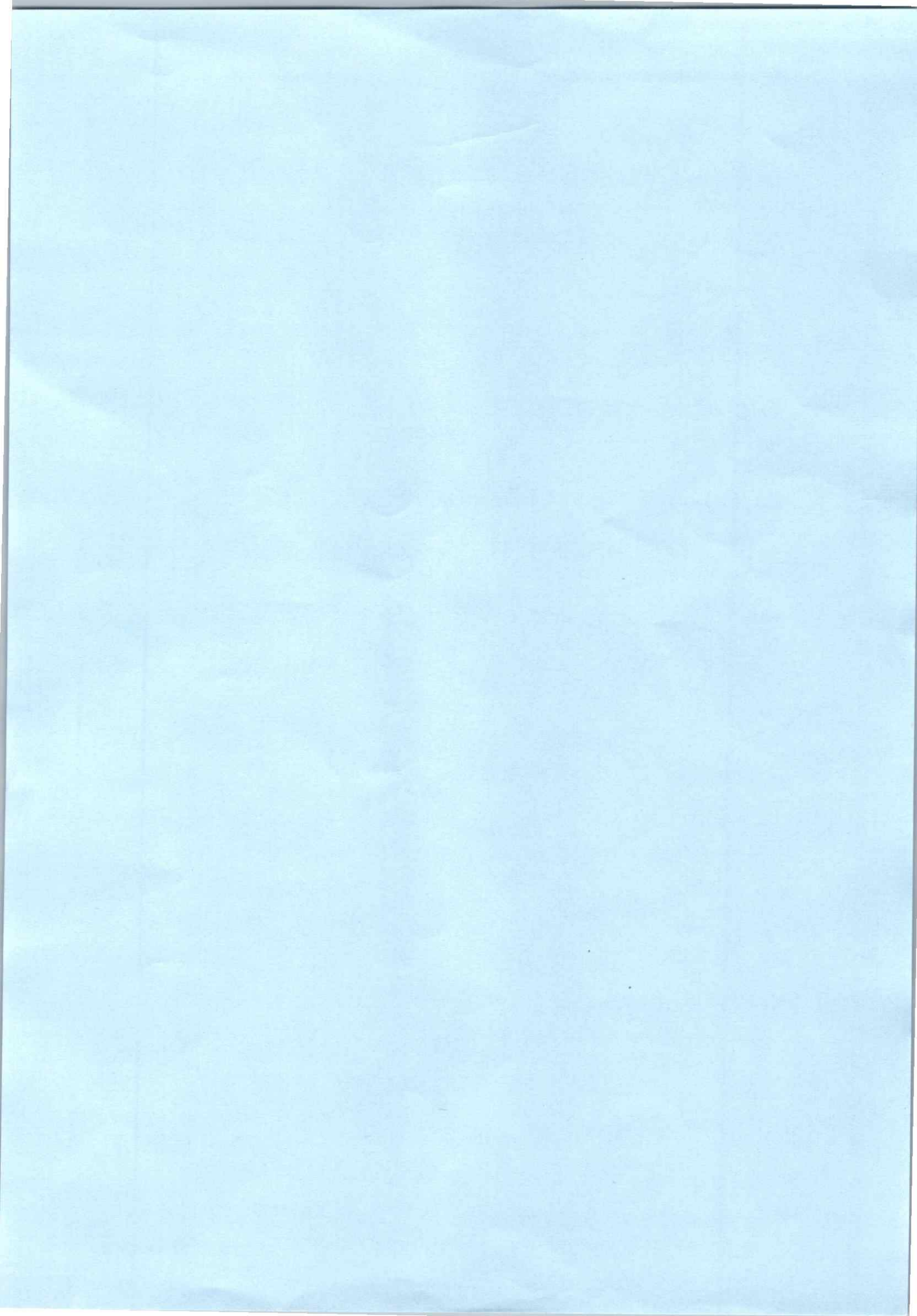


R19

I B.TECH I SEM

SUPPLEMENTARY EXAMINATIONS

SEPTEMBER 2023



I B.Tech I Semester Supple. Examinations, September-2023

Sub Code: 19BCC1TH03

LINEAR ALGEBRA AND CALCULUS

Time: 3 hours

(Common to CE, EEE, ME, ECE, CSE, IT)

Max. Marks: 60

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 12 = 60M)

Q.No.	Questions	Marks
1	Unit-I	
	i) Define the rank of a matrix. Write its properties. Find the rank of $A = \begin{bmatrix} 3 & 1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 5 \end{bmatrix}$.	[6M]
	a ii) Find the values of a and b for which the equations $x_1 + x_2 + x_3 = 3$ $x_1 + 2x_2 + 2x_3 = 6$ $x_1 + ax_2 + 3x_3 = b$ have (i) No solution (ii) a unique solution (iii) infinite number of solutions	[6M]
	OR	
	b i) Solve $2x_1 + x_2 + x_3 = 10, \quad 3x_1 + 2x_2 + 3x_3 = 18$ $x_1 + 4x_2 + 9x_3 = 16$ using the Gauss–Seidel iterative procedure. Take zero vector as the initial solution vector.	[6M]
	ii) Solve the equations $2x_1 + 3x_2 + x_3 = 9$ $x_1 + 2x_2 + 3x_3 = 6$ $3x_1 + x_2 + 2x_3 = 8$ by the method of LU decomposition.	[6M]
2	Unit-II	
a	(i) Define eigen value and eigen vector. Find the eigen values and the corresponding eigen vectors of $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$.	[6M]
	(ii) Show that the matrix $A = \begin{bmatrix} 3 & 1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 5 \end{bmatrix}$ satisfies its characteristic equation. Hence find A^{-1} .	[6M]

	OR		
	b	(i) Define rank, index, signature of a quadratic form. Find the nature, index, and signature of quadratic form $7x_1^2 + 6x_2^2 + 5x_3^2 - 4x_1x_2 - 4x_2x_3$ by reducing it canonical form.	[12M]
	Unit-III		
3	a	i) Verify Rolle's theorem for $f(x) = \begin{cases} x^2+1 & \text{for } 0 \leq x \leq 1 \\ 3-x & \text{for } 1 \leq x \leq 2 \end{cases}$	[6M]
		ii) Prove that $ \sin(x) - \sin(y) \leq x - y , \forall x, y \in R$	[6M]
	OR		
	b	i) Expand $2x^3 + 7x^2 + x - 6$ in powers of $(x - 2)$ by Taylor's theorem. ii) Find the greatest and least values of the function $f(x) = x^4 - 8x^3 + 22x^2 - 24x + 1$ in $[0, 2], [2, 4]$.	[6M] [6M]
	Unit-IV		
4	a	i) Transform the equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ into polar coordinates. ii) If $u = y\sqrt{1-x^2} + x\sqrt{1-y^2}, v = \sqrt{1-x^2}\sqrt{1-y^2} - xy$, prove that u and v are not independent, and find the relation between them.	[6M] [6M]
	OR		
	b	i) Expand $\tan^{-1}(y/x)$ about the point $(1, 1)$ using Taylor's theorem up to second degree terms. ii) Find the maxima / minima of the function $\sin(x) + \sin(y) + \sin(x+y)$	[6M] [6M]
	Unit-V		
5	a	i) Find the entire length of the cardioid $r = a(1 + \cos\theta)$. Also show that the upper half is bisected by $\theta = \pi/3$. ii) Find the volume formed by the revolution of loop of the curve $y^2(a+x) = x^2(3a-x)$, about the x -axis.	[6M] [6M]
	OR		
	b	i) Change the order of integration in $\int_0^3 \int_1^{\sqrt{4-y}} (x+y) dy dx$ and hence evaluate it. ii) Evaluate $\int_{-c}^c \int_{-b}^b \int_{-a}^a (x^2 + y^2 + z^2) dz dy dx$.	[6M] [6M]

I B.Tech I Semester Supple. Examinations, September-2023

Sub Code: 19BCC1TH02

ENGINEERING PHYSICS

Time: 3 hours

(Common to CE, ME, ECE)

Max. Marks: 60

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 12 = 60M)

Q.No	Questions	Marks
Unit-I		
1	a i) Differentiate Fraunhofer and Fresnel diffraction. Light of wavelength 580 nm is incident on a slit having a width of 0.300 mm. The viewing screen is 2.00 m from the slit. Find the positions of the first dark fringes and the width of the central bright fringe.	[4M]
	ii) How rings are formed in Newton's ring experiment. Discuss the construction and working of Newton's ring experiment. Derive the expression for the wavelength of the monochromatic light using this experiment.	[8M]
	OR	
	b i) What is double refraction? Discuss the construction and working of Nichol's prism to explain the double refraction phenomena.	[8M]
	ii) Calculate the thickness of (a) a quarter wave plate (b) a half-wave plate, given that $\mu_e=1.533$; $\mu_o=1.544$; $\lambda=5000 \text{ \AA}$.	[4M]
Unit-II		
2	a i) Discuss the construction and working of He-Ne laser system.	[8M]
	ii) Discuss the principle of light propagation through optical fibers using ray optics	[4M]
	OR	
	b i) Mention the different processes when light interacts with matter. Differentiate Spontaneous and stimulated emission of radiation using energy level diagram. Which type emission is most favorable to laser emission. Why.	[6M]
	ii) Derive the expression for numerical aperture and acceptance cone and discuss its importance.	[6M]
Unit-III		
3	a i) State and Explain Bragg's law of X-ray diffraction. Explain how this law helpful in identifying the crystal structure.	[6M]
	ii) What is Atomic packing factor (APF)? Derive the APF for SC and BCC structure.	[6M]
	OR	
	b i) Discuss various types of lattices without lacking the symmetry based on the axial lengths and interfacial angles of the unit cell.	[6M]
	ii) Derive the expression for interplanar distance. What is the interplanar spacing between (200),(220), (111) planes in a FCC crystal of atomic radius 1.246 \AA .	[6M]
Unit-IV		
4	a i) Differentiate soft and hard magnetic materials based on hysteresis curve with examples.	[6M]
	ii) Define magnetic susceptibility and permeability. Magnetic field and magnetic intensity are respectively 1.8 T and 1000 A/m. Find relative permeability and susceptibility.	[6M]

		OR	
	b	i) Explain the different types of magnetic materials based on intensity of magnetization, temperature and susceptibility.	[8M]
		ii) What are the fundamental laws of electromagnetism. Explain about Faraday's law of induction.	[4M]
		Unit-V	
5	a	i) Assuming Schrodinger wave equation, Solve the problem of a particle enclosed in a one-dimensional potential well of infinite height and derive the probability density function and energy of the particle for the ground and first two excited states.	[8M]
		ii) Distinguish intrinsic and extrinsic semiconductors. Explain the significance of doping.	[4M]
		OR	
	b	i) State and explain Hall effect. With a neat experimental setup determine the relation between Hall coefficient and Hall voltage.	[8M]
		ii) Derive the expression for de Broglie wavelength.	[4M]

I B.Tech I Semester Supple. Examinations, September-2023

Sub Code: 19BCC1TH05

PROBLEM SOLVING WITH PYTHON

Time: 3 hours

(Common to CE, ECE)

Max. Marks: 60

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 12 = 60M)

Q.No	Questions	Marks
1	Unit-I	
	a	i) What is flowchart and algorithm? Write differences between flowchart and algorithm. Give an example of flowchart and algorithm. [6M]
		ii) Explain about the operating system [6M]
	OR	
	b	i) Explain the different types of Modern computer systems [6M]
		ii) Explain differences between software and hardware [6M]
2	Unit-II	
	a	i) Construct a flowchart for finding the GCD of 2 numbers. [6M]
		ii) Explain different type conditional statements with a suitable example. [6M]
	OR	
b	i) Give flowchart and algorithm for calculating maximum and minimum of first N numbers. [6M]	
	ii) Explain different searching algorithms. [6M]	
3	Unit-III	
	a	i) What is data type? Explain different types of data types in Python programming with example. [6M]
		ii) Write a Python program to convert a list of characters into a string. Example: Input: ['s','t','r','i','n','g'], Output: string. [6M]
	OR	
	b	i) What are differences between user defined functions and build in functions in the python programming. Explain with suitable examples. [6M]
		ii) Define a function to find sum of all odd numbers between 1 to n where n is user input. [6M]
4	Unit-IV	
	a	i) Write a python program to form a number from a given list of digits. Final output should be a number. Example: Input: [3, 4, 5, 8], Output: 3458 [6M]
		ii) Write a Python program to find the second smallest number and second largest in a list [6M]
	OR	
	b	i) List the file handling methods in python? Explain briefly [6M]

		ii) What is dictionary? Write a python program to create following dictionary (Language Inventors) and print all keys and values of the dictionary?									
		<table border="1"> <thead> <tr> <th>Language</th> <th>Name</th> </tr> </thead> <tbody> <tr> <td>C</td> <td>Dennis Ritchie</td> </tr> <tr> <td>CPP</td> <td>James Gosling</td> </tr> <tr> <td>Python</td> <td>Guido van Rossum</td> </tr> </tbody> </table>	Language	Name	C	Dennis Ritchie	CPP	James Gosling	Python	Guido van Rossum	[6M]
Language	Name										
C	Dennis Ritchie										
CPP	James Gosling										
Python	Guido van Rossum										
		Unit-V									
5	a	i) Write a python program that use different methods (upper, lower, split, join, count, replace, and find) on string object.	[6M]								
		ii) Explain how to plot Bar plots by using Turtle with an example	[6M]								
		OR									
	b	i) Draw the event handling mechanism to illustrate the concept?	[6M]								
		ii) Explain scroll bar, check box, basic key press events with an example.	[6M]								

I B.Tech I Semester Supple. Examinations, September-2023

Sub Code: 19BCC1TH07

ENGINEERING CHEMISTRY

Time: 3 hours

(Common to EEE, CSE, IT)

Max. Marks: 60

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 12 = 60M)

Q.No.	Questions	Marks
1	Unit-I	
	a	i) Write notes on chemical oxygen demand. [6M]
		ii) Explain electro dialysis method for treatment of brackish water. [6M]
	OR	
	b	i) Discuss hot lime soda process for softening hard water. [6M]
		ii) Write the characteristics of industrial water. [6M]
2	Unit-II	
	a	Discuss (i) processing of natural rubber (ii) proximate analysis [12M]
	OR	
	b	i) Discuss antiknocking agents. [4M]
		ii) Explain free radical addition polymerization. [4M]
	iii) Differentiate thermoplastics and thermosetting. [4M]	
3	Unit-III	
	a	i) Discuss sol-gel method for preparing nanomaterials. [6M]
		ii) List applications of liquid crystals. [6M]
	OR	
	b	i) Explain chemical vapour deposition method for preparation of nanotubes. [6M]
	ii) Explain applications of composite materials. [6M]	
4	Unit-IV	
	a	i) Explain (i) dry cell (ii) Ni-Cd battery [6M]
		ii) Discuss electrochemical theory of corrosion. [6M]
	OR	
	b	i) Discuss electroless plating taking an example [6M]
	ii) Discuss construction and working of standard hydrogen electrode. [6M]	
5	Unit-V	
	a	i) Discuss (i) Extreme pressure lubrication (ii) Saponification value [6M]
		ii) Explain the properties of refractories. [6M]
	OR	
	b	i) Explain (i) Flash and fire point (ii) Viscosity [6M]
	ii) Discuss the manufacture of Portland cement. [6M]	

I B.Tech I Semester Supple. Examinations, September-2023

Sub Code: 19BCC1TH10

C PROGRAMMING

Time: 3 hours

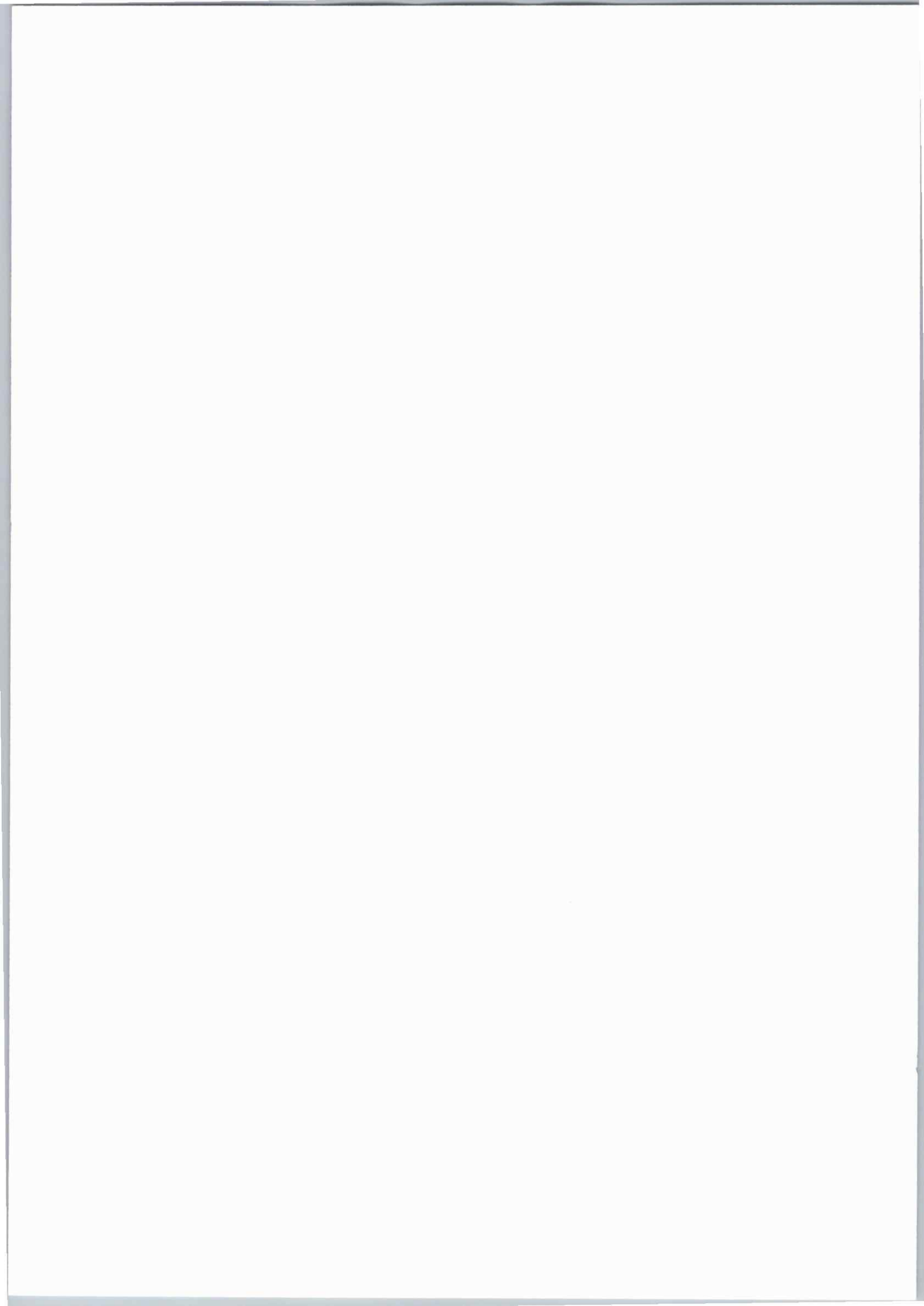
(Common to EEE, ME, CSE, IT)

Max. Marks: 60

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 12 = 60M)

Q.No	Questions	Marks
Unit-I		
1	a i) Give the flowchart to count positive and negative numbers in a given list terminated with zero.	[6M]
	a ii) Write an algorithm for finding whether the given number is Armstrong or not.	[6M]
	OR	
	b i) What are the relational operators? Explain with examples	[6M]
	b ii) Briefly explain about the basic data types in C	[6M]
Unit-II		
2	a Explain various branching statements in C with examples	[12M]
	OR	
	b i) Discuss the various parameter passing mechanisms with examples	[6M]
	b ii) Define function? How to declare function? Give Example	[6M]
Unit-III		
3	a i) How to access array elements? Explain.	[6M]
	a ii) Write a C program to add two matrices	[6M]
	OR	
	b i) Explain string manipulation library functions with their syntaxes	[6M]
	b ii) Write a C program to read a set of strings and sort them in alphabetical order	[6M]
Unit-IV		
4	a i) Describe the two ways of accessing a structure member through a pointer. Explain the same with an example.	[6M]
	a ii) Write a program for illustrating the pointer, indirect pointers	[6M]
	OR	
	b i) What are the advantages of union over structures? Explain both with examples	[6M]
	b ii) Explain about self-referential structures.	[6M]
Unit-V		
5	a i) Explain about different file operations that can be performed on files	[6M]
	a ii) Write a program to find the no of occurrences of a given word in a given file	[6M]
	OR	
	b i) Write a program to open a file and read the file and print the file contents in reverse order	[12M]



I B.Tech I Semester Supple. Examinations, September-2023

Sub Code: 19BCI1TH06 ELECTRONIC DEVICES AND LOGIC DESIGN

Time: 3 hours (Common to CSE & IT) Max. Marks: 60

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 12 = 60M)

Q.No	Questions	Marks
1	Unit-I	
	a	i) Explain the Operation and Characteristics of PN Junction diode [6M] ii) For a Ge diode, the $I_0=1\mu A$ and the voltage of 0.26V is applied. Calculate the forward and reverse dynamic resistance values at room temperature [6M]
	OR	
	b	i) Draw and explain the circuit of a half-wave rectifier with capacitor filter [6M] ii) A sinusoidal voltage whose $V_m=26V$ is applied to half-wave rectifier. The diode may be considered to be ideal and $R_L=1.2 K\Omega$ is connected as load. Find out peak value of current, RMS value of Current, DC value of current and Ripple factor [6M]
	Unit-II	
	a	i) Explain input and output characteristics of transistor in CB configuration with neat diagram. [8M] ii) Discuss the base width modulation [4M]
OR		
b	Explain the operation of MOSFET in depletion and enhance mode [12M]	
3	Unit-III	
	a	i)a. Perform the subtraction for (CDEF) ₁₆ . With (ABCD) ₁₆ using 16's complement. [6M] b.Convert (22.64) ₁₆ to octal.
	b	ii) Design the circuit by using only NAND gates for $Y = A'BE + AC' + D'E'$ [6M]
	OR	
	a	i) Simplify the following expressions using Boolean algebra [6M] a) $(A+A'B)(A'+B')+BC'$ b) $(X+Y'+X'Y)(X+Y')X'Y'$
	a	ii) Simplify the following expression using K-Map [6M] $F(A,B,C,D) = \sum m(0,1,2,8,9,10,11,14)$
4	Unit-IV	
	a	i) Design a Full adder Circuit Using Two Half Adders [6M] ii) Implement 8X1 Multiplexer Using 4X1 Multiplexer. [6M]
	OR	
	b	i) Convert SR Flip Flop to JK Flip Flop [6M] ii) Convert T-flip-flop to D-Flip-Flop [6M]
	Unit-V	
	a	i) Explain the operation of Parallel input Serial Output Shift register. [6M] ii) Explain the operation of synchronous counter. [6M]
OR		
b	i) Explain about universal Shift Register with neat Diagram [6M] ii) Explain about Bi-directional Shift Register with neat Diagram [6M]	
