special time-limited signals; continuous and discrete time signals, continuous and discrete amplitude signals. System properties: linearity: additivity and homogeneity, shift-invariance, causality, stability, reliability. Examples.

BEHAVIOR OF CONTINUOUS AND DISCRETE-TIME LTI SYSTEMS: Impulse response and step response, convolution, input-output behavior with aperiodic convergent inputs, cascade interconnections. Characterization of causality and stability of LTI systems. System representation through differential equations and difference equation, State-space Representation of systems. State-Space Analysis, Multi-input, multi-output representation. State Transition Matrix and its Role. Periodic inputs to an LTI system, the notion of a frequency response and its relation to the impulse response.

FOURIER SERIES AND FOURIER TRANSFORM: Fourier series representation of periodic signals, Waveform Symmetries, Calculation of Fourier Coefficients. Fourier Transform, convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality. The Discrete-Time Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT). Parseval's Theorem.

LAPLACE AND Z- TRANSFORMS: Review of the Laplace Transform for continuous time signals and systems, system functions, poles and zeros of system functions and signals, Laplace domain analysis, solution to differential equations and system behavior. The z-Transform for discrete time signals and systems, system functions, poles and zeros of systems and sequences, z-domain analysis.

SAMPLING AND RECONSTRUCTION: The Sampling Theorem and its implications. Spectra of sampled signals. Reconstruction: ideal interpolator, zero-order hold, first-order hold. Aliasing and its effects. Relation between continuous and discrete time systems. Introduction to the applications of signal and system theory: modulation for communication, filtering, feedback control systems.

E. TEXT BOOKS

T1. “Signals and Systems: Continuous and Discrete” by R F Ziemer and D R Fannin
T2. “Signals and Systems” by A V Oppenheim and A S Willsky and I T Young
T3.“Signals and Systems : Pearson New International Edition” by Alan V Oppenheim and S Hamid
T4. “Problems and Solutions in Signals and Systems” by R Gopal
T5.”Continuous and Discrete Signals and Systems” by Samir S Soliman and Mandyam D Srinath
T6. “Fundamentals of Signals and Systems” by Michael Roberts and Govind Sharma

F. REFERENCE BOOKS

R1. A.V. Oppenheim, A. S. Willsky and S. H. Nawab, “Signals and systems”, Prentice Hall India,1997
R2. J. G. Proakis and D. G. Manolakis, “Digital Signal Processing: Principles, Algorithms, andApplications”, Pearson, 2006.
R3. H. P. Hsu, “Signals and systems”, Schaum’s series, McGraw Hill Education, 2010
R4. S. Haykin and B. V. Veen, “Signals and Systems”, John Wiley and Sons, 2007.
R5. A.V. Oppenheim and R. W. Schafer, “Discrete-Time Signal Processing”, Prentice Hall,2009.
R6. M. J. Robert “Fundamentals of Signals and Systems”, McGraw Hill Education, 2007.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
[CO1]	Recognize sampling theorem and its implications.	**2**				**1**								**1**		**2**	
[CO2]	Understand the concepts of continuous time and discrete time systems.		**2**		**1**									**2**			
[CO3]	Solve systems in complex frequency domain.	**2**		**1**		**1**									**2**		
[CO4]	Analyze the discrete time signals and system using different transform domain techniques.		**1**		**3**									**3**			
[CO5]	Evaluate the various signal responses.			**1**	**2**									**3**		**2**	
[CO6]	Design and implement LTI filters for filtering different real world signals.		**1**	**1**	**3**	**1**									**3**		

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Major Project

Code: BTE28364

8 Credits | Semester VIII

Total Lecture: 240

The object of Project Work & Dissertation is to enable the student to extend further the investigative study, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry. This is expected to provide a good training for the student(s) in R&D work and technical leadership. The assignment to normally include:

1. In-depth study of the topic assigned in the light of the Report;
2. Review and finalization of the Approach to the Problem relating to the assigned topic;
3. Preparing an Action Plan for conducting the investigation, including team work;
4. Detailed Analysis/Modeling/Simulation/Design/Problem Solving/Experiment as needed;
5. Final development of product/process, testing, results, conclusions and future directions;
6. Preparing a paper for Conference presentation/Publication in Journals, if possible;
7. Preparing a Dissertation in the standard format for being evaluated by the Department.
8. Final Seminar Presentation before a Departmental Committee.

Extra-Curricular/Co-Curricular Activity

Code: BTE28390

0 Credits | Semester VIII

Total Lecture: 30

AICTE Activity Points to be earned by students admitted to Degree program **(For more details refer to Chapter 6, AICTE, Activity Point Program, and Model Internship Guidelines):**

Every regular student, who is admitted to the 4 year Degree program, is required to earn 100 activity points in addition to the total credits earned for the program. Students entering 4 years Degree Program through lateral entry are required to earn 75 activity points in addition to the total credits earned for the program. The activity points earned by the student shall be reflected on the students 8th Semester grade card.

The activities to earn the points can be spread over the duration of the course. However, minimum prescribed duration should be fulfilled.

Activity Points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression.

Incase student fail to earn the prescribed activity points, Eight semester Grade Card shall be issued only after earning the required activity Points.

Students shall be eligible for the award of degree only after the release of the Eight Semester grade card.