CHOICE BASED CREDIT SYSTEM
EVALUATION SCHEME
AND
COURSE OF STUDY
ACCORDING TO AICTE MODEL CURRICULUM
IN
B.TECH – II YEAR
ELECTRONICS AND COMMUNICATION ENGINEERING

APPROVED BY
BOARD OF SYLLABUS
29 JUNE 2024
(w.e.f. Batch 2023 and onwards)

FACULTY OF ENGINEERING AND TECHNOLOGY
GURUKUL KANGRI (DEEMED TO BE UNIVERSITY)
HARIDWAR-249404

Website: https://www.gkv.ac.in/departments/ece/

VISION

To become an excellence in higher education and learning center, that will provide inter disciplinary knowledge with impartment of human values and professional ethics among the youth, so as to serve as a valuable resource for industry and human society.

MISSION

"Educate everyone for technological transformation", Motivate the students to serve the nation and globe by their knowledge in the field of Electronics and Communication Engineering and the allied areas through constant interaction with research organizations and industries.

CORE VALUES

Ethics, Human Values, Professionalism, Commitment, Integrity, Team Work and Innovation.

Program Objectives

1. To provide students with strong foundation in basic sciences, Vedic knowledge, mathematics, computing, engineering principles and human values.
2. To confer in profundity information in center zones ofElectronics and Communication Engineering so as to comprehend, analyze, design, and create novel products and solutions for various real life problems.
3. To provide students with an academic environment to promote teamwork, ethics, multidisciplinary approach and lifelong learning required for a successful professional carrier.

Program Outcomes

1. Impart knowledge of mathematics, sciences, and engineering fundamentals in the domain of Electronics and Communication Engineering.
2. Potential to analyze an engineering problem and formulate its suitable solution.
3. Ability to design systems and processes that met the requirements of public safety and offer solutions for societal and environmental issues.
4. Ability to formulate and analyze complex engineering problems by using mathematical principles and engineering fundamentals.
5. Select appropriate techniques and modern automation tools for the system design and analysis.
6. Skills to develop environment friendly and sustainable solutions.
7. Understanding and commitment towards professional ethics, responsibilities and norms of engineering practices so as to become good citizens.

8. Ability to function effectively, individually and in a team.
9. Proficiency in communication, both verbal and written forms, which will enable them to complete globally.
10. Recognize the need for and have the ability to engage in independent and lifelong learning and hence participate and succeed in competitive examinations, higher studies etc.
11. Willingness and ability to take up administrative responsibilities involving both project and financial management confidently.
12. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.

(Effective from the academic session 2024-25)

GURUKULA KANGRI VISHWAVIDYALAYA, HARIDWAR

Faculty of Engineering & Technology

Electronics & Communication Engineering

B. Tech. Second Year

Syllabus in accordance with AICTE Model Curriculum SEMESTER-III

DSC/SEC/DSE/ AEC	SUBJECT	PERIODS			EVALUATION SCHEME				Subject Total	Credits
					SESSIONAL EVALUATION			EXAM ESE		
		L	T	P	CT	TA	Total			
THEORY										
BEM-C302	Engineering Mathematics- III	3	1	0	20	10	30	70	100	4
BET-C307	Analog circuits	3	0	0	20	10	30	70	100	3
BCE-C305	Data Structure-I	3	0	0	20	10	30	70	100	3
BET-C308	Electrical Circuits Analysis	3	0	0	20	10	30	70	100	3
BET-C306	Digital System Design	3	0	0	20	10	30	70	100	3
	MOOCS-I									3
		TOTAL CREDITS								19
PRACTICAL										
BET-C351	Analog circuits Lab	0	0	2	10	5	15	35	50	1
BCE-C355	Data Structure-I Lab	0	0	2	10	5	15	35	50	1
BET-C355	Digital System Design Lab	0	0	2	10	5	15	35	50	1
BET-C356	Project Based Learning Lab	0	0	2	Encourage students to find new ideas and think out of box for solutions to the social problems through Engineering Applications.				50	1
BET-S359	Summer Training and Internship Program-I (3-4 weeks)	To be pursued during summer vacation, submit a certificate of completion in the department(in summer break after II semester exam and will be assessed during III semester)							50	1
		TOTAL CREDITS								5
TOTAL									750	24

List of MOOC courses shall be decided by the departmental committee in each semester depending upon the list from SWAYAM/NPTEL and other recognized online platforms. Students have to study from Online Platform doubt sessions shall be held by internal teachers. Student has to give exam S WAYAM/NPTEL Platform for certification and credit transfer. SWAYAM courses to run every year from July onwards (Odd Semester) are declared in the month of May and for courses to run every year from January onwards (Even Semester) are declared in the month of December. For more detail please visit https://nptel.ac.in/courses and https://swayam.gov.in/. The duration of the course must be 12 weeks.

Notice: The SWAYAM course coordinator will ensure that the students are informed about MOOCs courses well before time. So that students get registered in the course decided by the departmental committee.

Effective from the session 2024-25

Course Code: BEM- C302
Course Name: Engineering Mathematics-III

MM: 100 **Time: 3 Hr.** **L T P** **3 1 0**	**Sessional examination : 30** **End Semester Examination: 70** **Credit : 4**

Prerequisites:	Engineering Mathematics I, Engineering Mathematics II
Objectives:	This course provides an introduction to the basic concepts and techniques of**:** **1.** Laplace transform and its application to the solution of ordinary differential equations. **2.** Fourier transform and its application to solve partial differential equations. **3.** Z transform of elementary sequences both from the definition and by using tables and use the appropriate theorems to calculate Z transforms and inverse Z transforms. **4.** Basic theory of function of a complex variableand theory of contour integration using residue calculus. **5.** Errors and numerical solution of algebraic and transcendental equations.
Course Coordinator	Dr Lokesh Kumar Joshi
Course Faculty	Dr. Lokesh Kumar Joshil, Dr Vivek Goel
Lectures	40 Hours

NOTE:	The question paper shall consist of two sections (Section-A and Section-B). Section-A shall containten (10) short answer type questions of six (06) mark each and student shall be required to attempt any five (05) questions. Section-B shall contain eight (08) long answer type questions of ten (10) marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus

UNIT	Module	Course Content	No. of Hours	POs mapped
UNIT-1	Module-1	**Laplace Transform:** Definition, Laplace transform of elementary functions, Shifting theorems, Transform of derivatives, Differentiation and Integration of transforms,	**04**	PO1/PO2/PO3/PO4/PO5/PO6/PO7,PO09, PO11/PO12
	Module-2	Heaviside unit step and Dirac Delta functions, Convolution theorem,	**02**	
	Module-3	Solution of ordinary linear differential equations used in Mechanics, Electric circuits and Bending of beams.	**02**	
UNIT-2	Module-3	**Fourier Transform:** Definition of Fourier	**06**	PO1/PO2/PO3/PO4/PO5/P

		transform, Fourier sine and cosine transforms. Fourier integral formula, Parsevel's identity		O6/PO7,PO09, PO11/PO12
	Module-4	Applications of Fourier transform in solving heat equations.	**02**	
UNIT-3	Module-5	**Z Transform:** Definition, Linearity property, Z transform of elementary functions, Shifting theorems, Initial and final value theorem, Convolution theorem,	**04**	PO1/PO2/PO3/PO4/PO5/PO6/PO7,PO09, PO11/PO12
	Module-6	Inversion of Z transforms, Solution of difference equations by Z transforms.	**03**	
UNIT-4	Module-7	**Function of Complex Variable:** Definition, Limit and Continuity of functions of Complex Variables: Analytic Functions, Harmonic Conjugate, Cauchy-Riemann Equations (without proof), Line Integral, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof).	**05**	PO1/PO2/PO3/PO4/PO5/PO6/PO7,PO09, PO11/PO12
	Module-8	Singular Points, Poles & Residues, Residue Theorem, Application of Residues theorem for Evaluation of Real Integral (UnitCircle).	**04**	
UNIT-5	Module-9	**Errors and Roots of equations:** Absolute, relative, round-off and truncation errors. Significant digits. Algebraic and Transcendental Equations, Numerical solution, Method of bisection, Newton-Raphson method, Direct iterative method, convergence.	**08**	PO1/PO2/PO3/PO4/PO5/PO6/PO7,PO09, PO11/PO12
Total No. of Hours			**40**	

Course Outcome:	On completion of this course, the students will be able to 1. apply Laplace transform in various engineering problems and solve the differential equations arising in mechanics and electrical circuits(L2, L3, L5, L6) 2.understand the concept of Fourier transform and use it to solve partial differential equations having initial and boundary values(L1, L2, L3, L4). 3. apply Z transform to convert discrete-time signals to the Z-domain, analyze system behavior, and use these techniques in digital signal processing and control systems. (L1, L2, L3, L4). 4.learn the functions of complex variables and apply it to solve the problems of complex differentiation and integration(L1, L2, L3, L5). 5. solve algebraic and transcendental equations by applying iterative methods and analyze their convergence.(L2,L3, L4,L5)

Suggested books:

S. No.	Name of Authors /Books /Publisher	Year of Publication
1.	Kreyszig E., Advanced Engineering Mathematics 10 edition, Wiley India Pvt. Ltd, ISBN- 9788126554232	2015
2.	Gerald, C.F., Wheatley P.O., Applied Numerical Analysis, Pearson, 2007, ISBN-ISBN-10 032119019X	2007
3.	Grewal B.S., Higher Engineering Mathematics, Khanna, New Delhi, ISBN-9788174091956	2000
4.	Jain R. K., Iyenger S.R.K., Jain M.K., Numerical Methods for Scientific and Engineering Computation, New Age International Publishers, ISBN-812242001X	2010

L1 – Remember, L2 – Understand, L3 – Apply, L4 – Analyze, L5 – Evaluate, L6 – Create

Scheme of Evaluation

- Attendance required: 75 %
- End semester exam: 70 marks (complete syllabus)
- Sessional Exam: 20 marks
- Assignment/seminar/tutorial: 10 marks(Each student in small groups will apply these concepts to solve practical problems)

BEM-C302
Engineering Mathematics III
CO-PO/PSO MAPPING

CO-PO/PSO MAPPING

Course Outcomes (COs)	Action Verb (CO)	Bloom's Level	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
			Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Modern Tool Usage	The Engineer and Society	Environment and Sustainability	Ethics	Individual and Team Work	Communication	Project Management and Finance	Life Long Learning			
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		L2, L3, L5, L6	3	3	1	3	2	2	1	-	1	-	3	2			

CO2		**L1, L2, L3, L4**	3	3	2	2	2	2	1	-	1	-	1	2			
CO3		**L1, L2, L3, L4**	3	3	3	2	2	2	1	-	1	-	2	2			
CO4		**L1, L2, L3, L5**	3	2	3	3	2	2	1	-	1	-	1	2			
CO5		**L2, L3, L4, L5**	3	2	2	2	2	2	1	-	1	-	3	3			
	Average		**3**	**2.6**	**2.6**	**2.2**	**2**	**2**	**1**		**1**	**0**	**1.8**	**2.2**			

Mapping %age		**0 - 5 = --**		**6 - 40 = 1**	**41 - 60 = 2**		**61 - 100 = 3**
Mapping Correlation		**No correlation**		**Low/ Slight**	**Moderate**		**Substantial/ High**

Mapping Correlation	**No correlation**	**Low / Slight**	**Moderate**	**Substantial/ High**
	--	1	2	3

Effective from the session 2024-25

Course Code: BET-C307
Course Name: ANALOG CIRCUITS

MM: 100 **Time: 3 Hr.** **L T P** **3 0 0**	**Sessional: 30** **ESE: 70** **Credit : 3**

Prerequisites:	Basic Electronics
Objectives:	The course is aimed at: [1] Imparting knowledge about multistage amplifiers, oscillators, active filters, regulators and IC OP-Amp applications. [2] Teaching about the different applications of op-amp, waveform generators, BJT and FET circuits and solving various quality parameters.
Course Coordinator	VIVEK ARYA

NOTE:	The question paper shall consist of two sections (Section-A and Section-B). Section-A shall contain of ten (10) short answer type questions of six (06) mark each and student shall be required to attempt any five (05) questions. Section-B shall contain eight (08) long answer type questions of ten (10) marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus

UNIT	Module	Course Content	No. of Hours	POs mapped	PSOs mapped
UNIT-1	Module-1	Multistage Amplifier: Effect of coupling and by-pass capacitors, types of coupling (DC, RC and TC), Darlington connection, cascode amplifier, coupling schemes for multistage amplifier and frequency response of transistor amplifier. Power amplifiers: ClassA, Class B, Class C and Class AB amplifiers and their efficiencies, harmonic distortion, push-pull amplifier. Basic idea of tuned amplifier.	**08**	PO1/ PO2/ PO3/ PO4	PSO1/ PSO2

UNIT-2	Module-2	IC OP-AMP Applications: OP-AMP Fundamentals (brief review of differential amplifier, current mirror, active load, level shifter, output stage; ac and dc characteristics) Basic building blocks using OP-AMPS. Inverting/ Non-inverting VCVS, Integrators, Differentiators, CCVS and VCCS, Instrumentation Amplifiers.	08	PO1/ PO2/ PO3/ PO4	PSO1/ PSO2
UNIT-3	Module-3	Waveform Generator: Square wave generators: 555Timer, Triangle generator, sawtooth generator, Sine wave generator, Wien-bridge and twin-T oscillators. Function Generators: Multi op-amp function generators, IC function generators, Non-linear Circuits: Logarithmic Amplifiers, Log/Antilog Modules, Precision Rectifier, Peak Detector, Sample and Hold Circuits. OP-AMP as Comparator, Schmitt Trigger, Square and Triangular Wave Generator, Monostable multivibrator. IC Analog Multiplier applications OTA	08	PO1/ PO2/ PO3/ PO4	PSO1/ PSO2
UNIT-4	Module-4	Active Filters: Introduction to filtering: Frequency response, Characteristics and terminology, Active versus passive filters, Low pass filter: First order low pass active filter, second order active filter model, second order low pass filter characteristics, Higher order filters. High pass active filter. Band pass filter: single op-amp band pass filter; multistage band pass filter, State variable filter.	08	PO1/ PO2/ PO3/ PO4	PSO1/ PSO2
UNIT-5	Module-5	Oscillators: Positive feedback, Berkhausen criterion for sinusoidal oscillation, Phase-shift oscillator, Weinbridge oscillator, Tuned oscillator, Hartley, Colpitts and Crystal oscillator. Voltage Regulators: OP-AMP Regulators, IC Regulators, Fixed Voltage Regulators (78/79, XX), SMPS.	08	PO1/ PO2/ PO3/ PO4	PSO1/ PSO2

Total No. of Hours	**40**		

Learning Outcomes:	At the end of the course, a student will be able to: 1. Understand the characteristics of amplifiers 2. Design and analyze various amplifier circuits 3. Design sinusoidal and non-sinusoidal oscillators 4. Understand the different wave from generators and active filters 5. Understand the functioning of OP-AMP and design OP-AMP based circuits

Suggested books:

1.	Sedra and Smith, Microelectronic Circuits", Oxford University Press, 5th Edition	2005
2.	J. Michael Jacob, Applications and design with Analog Integrated Circuits', PHI, 2nd Edition	2004
3.	Gayahwad, R.A., Op-Amp and Linear Integrated Circuits, PHI	2015

BET-C307
ANALOG CIRCUITS
CO-PO/PSO MAPPING

CO-PO/PSO MAPPING

Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	**3**		**3**	**3**								**3**	**3**	**2**
CO2	**3**		**3**	**3**								**3**	**3**	**3**
CO3	**3**		**3**	**3**								**3**	**3**	**3**
CO4	**3**		**2**	**1**								**3**	**3**	**3**
CO5	**3**		**2**	**1**								**3**	**3**	**3**
CO6	**3**		**1**	**1**								**3**	**3**	**1**
CO7	**3**		**1**	**3**								**3**	**3**	**3**
CO8	**3**		**1**	**3**								**3**	**3**	**3**
CO9	**3**		**1**	**3**								**3**	**3**	**3**
CO10	**3**		**1**	**1**								**3**	**3**	**3**

Batch 2024-2025 and onwards

Effective from the session 2024-25

Course Code: BET-C308

Course Name: Electrical Circuit Analysis

MM: 100 **Time: 3 Hr.** **L T P** **3 0 0**	**Sessional:30** **ESE:70** **Credit :3**

Prerequisites:	Basic Electrical Engineering
Objectives:	By the end of this section, you will be able to: *1.* Concept of graphical solution to electrical network *2.* Methodical approach to problem solving. *3.* Network Theorem *4.* AC circuit analysis,series and parallel resonance, Three phase circuit *5.* Two-port network analysis using network parameters *6.* Network Synthesis
Course Coordinator	Mr.Yogesh Kumar

NOTE:	The question paper shall consist of two sections (Section-A and Section-B). Section-A shallcontainoften(10)shortanswertypequestionsofsix(06)markeachandstudentshall berequiredtoattemptanyfive(05)questions.Section-Bshallcontaineight(08)long answer type questions of ten (10) marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus

UNIT	Module	Course Content	No. of Hours	POs mapped	PSOs mapped
UNIT-1	Module-1	Graph Theory: Graph of a network, definitions, tree, co-tree, link. basic loop and basic cut set, Incidence matrix, cut set matrix, Tie set matrix, Duality,Loop and Node method of analysis.	**07**	PO1/ PO2/ PO3/ PO4	PSO1/ PSO2
UNIT-2	Module-2	Network Theorems: Application to ac network-Superposition theorem,Thevenin's Theorem, Norton's theorem,Maximum power transfer theorem,Reciprocity theorem, Millman's theorem,Compensation theorem,Tellegen's theorem.	**08**	PO1/ PO2/ PO3/ PO4/PO10	PSO1/ PSO3
UNIT-3	Module-3	Sinusoidal steady state analysis:Representation of sine function as rotating phasor, phasor	**08**	PO1/ PO2/ PO3/ PO5	PSO1/ PSO2/PSO3

		diagram, impedances and admittances, AC circuit analysis, effective or RMS values,average power and complex power, series and parallel resonance,Three phase circuit, mutual coupled circuits,Dot convention in coupled circuits,Ideal Transformer.			
UNIT-4	Module-4	Two port networks:Characterization of LTI two port networks, Z,Y, ABCD and h parameters, reciprocity and symmetry, interrelationship between the parameters, interconnections of two port networks,Ladder and Lattice networks,Image parameters and characteristic impedance.	**08**	PO1/ PO2/ PO3/ PO4	PSO1/ PSO3
UNIT-5	Module-5	Network Synthesis:Positive real function, definition and properties, properties of LC, RC and RL driving point functions, synthesis of LC, RC and RL driving point immittance functions using Foster and Cauer first and second forms.	**08**	PO1/ PO2/ PO4/ PO5/PO10	PSO2/ PSO3
Total No. of Hours			**40**		

Course Outcomes:	At the end of the course, a student will be able to: **CO1:**To define the Tree, Co-Tree, link, basic loop and basic cut set, Network Theorems: applications to ac networks, Positive Real Function, Definition and Properties LC, RC, RL. **CO2:**Explain the Incidence matrix, Tie Set Matrix, Cut Set Matrix, Ladder Networks, Lattice Networks, Driving Point Function, Application to AC Networks, Idea Transformer. **CO3:**Illustrate the Graph of a Network, Duality, Image Parameters and Characteristic of impedance, Synthesis of LC, RC, RL in Foster and Cauer form. **CO4:**To relate the Interrelations between parameters and Interconnection of Two Port Networks **CO5:**To apply the Loop and Node Method Analysis, Superposition Theorem, Thevenin Theorem, Norton Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem, Millman Theorem, Compensation Theorem, Tellegen Theorem, Series and Parallel Resonance, Three Phase AC Circuit, Effective or RMS Value, Average and Complex Power, Reciprocity and Symmetry.

	CO6: To analyze Impedance and Admittance, Mutual and Dot Convention Coupled Circuits, AC Circuit Analysis, Representation of Sine function as rotating phasor, Phasor Diagram, Characterization of LTI Two Port Networks, Z, Y, ABCD, h Parameters.

Suggested books:

S. No.	Name of Authors /Books /Publisher	Year of Publication
1.	M.E.VanValkenburg, Network Analysis, Prentice Hall of India.	2019
2.	D.Roy Chaudhary, Networks and Systems, Wiley Eastern Ltd.	2010
3.	A. Chakrabarti, Circuit Theory (Analysis And Synthesis), Dhanpat Rai.	2013
4.	K.M. Soni , Circuit Analysis and Synthesis, S.K. Kataria& Sons.	2012

BET-C308
Electrical Circuit Analysis

CO-PO/PSO MAPPING

Course Outcomes (COs)	Action Verb (CO)	Bloom's Level	Program Outcomes (POs)											Program Specific Outcomes (PSOs)		
			Engineering Knowledge	Problem Analysis	Design /Development of Solutions	Conduct Investigations of Complex Problems	Modern Tool Usage	The Engineer and Society	Environment and Sustainability	Ethics	Individual and Team Work	Communication	Project Management and Finance	Life Long Learning			
			PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**Define**	**Remember L1**	**3**	**3**	**3**			**3**	**2**	**3**	**3**	**3**		**3**	**3**		**3**
CO2	**Explain**	**Understand L2**	**3**	**3**	**3**			**3**	**2**	**3**	**3**	**3**		**3**	**3**		**3**
CO3	**Illustrate**	**Understand L2**	**3**	**3**	**3**	**3**		**3**		**3**	**3**	**3**		**3**	**3**		**3**
CO4	**Relate**	**Understand L2**	**3**	**3**	**3**	**3**	**2**	**3**		**3**	**3**	**3**		**3**	**3**		**2**
CO5	**Apply**	**Apply L3**	**3**	**3**	**3**	**3**	**2**	**3**		**3**	**3**	**3**		**3**	**3**	**2**	**2**

CO6	**Analyse**	**Analyse L4**	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**3**		**3**	**3**	**2**	**3**
	Average		**3**	**3**	**3**	**3**	**2**	**3**	**2.33**	**3**	**3**	**3**		**3**	**3**	**2**	**2.66**

Mapping %age	**0 - 5 = --**	**6 - 40 = 1**	**41 - 60 = 2**	**61 - 100 = 3**
Manpping Correlation	**No correlation**	**Low/ Slight**	**Moderate**	**Substantial/ High**

Effective from the session 2024-25

Course Code: BCE-C305
Course Name: DATA STRUCTURE - I

MM: 100 **Time: 3 Hr.** **L T P** **3 0 0**	**Sessional: 30** **ESE: 70** **Credit : 3**

Prerequisites:	None
Objectives:	1. Analyze the asymptotic performance of algorithms. 2. Write rigorous correctness proofs for algorithms. 3. Demonstrate a familiarity with major algorithms and data structures. 4. Apply important algorithmic design paradigms and methods of analysis. 5. Synthesize efficient algorithms in common engineering design situations.
Course Coordinator	Dr. Suyash Bhardwaj

NOTE:	The question paper shall consist of three sections (Sec.-A, Sec.-B and Sec.-C). Sec.-A shall contain 10 objective type questions of one mark each and student shall be required to attempt all questions. Sec.-B shall contain 10 short answer type questions of four marks each and student shall be required to attempt any five questions. Sec.-C shall contain 8 descriptive type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Module	Course Content	No. of Hours	POs mapped	PSOs mapped
Module-1	**Introduction to Algorithm Design and Data Structure**: Design & analysis of algorithm, Top-down and Bottom-up approaches to algorithm design, Analysis of Algorithm, Frequency count, Complexity measures in terms of time and space. **Arrays, Stacks and Queues**: Representation of Array (Single & Multi-Dimensional Arrays), Address Calculation using column & row major Ordering, Array and linked representation and implementation of queues. Applications of Arrays, Stacks & Queues; Conversion from Infix to Postfix & Prefix and Evaluation of	**10**	1,2	1

	Prefix expressions using Stack, Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty. Circular queue, Deque and Priority Queue			
Module-2	**Linked List**: Representation and Implementation of Singly Linked List, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and Deletion to/from Linked List, Insertion and Deletion Algorithms, doubly linked List, Linked List in Array, Polynomial representation and addition, generalized linked list, Uses and Application	**08**	1,2,3	1
Module-3	**Trees**: Basic terminology, Binary Trees, Binary Tree Representation, Algebraic Expressions, Complete Binary Tree. Extended Binary Trees, Array and Linked representation of Binary trees, Traversing Binary trees. **Binary Search Tree**: Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of search algorithm, Path Length, AVL Tree, Balancing in AVL Trees, B-trees, uses and applications.	**06**	1,2,3	1,2
Module-4	**Graphs:** Introduction, Definition, Directed and undirected graph, Degree, incidence, adjacent vertices, path, cycle, connected and unconnected graph, complete graph, connectedness, weighted graph, subgraph, spanning trees. **Graph Representation**: Adjacency matrix, adjacency list, Incidence matrix. Traversal of graph: Depth first search, Breadth first search. Shortest path problem, Dijkstra's algorithm. Minimum spanning tree, Kruskal's algorithm, prim's algorithm	**08**	1,2,3,4	1,2
Module-5	**Searching:** Sequential Search, Binary Search, Comparison and implementation. **Sorting:** Insertion Sort, Bubble Sorting, Quick Sort, Two-way Merge Sort, Heap Sort, Sorting on Different Keys, Practical consideration for Internal Sorting. **Hashing**: Hash table, Hash Functions, Collision Resolution Strategies, Hash Table	**08**	1,2,3,4,5	1,2

	Implementation. Uses and applications.			
Total No. of Hours		**40**		

Learning Outcomes:	● Design correct programs to solve problems. ● Choose efficient data structures and apply them to solve problems. ● Analyze the efficiency of programs based on time complexity. ● Prove the correctness of a program using loop invariants, pre-conditions and post-conditions in programs ● Develops skills in implementations and applications of data structures.

Suggested books:

S. No.	Name of Authors /Books /Publisher
1.	Horowitz and Sahani, Fundamentals of Data Structure, Galgotia.
2.	R.Kruseetal, Data Structures and Program Design in C, Pearson Education.
3.	Lipschutz, Data Structure, TMH.
4.	Bruno R Preiss, Data Structures and Algorithms with Object Oriented Design Pattern in C++, John Wiley & Sons, Inc.
5.	YashwantKanetkar, Pointers in C, BPB.
6.	A M Tenenbaumetal, Data Structure using C & C++, PHI.
7.	K. Loudon, Mastering Algorithms with C, Sheoff Publisher & Distributors.

BCE-C305
DATA STRUCTURE - I
CO-PO/PSO MAPPING

Course Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)	
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3			1				1			1	2	2
CO2	3	2											2	2
CO3	2	2	3	3									1	1
CO4	1	1	2	2									2	2
CO5	1	1											1	1

Effective from the session 2024-25

Course Code: BET-C306
Course Name: DIGITAL SYSTEM DESIGN

MM: 100 **Time: 3 Hr.** **L T P** **3 1 0**	**Sessional: 30** **ESE: 70** **Credit : 3**

Prerequisites:	For this course, no pre-requisites are required. But should have knowledge of Diodes, transistors.
Objectives:	1. To get good knowledge of digital system. 2. Learn about the different number system that have different bases which plays very significant role in computer world. 3. During the course we can learn how to design the digital circuits by using Boolean algebra, K-maps and logic gates. 4. And to enable to implement synchronous state machines using flip-flops.
Course Coordinator	Dr. Tanuj Kumar Garg

NOTE:	The question paper shall consist of two sections (Section-A and Section-B). Section-A shall contain Ten (10) short answer type questions of six (06) mark each and student shall be required to attempt any five (05) questions. Section-B shall contain eight (08)long answer type questions of ten (10) marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus

UNIT	Module	Course Content	No. of Hours	POs mapped	PSOs mapped
UNIT-1	Module-1	**Number System**: Representation of negative numbers, 9's and 1's complement, 10's and 2's complement, arithmetic using 2's complement. BCD Code, Gray Code, Excess-3 Code, Introduction to Boolean algebra, Truth table verification of various gates, Realization of Switching functions with gates.	**3**	PO1/ PO2/ PO3/ PO5/ PO10/PO12	PSO1/ PSO2
	Module-2	**K- Map:** Representation up to 4 variables, simplification and realization of various functions using gates, Tabular Method, Combinational logic and design procedure.	**3**	PO1/ PO2/ PO3/ PO5/ PO10/PO12	PSO1/ PSO2

UNIT-2	Module-3	**Combinational logic Circuits:** Arithmetic circuits, Half and Full adder, Subtractors, BCD adders, Code Conversion, 4 bit Magnitude Comparator (IC -7485), Cascading of IC 7485, Decoder, Multiplexer, Demultiplexers, Encoders. Parallel Binary adder, IC 7483, 4-bit Binary parallel adder/subtractor,	**9**	PO1/ PO2/ PO3/ PO5/ PO10/PO12	PSO1/ PSO2
UNIT-3	Module-4	**Sequential Logic Circuits:** Flip Flops, S-R latch, gated latches, Edge triggered Flip Flops, Master-slave Flip Flops, Conversion of flip flops, Analysis of clocked sequential circuits, Design of synchronous circuits, State transition diagram, state reduction and assignment.	**10**	PO1/ PO2/ PO3/ PO5/ PO10/PO12	PSO1/ PSO2
UNIT-4	Module-5	**Counters:** Design of Asynchronous and Synchronous Counters, Two bits & four bits up & down counters and their design, Shift registers, Serial & Parallel data transfer, Shift left/Right register, Shift Register applications.	**8**	PO1/ PO2/ PO3/ PO5/ PO10/PO12	PSO1/ PSO2
UNIT-5	Module-6	**Logic Families:** Diode switching, Transistors as a switching element, MOS as a digital circuit element, concept of transfer characteristics, input characteristics and output characteristics of logic gates, fan in, fan out, noise margin, Logic families: TTL, IIL, ECL, NMOS, & CMOS, Open collector outputs.	**7**	PO1/ PO2/ PO3/ PO5/ PO10/PO12	PSO1/ PSO2
Total No. of Hours			**40**		

Learning Outcomes:	At the end of this course students will demonstrate the ability to • Design and analyze combinational logic circuits. • Design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder . • Design & analyze synchronous sequential logic circuits.

Suggested books:

S. No.	Name of Authors /Books /Publisher	Year of Publication
1.	M.Morris Mano, Digital Design, PHI	XXXX
2.	R.P.Jain, Modern Digital electronics, TMH	XXXX
3.	A.Anand Kumar, Fundamentals of Digital Circuits, PHI	XXXX
4.	Lee S.C, Modern Switching Theory and Digital design, PHI	XXXX
5.	Greenfield J.D., Practical Digital design using ICs, John Wiley.	XXXX

BET-C306
DIGITAL SYSTEM DESIGN
CO-PO/PSO MAPPING

Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	3		3	3	3							3	3	3	
CO2	3		3	3	3							3	3	3	
CO3	3		3	3	3							3	3	3	
CO4	3		2	1	3							3	3	3	
CO5	3		2	1	3							3	3	3	
CO6	3		1	1	3							3	3	3	
CO7	3		1	3	3							3	3	3	
CO8	3		1	3	3							3	3	3	
CO9	3		1	3	3							3	3	3	
CO10	3		1	1	3							3	3	3	

Effective from the session 2024-25

Course Code: BET-351
Course Name: Analog Circuit Lab

MM: 50 **Time: 2 Hr.** **L T P** **0 0 2**	**Sessional: 15** **ESE: 35** **Credit: 1**

Prerequisites:	Analog Circuit (BET-C307), Basic Electronics
Objectives:	Students will find frequency response curve of RC Coupled Amplifier, efficiency of A, B & AB Push pull Amplifier, CMRR of differential amplifier etc. by Experiments.
Course Coordinator	Anuj Kumar Sharma
Notes	1. In practical examination the student shall be required to perform one experiment. 2. A teacher shall be assigned 20 students for daily practical work in laboratory. 3. No batch for practical class shall consist of more than 20 students. 4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students. 5.Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

LIST OF EXPERIMENTS:

1. To draw the frequency response curve of RC Coupled Amplifier.
2. To draw the frequency response curve of Transformer Coupled Amplifier.
3. To find the efficiency of A, B & AB Push pull Amplifier.
4. To find the frequency of oscillation of various Oscillator.
5. To find the CMRR of differential amplifier.
6. To study the gain and frequency response of Inverting Amplifier and Non Inverting Amplifier.
7. To study the operational amplifier as Differentiator and Integrator.
8. To study the Op-Amp as summer and subtractor.
9. To study the OP-AMP as square wave generator.
10. To study 2nd order Low Pass active Filter and High Pass active Filter.
11. To study the hysteresis characteristics of the Op- Amp based Schmitt trigger.
12. To study the monostable multivibrator using Timer IC 555.
13. To find the frequency of oscillation for astable multivibrator using Timer IC 555.

Course Outcomes:		Bloom's Knowledge Level
CO1	Understanding the Op-Amp circuit used for summer, subtractor, square wave generator, integrator, differentiator.	L2
CO2	Understanding the concept behind the hysteresis characteristics of the Op- Amp based Schmitt trigger	L2

CO3	Analyze the frequency of oscillation for astable multivibrator using Timer IC 555.	L4
CO4	Evaluate the gain and frequency response of Inverting Amplifier and Non Inverting Amplifier.	L5
CO5	Design 2nd order Low Pass active Filter and High Pass active Filter	L6
CO6	Design monostable multivibrator using Timer IC 555	L6

Course Outcomes (COs)	**BET-C351 ANALOG CIRCUITS LAB Program Outcomes (POs)**															
			PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	**Understand**	**L2**	**3**	**1**	**1**	**3**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**3**
CO2	**Understand**	**L2**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**3**
CO3	**Analyze**	**L4**	**3**	**0**	**1**	**0**	**2**	**1**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**3**
CO4	**Evaluvate**	**L5**	**2**	**0**	**3**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**2**
CO5	**Design**	**L6**	**3**	**3**	**3**	**3**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**2**	**3**
CO6	**Desgin**	**L6**	**3**	**3**	**3**	**3**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**3**	**3**

Effective from the session 2024-25

Course Code: BCE-C355
Course Name: Data Structure-I Lab

MM: 50 **Time: 3 Hr.** **L T P** **0 0 2**	**Sessional: 15** **ESE: 35** **Credit: 01**

Objectives:	1. To develop skills to design and analyze simple linear and non-linear data structures. 2. To develop skills to implement searching and sorting.
Course Coordinator	Dr. Suyash Bhardwaj

NOTE:	1. In practical examination the student shall be required to perform one experiment. 2. A teacher shall be assigned 20 students for daily practical work in laboratory. 3. No batch for practical class shall consist of more than 20 students. 4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students. 5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean

LIST OF EXPERIMENTS	No. of Hours	POs mapped	PSOs mapped
1. Array implementation of Stack.	**03**	1	
2. Array implementation of Queue.		1	
3. Array implementation of Circular Queue.		1	
4. Implementation of Linked List.		2	
5. Implementation of Circular Linked List		2	
6. Implementation of Doubly Linked List		2	
7. Implementation of Stack using list.		3	
8. Implementation of Queue using list.		3	
9. Implementation of Binary Search Tree.		4	
10. Insertion and Deletion in BST.		4	
11. Implementation of Searching and Sorting Algorithms.		5	
12. Implementation of a hash function.		5	1,2

Learning Outcomes:	● Develop program for stack, queue and circular queue ● Compile linked list, Circular linked list, doubly linked list via program ● Apply list in stack and queue via programs ● Create and delete from Binary search tree via programs ● Illustrate different types of searching and sorting algorithms by making programs

BCE-C355
Data Structure-I Lab
CO-PO/PSO MAPPING

Course Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)	
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1										1	1
CO2	3	2	1										1	1
CO3	3	1	1										1	1
CO4	3	1	1	1									1	1
CO5	3	1	1	1									2	2

Effective from the session 2024-25

Course Code: BET-C355
Course Name: Digital System Design Lab

MM: 100 **Time: 3 Hr.** **L T P** **0 0 2**	**Sessional: 15** **ESE: 35** **Credit: 1**

Prerequisites:	Basic Electrical Engg.
Objectives:	Students will perform different combinational and sequential digital circuits using gates and ICs.
Course Coordinator	Dr. Ashish Nainwal
Notes	1. In practical examination the student shall be required to perform one experiment. 2. A teacher shall be assigned 20 students for daily practical work in laboratory. 3. No batch for practical class shall consist of more than 20 students. 4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students. 5.Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

LIST OF EXPERIMENTS:

List of Experiments	No of hours	PO mapped	PSO mapped
1. To verify the truth tables of various types of gates using IC 7400.	**2**	PO1/ PO2	**PSO1/PSO2**
2. To verify the truth tables of Multiplexer & also implement a function using Multiplexer.	**2**	PO1/ PO2/ PO3/ PO4	**PSO1/PSO2**
3. To design & verify the truth table of half & full adder.	**2**	PO1/ PO2/ PO3	**PSO1/PSO2**
4. To design & verify the truth table SR flip-flop using NOR/NAND gates.	**2**	PO1/PO3/ PO4	**PSO1/PSO2**
5. To design & verify the truth table JK flip-flop using NOR/NAND gates.	**2**	PO1/ PO2/ PO3	**PSO1/PSO2**
6. To design & study counters.	**2**	PO1/ PO2 PO4	**PSO1/PSO2**
7. To design & study Shift registers.	**2**	PO1/ PO2/ PO3/ PO4	**PSO1/PSO2**
8. To verify the truth tables of de Multiplexer.	**2**	PO1/ PO2/ PO3/ PO4	**PSO1/PSO2**

Course Outcomes:		Bloom's Knowledge Level
CO1	Understanding of Digital Binary System and implementation of Gates.	L2
CO2	Analyze the Sequential circuits with the help of combinational circuits and feedback element.	L4
CO3	Evaluate and design the counters with the help of sequential circuit and basic Gates.	L5
CO4	Design data selector circuits with the help of universal Gates.	L6
CO5	Design the shift registers using sequential circuit and basic Gates	L6

BET-C355
Digital System Design Lab
CO-PO/PSO MAPPING

Course Outcomes (COs)			**Program Outcomes (POs)**													
			PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	**Define**	**L1**	**3**												**3**	**3**
CO2	**Interpret**	**L2**	**3**	**2**	**2**										**3**	**3**
CO3	**Explain**	**L2**	**3**	**2**	**2**										**2**	**2**
CO4	**Experiment with**	**L3**	**3**	**3**	**3**	**2**									**2**	**3**
CO5	**Analyze**	**L4**	**3**	**3**	**2**	**2**									**2**	**3**

Effective from the session 2024-25

Course Code: BET-S359
Course Name: Summer Training and Internship Program-I (3-4 weeks)

MM : 50 **Time :0 Hr** **L T P** **0 0 0**	**Sessional : 50** **ESE : 0** **Credit : 1**

Guidelines:

1. The internship certificate will have to be submitted in the department after summer vacation for evaluation.
2. Students can choose to do internship or industrial training.
3. Students can do internship through online/offline mode.
4. The duration of the internship must be 3 to 4 weeks.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Explore career alternatives prior to graduation.
2. Assess interests and abilities in their field of study.
3. Learn to appreciate work and its function in the economy.
4. Develop work habits and attitudes necessary for job success.
5. Develop communication, interpersonal and other critical skills in the job interview process.
6. Build a record of work experience.

Effective from the session 2024-25

Course Code: BET-C356
Course Name: PROJECT BASED LEARNING LAB

MM : 50 **Time :0 Hr** **L T P** **0 0 2**	**Sessional : 50** **ESE : 0** **Credit : 1**

Note:

1. The project is a team activity having 2-3 students in a team. This is electronic product design work with a focus on electronic circuit design.
2. The project may be a complete hardware or a combination of hardware and software. The software part in project should be less than 50% of the total work.
3. It should encompass components, devices, analog or digital ICs, micro controller with which functional familiarity is introduced.
4. After interactions with course coordinator and based on comprehensive literature survey/need analysis, the student shall identify the title and define the aim and objectives of the project.
5. Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and submit the proposal within first week of the semester.
6. The student is expected to design, development and testing of the proposed work as per the schedule.
7. The focus is mainly on creativity and collaboration, PBL is enhanced when students experience opportunities to work across disciplines, employ technologies to make communication and product realization more efficient, or to design solutions to real-world problems posed by outside organizations or corporations. Projects do not need to be highly complex for students to benefit from PBL techniques. Often times, quick and simple projects are enough to provide students with valuable opportunities to make connections across content and practice.

Introduction:

Project-based learning (PBL) involves students designing, developing, and constructing hands-on solutions to a problem. The educational value of PBL is that it aims to build students' creative capacity to work through difficult or ill-structured problems, commonly in small teams. Typically, PBL takes students through the following phases or steps:

1. Identifying a problem.
2. Agreeing on or devising a solution and potential multiple solution path to the problem (i.e., how to achieve the solution)
3. Designing and developing a prototype of the solution.
4. Refining the solution based on feedback from experts, instructors, and/or peers.
5. At the end of semester student have to submit a comprehensive report on the project work.

Depending on the goals of the instructor, the size and scope of the project can vary greatly. Students may complete the five phases listed above over the course of semester.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Conceive a problem statement either from rigorous literature survey or from the requirements raised from social need.
2. Design, implement and test the prototype/algorithm in order to solve the conceived problem.
3. Write comprehensive report on the project work.

Effective from the academic session 2024-25

GURUKULA KANGRI VISHWAVIDYALAYA, HARIDWAR
Faculty of Engineering & Technology
Electronics & Communication Engineering

B. Tech. Second Year
Syllabus in accordance with AICTE Model Curriculum

SEMESTER-IV

DSC/SEC/DSE /AEC	SUBJECT	PERIODS			EVALUATION SCHEME				Subject Total	Credits
					SESSIONAL EVALUATION			EXAM ESE		
		L	T	P	CT	TA	Total			
THEORY										
BCE-C409	Python programming	3	0	0	20	10	30	70	100	3
BKT-A403	Bharteeya Jnanaparampara	2	0	0	20	10	30	70	100	2
BET-C418	Microprocessor and Interfacing	3	0	0	20	10	30	70	100	3
BET-C412	Electromagnetic waves	3	0	0	20	10	30	70	100	3
BET-C417	Signals & Systems	3	0	0	20	10	30	70	100	3
	MOOCS-II									3
		TOTAL CREDITS								17
PRACTICAL										
BET-C461	Microprocessor Lab	0	0	2	10	5	15	35	50	1
BET-C465	System Engineering Lab	0	0	2	10	5	15	35	50	1
BCE-C457	Python programming Lab	0	0	2	10	5	15	35	50	1
BET-C483	Seminar	0	0	2	To increase the communication ability of students and to prepare them for presenting seminar on advanced topics of their branch				50	1
BET-C484	Entrepreneurship Development LAB	0	0	2	This promote social enterprises & technologies targeted at problems of the society. Students will be aware of various government/non govt. schemes for prospective entrepreneurs.				50	1
		TOTAL CREDITS								5
TOTAL									750	22

Note:

1) The students have to undergo an industrial training/mini project/internship program during summer vacation (June –July) after IV semester examination. The report and certificate of completion of training program has to be submitted in the department which will be evaluated in V semester. Also the students have to present PPT of the industrial training/mini project/internship.

2) List of MOOC courses shall be decided by the departmental committee in each semester depending upon the list from SWAYAM/NPTEL and other recognized online platforms. Students have to study from Online Platform doubt sessions shall be held by internal teachers. Student has to give exam SWAYAM/NPTEL Platform for certification and credit transfer. SWAYAM courses to run every year from July onwards (Odd Semester) are declared in the month of May and for courses to

run every year from January onwards (Even Semester) are declared in the month of December. For more detail please visit https://nptel.ac.in/courses and https://swayam.gov.in/. The duration of the course must be 12 weeks.

Notice: The SWAYAM course coordinator will ensure that the students are informed about MOOCs courses well before time. So that students get registered in the course decided by the departmental committee.

Effective from the session 2024-25

Course Code: BKT-A403
Course Name: BHARTEEYA JNANAPARAMPARA

MM: 100	**Sessional: 30**
Time: 3 Hr.	**ESE: 70**
L T P	**Credit: 0**
2 0 0	

समस्त स्नातक स्तर की कक्षाओं हेतु
अनिवार्य पाठ्यक्रम
तृतीय / चतुर्थ सत्र Semester III/IV

समय (Time) – 03 घंटे (Hours)
पूर्णांक -100
सत्रान्तपरीक्षा -70
आन्तरिकपरीक्षा – 30
Credit- 0

BKT - A301 / A401 भारतीय ज्ञानपरम्परा
Bharteeya Jnanaparampara

प्रस्तावित पाठ्यक्रम (Prescribed Course)

घटक-1

1 वैदिक एवं लौकिक साहित्य का परिचय एवं उसका उद्देश्य (वैदिक साहित्य,आर्ष साहित्य एवं स्मृति साहित्य)
2 वैदिक प्रार्थनाएं गायत्री, भद्रप्राप्ति, शान्ति, संगठन, सौमनस्य एवं पञ्च महायज्ञ का सामान्य परिचय
3 ब्रह्मचर्य महिमा, वैदिक राष्ट्रभक्ति एवं शिवसंकल्प (ब्रह्मचर्य सूक्त- अथर्ववेद ११.५, पृथिवी सूक्त - अथर्ववेद १२.१, शिवसंकल्प सूक्त - यजुर्वेद ३४.१-६ में वर्णित विषयवस्तु के आधार पर)

घटक-2

1 वैदिक कालीन सामाजिक एवं शिक्षा व्यवस्था
2 संस्कारों की जीवन में उपयोगिता
3 पुरुषार्थ चतुष्टय – धर्म, अर्थ, काम, मोक्ष

घटक-3

1 त्रैतवाद – ईश्वर, जीव एवं प्रकृति का स्वरूप
2 कर्म एवं पुनर्जन्म सिद्धान्त (कर्म- निष्काम कर्मयोग एवं कर्मफल सिद्धान्त)

घटक-4

1 मानव जीवन के विकास में योग की महत्ता
2 अष्टांग योग- यम, नियम, आसन, प्राणायाम, प्रत्याहार ,धारणा, ध्यान, समाधि

घटक-5

1 भारतीय संस्कृति एवं सभ्यता : एक परिचय
2 महर्षि दयानन्द एवं स्वामी श्रद्धानन्द का व्यक्तित्व एवं कृतित्व
3 आर्य समाज की स्थापना, उद्देश्य एवं कार्य (सामाजिक जनजागरण, अछूतोद्धार, महिला शिक्षा, शुद्धि आन्दोलन, सामाजिक कुरीतियों का उन्मूलन, स्वतन्त्रता संग्राम में योगदान)

सहायक पुस्तकें –

1 वैदिक साहित्य एवं संस्कृति, डॉ० कपिल देव द्विवेदी।
2 उपनिषद् दीपिका, डॉ० रामनाथ वेदालंकार।
3 वैदिकदर्शन, डॉ० कपिल देव द्विवेदी, विश्वविद्यालय प्रकाशन, वाराणसी
4 प्राचीन भारत तथा सामाजिक एवं आर्थिक इतिहास, डॉ० देवेन्द्र गुप्ता, भारतीय बुक कॉर्पोरेशन, नई दिल्ली।
5 योगदर्शन, स्वामी रामदेव, पतंजलि योगपीठ, हरिद्वार।
6 सत्यार्थ प्रकाश, स्वामी दयानन्द।
7 आर्यसमाज का इतिहास, डॉ० सत्यकेतु विद्यालंकार।
8 भारतीय नवजागरण के पुरोधा, डॉ० भवानी लाल भारतीय
9 संस्कृत साहित्य का इतिहास, डॉ० कपिल देव द्विवेदी, विश्वविद्यालय प्रकाशन, वाराणसी

M.Rai

Effective from the session 2024-25

Course Code: BCE-C409
Course Name: Python Programming

MM: 100 **Time: 3 Hr.** **L T P** **3 1 0**	**Sessional: 30** **ESE: 70** **Credit : 3**

Prerequisites:	Object Oriented Programming Paradigms, C
Objectives:	1. Describe the core syntax and semantics of Python programming language. 2. Understand working with the strings and functions. 3. Illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
Course Coordinator	Mr. Namit Khanduja

NOTE:	**NOTE:** The question paper shall consist of three sections (Sec.-A, Sec.-B and Sec.-C). Sec.-A shall contain 10 objective type questions of one mark each and student shall be required to attempt all questions. Sec.-B shall contain 10 short answer type questions of four marks each and student shall be required to attempt any five questions. Sec.-C shall contain 8 descriptive type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Module	Course Content	No. of Hours	POs mapped	PSOs mapped
Module-1	Introduction to Python – Installation – Python Interpreter – Variables, Expressions and Statement – Assignment Statements, Variables Name, Expressions & Statements, Order of Operations & String Operations.	**06**	1	1
Module-2	Functions – Function Calls, Math Functions, Adding New Function, Definition & Uses, Parameters & Arguments	**10**	1,2	1
Module-3	Conditional & Recursions – Boolean Expressions, Logical Operators, Conditional Execution, Chained Conditional Executions, Recursion	**08**	1,2,3, 4,5	1
Module-4	Strings, Lists, Dictionaries, Tuples – Introduction to Strings, Lists, Dictionaries and Tuples, Modules and packages.	**08**	1,2,3, 4,5	1
Module-5	Introduction to Objects and classes, File handling –Reading and writing.	**08**	1,2,5	1,2

Total No. of Hours	**40**		

Learning Outcomes:	**CO1 Knowledge (Remembering) L1** Define the features, basic syntax and fundamental data types in Python. Recall and explain the principles of variables, data structures, and control structures used in Python programming. **CO2 Comprehension (Understanding) L2** Interpret and explain Python code snippets and programs. Compare and contrast different data structures and their appropriate usage in Python. **CO3 Application (Applying) L3** Develop simple Python programs to solve real-world problems. Apply conditional statements, loops, and functions to solve programming challenges. **CO4 Analysis (Analyzing) L4** Analyze and debug Python code to identify and correct errors. Evaluate and critique the efficiency and readability of Python programs. **CO5 Synthesis (Creating) L5** Create Python applications and scripts to automate tasks or address specific problems. Design and implement Python functions for solving complex problems or building reusable code.

Suggested books:

S. No.	**Name of Authors /Books /Publisher**
1.	How to Think Like a Computer Scientist: Learning with Python (3nd edition) Peter Wentworth Jeffrey Elkner, Allen B. Downey, and Chris Meyers. http://openbookproject.net/thinkcs/python/english3e/
2.	A Byte of Python by Swarooph CH https://python.swaroopch.com/
3.	The Python Tutorial available at http://docs.python.org/3.3/tutorial/
4.	Python Documentation available at http://www.python.org/doc/

BCE-C409
Course Name: Python Programming
CO-PO/PSO MAPPING

COs	**Program Outcomes (POs)**												**(PSOs)**	
(COs)	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**

CO1	3	2											1	
CO2	3	2	1										1	
CO3	3	2	1										1	
CO4	1	1		1	1								1	
CO5	1	1	1	1	1							1	1	1

Effective from the session 2024-25

Course Code: BET-C417
Course Name: SIGNALS AND SYSTEMS

MM: 100 **Time: 3 Hr.** **L T P** **3 1 0**	**Sessional: 30** **ESE: 70** **Credit : 3**

Prerequisites:	Engineering mathematics II, knowledge of differential equations and difference equations,
Objectives:	To understand the basic properties of signal & systems. To know the methods of characterization of LTI systems in time domain. To understand the application of various transforms for analysis of signals and systems. To introduce processing of signals through systems using convolution, correlation operations. To analyze systems using Laplace and Z Transform
Course Coordinator	Dr. Gourav Kumar Malik

NOTE:	The question paper shall consist of two sections (Section-A and Section-B). Section-A shall contain of ten (10) short answer type questions of six (06) mark each and student shall be required to attempt any five (05) questions. Section-B shall contain eight (08)long answer type questions of ten (10) marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus

UNIT	Module	Course Content	No. of Hours	POs mapped	PSOs mapped
UNIT-1	Module-1	Continuous-time and discrete-time Signals, Transformations of the Independent Variable, Exponential and Sinusoidal Signals, Continuous-Time and Discrete-Time LTI Systems and their properties, convolution sum and convolution integrals, LTI System described by differential and difference equations.	**6**	PO1/ PO2/ PO3/ PO4/ PO5…	PSO1/ PSO2/..
	Module-2	Z-Transform: Z-Transform, Region of convergence, Inverse Z-transform, analysis and characterization of LTI system, Block diagram representation, Unilateral Z-transform.	**4**	PO1/ PO2/ PO3/ PO4/ PO5…	PSO1/ PSO2/..
UNIT-2	Module-3	The response of LTI Systems to Complex Exponentials, Fourier Series Representation of Continuous-time Periodic Signals and their	**4**	PO1/ PO2/ PO3/ PO4/	PSO1/ PSO2/..

		Properties,		PO5…	
	Module-2	Continuous time and discrete time Fourier Transforms and their properties, System Characterized by Linear Constant Coefficient Differential equations and Difference equations.	**4**		
UNIT-3	Module-4	Magnitude Phase Representation of the Fourier Transform, Magnitude Phase Representation of the Frequency response of LTI systems	**4**	PO1/ PO2/ PO3/ PO4/ PO5…	PSO1/ PSO2/..
	Module-5	Time domain Properties of Ideal Frequency Selective filter, Time Domain and Frequency Domain aspects of Non ideal filters, First Order and Second Order Continuous Time and Discrete time Systems.	**5**	PO1/ PO2/ PO3/ PO4/ PO5…	PSO1/ PSO2/..
UNIT-4	Module-6	Signal representation by samples, sampling theorem, Impulse train sampling, sampling of discrete time signals, discrete time processing of continuous time signals	**4**	PO1/ PO2/ PO3/ PO4/ PO5…	PSO1/ PSO2/..
	Module-7	Laplace Transform, Region of convergence, inverse Laplace Transform, Analysis and characterization of LTI System, Block diagram representation, Unilateral Laplace transform.	**5**	PO1/ PO2/ PO3/ PO4/ PO5…	PSO1/ PSO2/..
UNIT-5	Module-8	Random variable, random process correlation functions, cumulative distribution function, probability density function, joint-cumulative distribution, probability density function. Expectation, mean, variance, covariance, auto-correlation, power spectral density, Gaussian Pdf and Rayleigh Pdf.	**4**	PO1/ PO2/ PO3/ PO4/ PO5…	PSO1/ PSO2/..
Total No. of Hours			**40**		

Learning Outcomes:	• Understand basic signals and different kind of systems, classify them & perform various operations on them. • Apply different Transformation techniques to find the solution of systems. • Analyze the concept of the Sampling theorem, reconstruction, aliasing, and Nyquist's theorem to represent continuous-time signals in discrete time so that they can be processed by digital computers

	• Evaluate the output of an LTI system in the time and frequency domains by using different transform techniques • Create the concepts of Transforms in analysis of signals and system and their role in solution of Differential and difference equations. and also Create foundation of communication and signal processing to be studied in the VII, VIII semester

Suggested books:

S. No.	Name of Authors /Books /Publisher	Year of Publication
1.	Alan. V. Oppenheim, Alan. S. Willsk, S. Hamid Nawab, Signals and systems, second edition- PHI learning Pvt. Ltd, ISBN-7560509703	2015
2.	M.J.Roberts, "**Signals and Systems",** Ed, Tata McGraw Hills, ISBN-0073309508	2010
3.	P. Ramesh Babu, R. Ananda Natarajan, "**Signals and Systems",** Ed, SCITECH Publications., ISBN- 9385983407	2018
4.	Charles L. Phillips, John M.PARR and EVEA. RISKIN, "**Signals, Systems and Transforms ",** Third Edition, PEARSON Education, ISBN- 1292015284	2014
5.	Chen, "**Signals & Systems",** Ed, Oxford University Press , ISBN-0195686144	2008
6	Simon Haykin and Barry VanVeen, Signals and systems, second edition, Wiley, India,ISBN- 9354243150	2007

BET-C417
SIGNALS AND SYSTEMS
CO-PO/PSO MAPPING

Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	0	0	0	0	0							3	3	
CO2	3	3	2	0	0	0							3	1	
CO3	3	2	0	0	0	2							2	2	
CO4	3	3	3	2	0	0							1	1	
CO5	2	3	3	3	0	0							2	0	

Effective from the session 2024-25

Course Code: BET-C418
Course Name: Microprocessor and Interfacing

MM: 100 **Time: 3 Hr.** **L T P** **3 0 0**	**Sessional: 30** **ESE: 70** **Credit : 3**

Prerequisites:	Digital System Design
Objectives:	Students will learn about architecture, as well as how to obtain data and instructions from memory for processing. The ability to write programmes using an instruction set and control external devices via an I/O interface.
Course Coordinator	Ashish Nainwal

NOTE:	The question paper shall consist of two sections (Section-A and Section-B). Section-A shall contain of ten (10) short answer type questions of six (06) mark each and student shall be required to attempt any five (05) questions. Section-B shall contain eight (08) long answer type questions of ten (10) marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus

UNIT	Module	Course Content	No. of Hours	POs mapped	PSOs mapped
UNIT-1	Module-1	Introduction to Microprocessors and assembly language, 8085 architectures, addressing modes of 8085	**5**	PO1/PO2/PO3	PSO1/ PSO2
	Module-2	8085 instruction set and programming techniques, timing diagrams, Counters & time delays	**5**	PO1/PO2/PO3	PSO1/ PSO2
UNIT-2	Module-3	Stacks and subroutines, basics of memory interfacing. Interfacing I/O Devices	**4**	PO1/PO3	PSO1/ PSO2
	Module-4	Programming of basic arithmetic operations: addition, subtraction, multiplication, division, code conversion etc, Interrupts	**4**	PO1/PO2/PO4	PSO1/ PSO2
UNIT-3	Module-5	Programmable Peripheral Interface (PPI) (8255), Programmable Interval	**8**	PO1/PO3	PSO1/ PSO2

		Timer (8254), Programmable interrupt controller (8259), DMA & DMA controller (8237), ADC / DAC interfacing			
UNIT-4	Module-6	8086 Processor: 8086 architectures, Pin configuration, 8086 in min/max mode	**4**	PO1/PO2	PSO1/ PSO2
	Module-7	Addressing modes, Instruction set of 8086, Assembler directives, basic assembly language programming	**4**	PO1/PO2	PSO1/ PSO2
UNIT-5	Module-8	Introduction to Pentium and Pentium Processor, cache structure, superscalar architecture, Introduction to Pentium II, III, IV & Core 2 microprocessor.	**6**	PO1/PO3/PO4/PO5	PSO1/ PSO2
Total No. of Hours			**40**		

Learning Outcomes:	• Define architectures of microprocessors. • Interpret basic assembly language programs. • Experiment with interfacing design of peripherals like I/O, memory etc. • Explain the peripheral devices and interfacing with processor for task sharing • Analyze the functionality of advanced version processors.

Suggested books:

S. No.	Name of Authors /Books /Publisher	Year of Publication
1.	Microprocessor, architecture, programming and applications with 8085 R.S Gaonkar, Publisher-Penram International Publishing ,ISBN-978-8187972884	2013
2.	Microprocessors and interfacing Douglas hall, Publisher: McGraw Hill Education; 3rd edition, ISBN- 978-1259006159	2017
3.	8086 microprocessor: programming and interfacing the PC, K.J Ayala Publisher-Delmar Cengage Learning; Deluxe Education edition ISBN-978-0314012425	1995
4.	Barry B. Brey, The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4 and Core 2 with 64-bit Extensions, 9/e, Pearson Education.	2013

BET-C411 Microprocessor and Interfacing CO-PO/PSO MAPPING																
Course Outcomes (COs)			**Program Outcomes (POs)**											**Program Specific Outcomes (PSOs)**		
			PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	
CO1			**3**	**0**	**0**	**0**	**0**								**3**	**2**	
CO2			**3**	**3**	**2**	**1**	**0**								**3**	**3**	
CO3			**3**	**2**	**1**	**0**	**0**								**2**	**1**	
CO4			**3**	**2**	**0**	**1**	**0**								**1**	**2**	
CO5			**3**	**0**	**0**	**0**	**3**								**2**	**2**	

Effective from the session 2024-25

Course Code: BET-C412
Course Name: ELECTROMAGNETIC WAVES

MM: 100 **Time: 3 Hr.** **L T P** **3 0 0**	**Sessional: 30** **ESE: 70** **Credit : 3**

Prerequisites:	For this course, no pre-requisites are required. But should have knowledge of Diodes, transistors.
Objectives:	5. Solve mathematical problems in Cartesian, cylindrical, and spherical coordinate systems. 6. Apply basics of electrostatics in different coordinate systems and analyze the behavior of electric field, potential, flux, and capacitance in conductor, dielectric, and interfaces. 7. Explain the magnetostatics of circuits using basic relations to analyze the effect of magnetic forces, materials and calculate inductance. 8. Solve electromagnetic problems using Maxwell's equations for time-varying fields 9. And to understand Maxwell's equations and investigate the behavior of EM waves in different media and calculate the average power density radiated.
Course Coordinator	**Dr. Atul Kumar Varshney**

NOTE:	The question paper shall consist of two sections (Section-A and Section-B). Section-A shall contain Ten (10) short answer type questions of six (06) mark each and student shall be required to attempt any five (05) questions. Section-B shall contain eight (08)long answer type questions of ten (10) marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus

UNIT	Module	Course Content	No. of Hours	POs mapped	PSOs mapped
UNIT-1	Module-1	Electric charges – Coulomb's Law – Electric Field Intensity – Linear, Surface and Volume charge density – Gauss Law and its application.	**3**	PO1/ PO2/PO4 /PO5	PSO1/ PSO2
	Module-2	Electric scalar Potentials and potential difference – Potential due to uniformly charged disc and uniformly charged line, potentials between two coaxial cylinders and between two conducting spherical shell – Electric field lines and equipotential contours	**3**	PO1/ PO2/PO4 /PO5	PSO1/ PSO2

		– Potential gradient and electric field due to electric dipoles – Conservative nature of electric field.			
UNIT -2	Module -3	Dielectric boundaries – Capacitance – Capacitance of system of conductors' Overhead lines and underground cables – Methods of images and its application Electrostatic energy and energy density – Force between charged conductors' dielectric strength and breakdown. Divergence and curl of vector fields. Divergence theorem – Stokes theorem – solutions of electrostatic problems – Examples on Laplace's equation.	**9**	PO1/ PO2/PO4 /PO5	PSO1/ PSO2
UNIT -3	Module -4	Magnetic field intensity and magnetic flux density, Biot-Savarat law, Force between current carrying wires. Torque on closed circuits, Ampere's law Magnetic scalar and vector potentials – Boundary conditions at magnetic surfaces.	**10**	PO1/ PO3/ PO4/ PO5	PSO1/ PSO2
UNIT -4	Module -5	Faraday's law of electromagnetic induction, Inductor and inductance, Inductance of solenoids, toroid's, transmission lines and cables, Mutual inductance, Inductors in series and parallel, energy stored in magnetic field, Pull of an electromagnet magnetic circuit.	**8**	PO1/ PO3/ PO4/ PO5	PSO1/ PSO2
UNIT -5	Module -6	Maxwell's equations, Equation of continuity, displacement current, Maxwell's equation in point and integral forms, The wave equations, Uniform plane wave, relation between electric and magnetic field intensities in a uniform plane wave, Poynting vector, Poynting theorem, boundary conditions.	**7**	PO1/ PO2/ PO3/PO4/ PO5	PSO1/ PSO2
Total No. of Hours			**40**		

Learning Outcomes:	At the end of this course students will demonstrate the ability to • Understand the various coordinate systems. • To understand Maxwell's four equations of electromagnetics and estimate the electric field and magnetic fields as well as the electromagnetic forces because of different charges and line wires.

	• Use Laplace and Poission's equations to determine capacitance and electric potential. • Calculation of series and parallel inductances. • To understand the behavior of the EM waves under various medias. • Understand principle of radiation and radiation characteristics of an antenna

Suggested books:

S. No.	Name of Authors /Books /Publisher	Year of Publication
1.	William H. Hayt, 'Engineering electromagnetics', Tata- McGraw Hill, 5th edition	1992
2.	Sarwate, V.V., 'Electromagnetic Fields and Waves', Wiley Eastern Limited, New Delhi	1993
3.	Mahajan, A.S. and Rangawala, A.A. 'Electricity and Magnetism, Tata-McGraw Hill Publishing Company, Ld, New Delhi	1989
4.	Seely, S., Introduction to electromagnetic Fields', McGraw Hill	1993
5.	Joseph, a. Edminister, 'Electromagnetic – Schaum's outline Series', International Edition, McGraw Hill Inc., New York	1991
6.	Narayana Rao, N., 'Elements of Engineering Electromagnetics', Prentics Hall of India	1991

BET-C412
Course Name: ELECTROMAGNETIC WAVES
CO-PO/PSO MAPPING

Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	3	2	3	3	3								3	3	
CO2	3	3	3	3	3								3	3	
CO3	3	3	3	3	3								3	3	
CO4	3	1	2	1	3								3	3	
CO5	3	2	2	1	3								3	3	

Effective from the session 2024-25

Course Code: BET-C461

Course Name: Microprocessor Lab

MM: 50 **Time: 3 Hr.** **L T P** **0 0 2**	**Sessional: 15** **ESE: 35** **Credit : 1**

Prerequisites:	Digital System Design
Objectives:	Students will perform assembly level program in 8085 kit and 8086 kit.
Course Coordinator	Dr. Ashish Nainwal
Notes	1. In practical examination the student shall be required to perform one experiment. 2. A teacher shall be assigned 20 students for daily practical work in laboratory. 3. No batch for practical class shall consist of more than 20 students. 4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students. 5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

LIST OF EXPERIMENTS:

Microprocessor 8085:

List of Experiments	No of hours	PO mapped	PSO mapped
1. Write a program to add two 8 bit hexadecimal numbers Stored at consecutive memory location.	2	**PSO1/PSO2**	**PSO1/PSO2**
2. Write a program to find 1's and 2's complement of a hexadecimal number.	2	**PSO1/PSO2/PSO3**	**PSO1/PSO2**
3. Write a program to add 'n' 8 bit hexadecimal numbers series starting from 2301H (neglecting the carry generated). The number of data bytes to be added is stored in 2300H.	2	**PSO1/PSO2/PSO4**	**PSO1/PSO2**
4. Write a program to find maximum number in given data series.	**2**	**PSO1/PSO2/PSO3 /PSO4**	**PSO1/PSO2**
5. Write a program to check parity of a hexadecimal number stored in memory location 2020H.If the parity is odd, store 00H in memory location 2041H, else store EEH.	**2**	**PSO2/PSO3**	**PSO1/PSO2**
6. Write a program to move to data block from 3000H to 3005H to memory location 3050H to 3055H.	**2**	**PSO2/PSO3/PSO4**	**PSO1/PSO2**

7. Write a program to add two 16 bit hexadecimal numbers.	**2**	**PSO1/PSO2/PSO4**	**PSO1/PSO2**
8. Write a Program to Multiply Two 8 bit Hexadecimal Numbers (with Carry).	**2**	**PSO1/PSO2/PSO3**	**PSO1/PSO2**
9. Write a program to generate a Ramp and Square waveform at the O/P of DAC 0800 the address of DAC is A0 (Use CN-03)	**2**	**PSO1/PSO2**	**PSO1/PSO2**
10. Write a program to turn on LEDs using 8255 PPI.	**2**	**PSO1/PSO2/PSO3**	**PSO1/PSO2**
11. Write a program to display '2' in seven segment display using 8255 PPI.	**2**	**PSO1/PSO2/PS03/ PSO4**	**PSO1/PSO2**

Microprocessor 8086:

12. To add two binary numbers each 8 byte long.	**2**	**PSO1/PSO2/PSO3**	**PSO1/PSO2**
13. To find the maximum No. in a given string (16 byte long) and store it in location 0310.	**2**	**PSO1/PSO2**	**PSO1/PSO2**
14. To sort a string of a No. of byte in descending order.	**2**	**PSO1/PSO2/PSO4**	**PSO1/PSO2**
15. To multiply an ASCII string of eight number by a single ASCII digit. The result is a sting of unpacked BCD digits.	**2**	**PSO2/PSO3**	**PSO1/PSO2**

Course Outcomes:		Bloom's Knowledge Level
CO1	Understand basic arithmetic operations in assembly language.	L2
CO2	Analyze the concept of parity checking for error detection.	L4
CO3	Understand to manage memory allocation for data storage.	L2
CO4	Analyze to control output waveforms using conditional branching.	L4
CO5	Evaluate the logic and algorithm required to find the maximum number.	L5

BET-C461 Microprocessor Lab CO-PO/PSO MAPPING																	
Course Outcomes (COs)			**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**		
			PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	
CO1	**Define**	**L1**	**3**												**3**	**3**	
CO2	**Interpret**	**L2**	**3**	**2**	**2**										**3**	**3**	
CO3	**Explain**	**L2**	**3**	**2**	**2**	**2**									**2**	**2**	
CO4	**Experiment with**	**L3**	**3**	**3**	**3**	**3**									**2**	**3**	
CO5	**Analyze**	**L4**	**3**	**3**	**2**	**2**									**3**	**3**	

Effective from the session 2024-25

Course Code: BCE-C457
Course Name: Python Programming Lab

MM: 50 **Time: 3 Hr.** **L T P** **0 0 2**	**Sessional: 15** **ESE: 35** **Credit: 01**

Objectives:	1. To demonstrate about Python data structures like Strings, Lists, Tuples, Sets and dictionaries 2. To understand about Functions, generators, comprehension and Operators in Python Programming.
Course Coordinator	Mr.Namit Khanduja

NOTE:	1. In practical examination the student shall be required to perform one experiment. 2. A teacher shall be assigned 20 students for daily practical work in laboratory. 3. No batch for practical class shall consist of more than 20 students. 4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students. 5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

LIST OF EXPERIMENTS	No. of Hours	POs mapped	PSOs mapped
1. Installation of spyder on any other IDE.	**03**		1,2
2. Working with IDE			
3. Programs for variables		1,	
4. Programs for lists		1,2	
5. Programs for tuples		1,2,	
6. Programs for dictionaries		1,2	
7. Programs for functions		3,4,5	
8. Programs for Boolean operators		1,2	
9. Programs for logical operators		1,2	
10. Programs for string operations		1,2	
11. Guessing Game Challenge		1,2	
12. Caesar Cipher project		1,2,3,4,5	
13. Pluralizer project		1,2,3	

Learning Outcomes:	**CO1 Knowledge (Remembering):**

	List and explain basic programming concepts, such as variables, loops, and conditionals in Python. **CO2 Comprehension (Understanding):** Demonstrate an understanding of the principles of input/output operations and error handling in Python. **CO3 Application (Applying):** Construct Python programs that utilize functions and modules to solve real-world tasks. **CO4 Analysis (Analyzing):** Analyze and identify errors in Python code, offering explanations and solutions. Break down complex programming problems into smaller, manageable components. **CO5 Synthesis (Creating):** Design and create original Python programs to address complex tasks or problems. Combine various Python concepts, data structures, and libraries to develop functional and efficient applications.

CO-PO/PSO MAPPING

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**	
(COs)	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2											1	
CO2	3	2											1	1
CO3	3	1			1								1	1
CO4	1	1	1	1	1								1	1
CO5	1	1	1	1	1								1	1

Effective from the session 2024-25

Course Code: BET-C465
Course Name: System Engineering LAB

MM: 100 **Time: 2 Hr.** **L T P** **0 0 2**	**Sessional: 30** **ESE: 70** **Credit : 1**

Prerequisites:	Signal and System, Mathematics –II, Fourier Series, Knowledge of CRO , Filter Theory.
Objectives:	• To design the analog low pass and high pass filters. • Analyze the filters spectrum using spectrum analyzer. • To understand the fast computation of DFT and appreciate the FFT processing. • Apply the principles Fourier series to generate the different signals. • To study different sampling techniques.
Course Coordinator	Gorav Kumar Malik

NOTE:	In practical examination the student shall be required to perform one experiment. A teacher shall be assigned 30 students for daily practical work in laboratory. No batch for practical class shall consist of more than 30 students. The number of students in a batch allotted to an examiner for practical examination shall not exceed 30 students. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean. 6. The programming to be done in mixed programming platform i.e. using Sci-Lab.

List of Experiment		
1. To measure frequency and level of a given unknown signal. 2. To measure harmonics of SINE WAVE. 3. To check Frequency response of a 'LOW PASS' filter. 4. To check Frequency response of a 'HIGH PASS' filter. 5. To check Frequency response of a 'BAND PASS' filter. 6. To construct a triangular wave with the help of fundamental frequency and its harmonic components. 7. To construct a rectangular sawtooth wave with the help of fundamental frequency and its harmonic components. 8. To construct square wave with the help of fundamental frequency and its harmonic components. 9.To construct Half sine wave with the help of fundamental frequency and its harmonic components. 10. Study of signal sampling and reconstruction techniques. 11. To calculate and verify time response of low pass filter. 12. To calculate and verify time response of high pass filter.		
Total No. of Hours	**2 hr./week**	

Learning Outcomes:	• Understand the significance of low pass and high pass filter and role of filter spectrum. • Experiment with different sampling technique and observe the waveform. • Examine different time response of filters. • Analyze the different waveform generation using Fourier series.

Suggested books:

S. No.	Name of Authors /Books /Publisher	Year of Publication
1.	Alan. V. Oppenheim, Alan. S. Willsk, S. Hamid Nawab, Signals and systems, second edition- PHI learning Pvt. Ltd, ISBN-7560509703	2015
2.	M.J.Roberts, "***Signals and Systems",*** Ed, Tata McGraw Hills, ISBN- 0073309508	2010
3.	P. Ramesh Babu, R. Ananda Natarajan, "***Signals and Systems",*** Ed, SCITECH Publications., ISBN- 9385983407	2018
4.	Charles L. Phillips, John M.PARR and EVEA. RISKIN, "***Signals, Systems and Transforms ",*** Third Edition, PEARSON Education, ISBN- 1292015284	2014
5.	Chen, "***Signals & Systems",*** Ed, Oxford University Press , ISBN- 0195686144	2008
6	Simon Haykin and Barry VanVeen, Signals and systems, second edition, Wiley, India,ISBN- 9354243150	2007

BET-C465
System Engineering Lab
CO-PO/PSO MAPPING

Course Outcomes (COs)			**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**		
			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**	**PSO2**	**PSO 3**
CO1			**3**	**3**	**0**	**1**	**2**	**0**							**3**	**2**	
CO2			**2**	**0**	**0**	**2**	**0**	**0**							**2**	**2**	
CO3			**2**	**1**	**1**	**0**	**0**	**0**							**2**	**3**	
CO4			**1**	**1**	**1**	**1**	**0**	**0**							**2**	**2**	
CO5																	
CO6																	
CO7																	
CO8																	
CO9																	
CO10																	
CO11																	
CO12																	
CO13																	
Avg			**2**	**1.667**	**1**	**1.333**	**2**	**0**							2.25	2.25	
Final Avg			**1.6**												2.25		

Effective from the session 2024-25
BET-C483
SEMINAR

L	T	P	MM: 50
0	0	2	Credit: 1

Objective: To increase the communication ability of the students and to prepare them for presenting seminar on advanced topics of their branch.

Note:

The students will be required to deliver a seminar on a topic of general interest in or any advanced technical topics related to the theory papers studied. The topic will be decided by mutual consent of the Faculty- in- charge and students.

* Total 50 marks include 15 marks for report and 35 marks for presentation.

Learning Outcomes:

1. Identify important practical concepts and grasp the depth knowledge of the topic.
2. Get in touch with recent technologies.
3. Solve industrial problems as a part of industrial training curriculum.
4. Sharpen their personality and intelligence, develop effective group communication, presentation, self-management and report writing skills.

Effective from the session 2024-25

Course Code: BET-C484
Course Name: ENTREPRENEURSHIP DEVELOPMENT LAB

MM : 50 **Time :0 Hr** **L T P** **0 0 2**	**Sessional : 50** **ESE : 0** **Credit : 1**

Note:

1. The aim of this course is to help the student to attain the in competency through various teaching learning experiences:
2. Develop project proposals to launch small scale enterprises.
3. The theory, practical experiences and relevant soft skills associated with this taught and implemented, so that the student demonstrates entrepreneurial traits and business opportunities.

Suggested practicals

1. Submit a profile summary(about500words) of a successful entrepreneur indicating milestone achievements.
2. Generate business ideas(product/service) for entrepreneurial opportunities through brainstorming.
3. Undertake self-assessment test to discover your entrepreneurial traits.
4. Identify the business opportunity suitable for you.
5. Arrange an exhibition cum sale of products prepared out of waste.
6. Survey industries of your stream, grade them according to the level of scale of production, investment, turnover, pollution to prepare a report on it.
7. Visit a bank/financial institution to enquire about various funding schemes for small scale enterprise.
8. Collect loan application forms of nationalize banks/other financial institutions.
9. Compile the information from financial agencies that will help you set up your business enterprise.
10. Compile the information from the government agencies that will help you set up your business enterprise.
11. Prepare Technological and financial feasibility report of a chosen product/service.
12. Craft a vision statement and enabling mission statements for your chosen enterprise.
13. Prepare a set of short term, medium and long term goals for starting a chosen small scale enterprise
14. Prepare marketing strategy for your chosen product/service.
15. Compile information about various insurance schemes covering different risk factors.
16. Organize a funfair of your class and write a report of profit/loss Find the breakeven point for the business idea chosen by you.
17. Arrange a discussion session with your institute's pass out students who are successful entrepreneurs.
18. Prepare a business plan for your chosen small scale enterprise.

Web-links:

1. https://kb.iu.edu/d/abzb
2. https://scantocomputer.com/what-does-it-mean-to-scan-a-document/
3. https://www.youtube.com/watch?v=PWGvIyIOfBo
4. https://www.taxmann.com/
5. https://www.investopedia.com/
6. https://byjus.com/commerce/what-is-entrepreneurship
7. https://enterpriseleague.com/
8. http://www.slideshare.net

9. https://openstax.org/
10. https://www.opengrowth.com/
11. https://www.americanexpress.com/
12. https://smallbusiness.chron.com/
13. https://www.creditmantri.com/
14. https://www.geeksforgeeks.org/

Learning Outcomes:

1. Identify your entrepreneurial traits.
2. Identify the business opportunities that suits you.
3. Use the support systems to zero down to your business idea.
4. Develop comprehensive business plans.
5. Prepare plans to manage the enterprise effectively.