R-17

Code: 7GC13

I B.Tech. I Semester Supplementary Examinations November 2023
Engineering Physics
(Common to EEE & ECE)

Max. Marks: 70   Time: 3 Hours
Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)
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UNIT–I

1. a) Explain the construction and working of semiconductor laser   7M

   b) Describe the principle on which optical fiber works and obtain an expression for numerical aperture.   7M

OR

2. Explain the process of induced absorption, spontaneous emission and stimulated emission. Obtain an expression for energy density of radiation under equilibrium conditions in terms of Einstein A & B Coefficients.   14M

UNIT–II

3. a) What is space lattice? Describe briefly the seven systems of crystals   7M

   b) Explain the various detection methods for ultrasonics.   7M

OR

4. a) Prove that FCC structure closely packed than SC and BCC.   10M

   b) State and derive Bragg's Law.   4M

UNIT–III

5. a) Explain postulates of free electron model   6M

   b) How the solids are classified on the basis of energy band theory   8M

OR

6. a) Define conductivity and drive its equation for metals   8M

   b) Distinguish metals, semiconductors and insulators   6M

UNIT–IV

7. a) Distinguish direct and indirect band gap semiconductors.   8M

   b) Explain the construction and working of Photo Diode.   6M

OR

8. a) Analyze the formation of paired electrons in superconductors by using the B.C.S theory   8M

   b) Write the applications of superconductors.   6M

UNIT–V

9. Classify the magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials.   14M

OR

10. a) Explain Chemical Vapour deposition method to prepare nanomaterials.   7M

    b) Write the properties of carbon nanotubes.   7M

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R-17

Code: 7G311

I B.Tech. I Semester Supplementary Examinations November 2023

Fundamentals of Electrical & Electronics Engineering

(Common to EEE & ECE)

Max. Marks: 70   Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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UNIT–I

1.		Classify the types of capacitors and explain any four with neat diagrams.	14M

OR

2.	a)	Differentiate ideal and practical sources and draw their equivalent circuits.	10M
	b)	What is capacitance? Draw symbol of capacitor and write its voltage, current, energy relations.	4M

UNIT–II

3.	a)	Determine the equivalent capacitance when three capacitors with values 3F, 4Fand 6F are connected in series.	6M
	b)	State and explain Thevenin's theorem.	8M

OR

4.	a)	State and explain Kirchhoff's laws.	7M
	b)	State and explain super position theorem.	7M

UNIT–III

5.	a)	Draw and explain the energy band diagram of PN junction diode.	6M
	b)	Write short notes on i) Avalanche breakdown ii) Zener breakdown	8M

OR

6.	a)	Draw and explain piece-wise linear diode characteristics	8M
	b)	If the forward voltage applied to a silicon diode at 30°C is 0.8V. Find the value of the forward current, if the reverse saturation current is 50nA. take $=2$	6M

UNIT–IV

7.	a)	List the merits and demerits of LC filter.	5M
	b)	Derive the expression for ripple factor and efficiency for half wave and full wave rectifiers.	9M

OR

8.	a)	Derive the expressions for the following for full wave rectifier 1) Average DC load current 2) Average DC load voltage 3) RMS load current	10M
	b)	Compare half wave and full wave rectifiers in respect of following terms and comment on the comparisons. i) efficiency ii) Ripple factor	4M

UNIT–V

9.	a)	Draw and explain the input and output characteristics of transistor in CE configuration.	8M
	b)	Compare various transistor configurations.	6M

OR

10.	a)	Derive the relation between and	5M
	b)	Explain the operation of PNP transistor with neat diagram.	9M

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Code: 7G111

I B.Tech. I Semester Supplementary Examinations November 2023

Problem Solving Techniques and C Programming

(Common to All Branches)

Max. Marks: 70   Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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UNIT–I

1.	a)	Give a comparison between system and application software's with examples.	7M
	b)	Write an algorithm to find the greatest number among the three given numbers.	7M

OR

2.	a)	Explain in detail about the software development method.	7M
	b)	List and explain various symbols used in flowcharts with figures	7M

UNIT–II

3.	a)	Describe the structure of a C program with example	7M
	b)	What is the purpose of the comma operator? Within which control statement does the comma operator usually appear?	7M

OR

4.	a)	Explain various format modifiers available in C language.	7M
	b)	What are relational operators? Explain about relational operators with suitable programming example.	7M

UNIT–III

5.	a)	In what way a do – while loop differs from while loop. Explain.	7M
	b)	Write a C program to print all the prime numbers between 1 to 100	7M

OR

6.	a)	Write 'C' program to print the Fibonacci sequence.	7M
	b)	Discuss selection statements with suitable examples for each.	7M

UNIT–IV

7.	a)	Write a 'C' program to read a string from keyboard and print the numbers of uppercase letters, lower case letters, digits, spaces and special characters.	7M
	b)	What is meant by string? Explain strings with example 'C' program.	7M

OR

8.	a)	Define an array. Write a program to find the largest and smallest element in a given array	7M
	b)	Write a C program to check whether the given matrix is symmetric or not.	7M

UNIT–V

9.	a)	Write a C program to exchange the value of two integers using call by reference.	7M
	b)	Write a c program to find factorial of a number using recursive function	7M

OR

10.	a)	Define scope. Briefly explain the scope, life time and visibility of Identifier.	7M
	b)	Explain about pre-processor commands with examples.	7M

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Code: 7GC14

I B.Tech. I Semester Supplementary Examinations November 2023

Engineering Mathematics – I

(Common to All Branches)

Max. Marks: 70   Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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UNIT–I

1. a) Solve the equations x+2y+3z=0, 3x+4y+4z=0, 7x+10y+12z=0   7M

    b) Find the eigen values and eigen vectors of $\begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$ 7M

OR

2. a) Find the rank of $\begin{bmatrix} 2 & -4 & 3 & -1 & 0 \\ 1 & -2 & -1 & -4 & 2 \\ 0 & 1 & -1 & 3 & 1 \\ 4 & -7 & 4 & -4 & 5 \end{bmatrix}$ 7M

    b) Investigate the values of λ *and* μ so that the equations
    2x+3y+5z=9, 7x+3y-2z=8, 2x+3y+λz = μ , have (i) no solution, (ii) a unique solution and
    (iii) an infinite number of solutions.   7M

UNIT–II

3. a) Show that the matrix $\begin{bmatrix} i & 0 & 0 \\ 0 & 0 & i \\ 0 & i & 0 \end{bmatrix}$ is Skew-Hermitian and hence find eigen values   7M

    b) Reduce the quadratic form $10x^2 + 2y^2 + 5z^2 - 4yz - 10zx + 5xy$ to the canonical form
    by linear transformation.   7M

OR

4. a) Define Hermitian, skew-Hermitian, Unitary Matrices and give example for each   7M

    b) Find the eigen values of the matrix $\begin{bmatrix} 2 & 3+4i \\ 3-4i & 2 \end{bmatrix}$ 7M

UNIT–III

5. a) A body is kept in air with temperature 25^0c cools from 140^0c to 80^0c in 20 minutes. Find
    the when the body cools down to 35^0c   7M

    b) A bacterial culture, growing exponentially, increases from 200 to 500 grams in 1 hour.
    How many grams will be present after 90 minutes?   7M

OR

6. a) Find the orthogonal Trajectories of the family of curves $x^2 + y^2 + 2gx + c = 0$ where
    g is parameter.   7M

    b) Find the orthogonal Trajectories of the family of curves $r^n = a^n \cos n\theta$ 7M

7. a) Solve $\dfrac{d^3 y}{dx^3} - y = e^x + \sin 3x + 2$

   7M

   b) In L-C-R circuit, the charge q on a plate of a condenser is given by Solve

   $L\dfrac{d^2 q}{dt^2} - \dfrac{dq}{dt} + \dfrac{q}{C} = E\sin pt$ the circuit is turned to resonance so that $\dfrac{p^2}{LC}$. Find the current
   i

   7M

OR

8. a) Solve by the method of variation of parameters $\dfrac{d^2 y}{dx^2} - 2\dfrac{dy}{dx} = e^x \sin x$

   7M

   b) Solve $(D+2)(D-1)^2 y = e^{-2x} + 2\sinh x$

   7M

9. a) Find the first and second order partial derivatives of $f(x, y) = ax^2 + 2hxy + by^2$ and verify

   $\dfrac{\partial^2 f}{\partial x \partial y} = \dfrac{\partial^2 f}{\partial y \partial x}$

   7M

   b) If $x = r\sin_{\shortmid\shortmid} \cos W$, $y = r\sin_{\shortmid\shortmid} \sin W$, $z = r\cos_{\shortmid\shortmid}$, Show that $\dfrac{\partial(x, y, z)}{\partial(r,_{\shortmid\shortmid}, W)} = r^2 \sin_{\shortmid\shortmid}$

   7M

OR

10. If $U = \log(x^3 + y^3 + z^3 - 3xyz)$ prove that $\left(\dfrac{\partial}{\partial x} + \dfrac{\partial}{\partial y} + \dfrac{\partial}{\partial z}\right)^2 U = \dfrac{-9}{(x+y+z)^2}$

   14M

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