R-17

Code: 7GC13

I B.Tech. I Semester Supplementary Examinations February 2022

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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Marks

UNIT–I

1. a) Derive the expressions for diameters of dark and bright Newton's rings   7M
   b) Distinguish He-Ne laser from Ruby laser   7M

OR

2. a) Analyze the optical signal transmission through graded-index optical fiber.   7M
   b) The refractive indices of core and cladding of an optical fiber are 1.50 and 1.45 respectively. Calculate the Numerical aperture, acceptance angle and critical angle of optical fiber.   7M

UNIT–II

3. a) Prove that FCC has closely packed structure by calculating packing fractions of S.C, B.C.C and F.C.C   10M
   b) Evaluate the glancing angle on the cube (1 1 0) of rock salt crystal (a=0.2814 nm) corresponding to second order diffraction maximum for the X-ray of wavelength 0.071 nm.   4M

OR

4. a) Analyze the various detection methods for ultrasonics   7M
   b) Describe Non Destructive Testing of materials   7M

UNIT–III

5. a) State and Explain Heisenberg's uncertinity principle   7M
   b) Derive Schrodinger's 1-D time independent wave equation for a free particle.   7M

OR

6. a) Classify the solids into metals, semiconductors and insulators   7M
   b) Explain the Fermi-Dirac distribution function along with its temperature dependence.   7M

UNIT–IV

7. a) State the Hall Effect and also derive the Hall coefficient   7M
   b) Explain the construction and working of LED   7M

OR

8. a) Analyze the formation of paired electrons in superconductors by using the B.C.S theory.   7M
   b) Write short notes on high T_c superconductors   7M

UNIT–V

9. a) Distinguish the soft and hard magnetic materials   7M
   b) A magnetic material has a magnetization of 3300 A/m and flux density of 0.0044Wb/m^2. Compute the magnetizing force and the relative permeability of the material.   7M

OR

10. a) Explain the construction and working of Ball mill method to prepare nanoparticles.   7M
    b) Write the properties of nanomaterials   7M

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I B.Tech. I Semester Supplementary Examinations February 2022
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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Marks

UNIT–I

1. a) State ohms law. Give the relation between voltage and current for capacitor, inductor and resistor. | 6M
   b) Determine the color coding for the following resistors.
   i) 100K   ii) 47   iii) 2.2K   iv) 10K | 8M

OR

2. a) Explain the dependent and independent sources. | 7M
   b) Classify the types of resistors. Explain fixed resistors with neat diagram. | 7M

UNIT–II

3. a) State and explain Kirchoff's laws. | 7M
   b) Differentiate series and parallel circuit

OR

4. a) State and explain super position theorem.
   b) Find current through 5 resistor using Thevenin's theorem for the circuit given below.
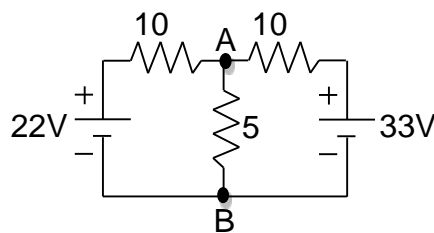
UNIT–III

5. a) Explain the operation of Zener diode in forward biased mode | 8M
   b) If the forward voltage applied to a silicon diode at $30^{O}C$ is 0.8V. Find the value of the forward current, if the reverse saturation current is 50nA. take $\eta = 2$ | 6M

OR

6. a) Explain breakdown mechanism in PN junction diode | 10M
   b) A Ge diode carries a current of 1mA at room temperature when a forward bias of 0.15 V is applied. Estimate the reverse saturation current at room temperature | 4M

UNIT–IV

7. a) Derive the expressions for the following for full wave rectifier
      i) Average DC load current   ii) Average DC load voltage   iii) 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

OR

8. a) Compare half wave and full wave rectifiers. | 8M
   b) List the advantages of bridge rectifier | 6M

UNIT–V

9. a) Write the current components in PNP transistor and explain. | 7M
   b) Draw and explain input and output characteristics of CE configuration. | 7M

OR

10. a) Explain hoe BJT acts as an amplifier. | 7M
    b) Explain the working principle of NPN transisitor. | 7M

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I B.Tech. I Semester Supplementary Examinations February 2022
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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Marks

UNIT–I

1. a) What is a flow chart? How it is different from an Algorithm   7M
    b) Illustrate different phases of Software Development Life Cycle (SDLC) with a neat diagram.   7M

OR

2. a) What is Programming Language? What is the generation of programming Language? Describe it briefly.   7M
    b) Give short notes on computer environments.   7M

UNIT–II

3. a) What is a variable? What are the rules for declaring variables? Give examples of valid and invalid variables   7M
    b) Describe Structure of C program with an example.   7M

OR

4. a) Explain about the basic data types in C language with examples   7M
    b) Explain with examples, any two types of operators in c programming language.   7M

UNIT–III

5. a) Explain for loop and nested for loop in c programming language.   7M
    b) Write a program to print sum of odd numbers between 1 and 100 using for loops.   7M

OR

6. a) Explain with examples, if…else and nested if….else statements.   7M
    b) Write a program to find the largest among three numbers.   7M

UNIT–IV

7. a) How single dimensional arrays and multidimensional arrays are declared and initialized? Explain with suitable examples.   7M
    b) How to declare and initialization of strings? Explain them with examples.   7M

OR

8. a) Explain any five string handling functions with suitable examples,   7M
    b) Write a C program for addition of two matrices.   7M

UNIT–V

9. a) Discuss in details about local variables and global variables with respect to their scope and extent.   7M
    b) Explain about the actual arguments and formal argument in functions. What is the difference between these arguments?   7M

OR

10. a) What are the different ways of passing parameters to the function? Explain.   7M
    b) Write a c program to find the factorial of a number using recursive function.   7M

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I B.Tech. I Semester Supplementary Examinations February 2022
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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Marks

UNIT–I

1. a) Define the rank of the matrix. Find the rank of the matrix

A= $\begin{bmatrix} -2 & -1 & -3 & -1 \\ 1 & 2 & 3 & -1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & -1 \end{bmatrix}$ 7M

   b) Find the values of ' k ' for which the system of equations
   (3k-8)x +3y +3z = 0, 3x+ (3k-8)y + 3z = 0, 3x +3y +(3k-8)z = 0 has a
   non-trivial solution.   7M

OR

2. a) Find the eigen values and eigen vectors of

   $\begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$ 7M

   b) Test for consistency and solve 5x+3y+7z=4, 3x+26y+2z=9,
   7x+2y+10z=5   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) Diagonalize the matrix A= $\begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$ 7M

   b) Find the Eigen values and Eigen vectors $A = \begin{bmatrix} 4 & 1-3i \\ 1+3i & 7 \end{bmatrix}$ 7M

UNIT–III

5. a) Solve $x\dfrac{dy}{dx} + y = x^3 y^6$ 7M

   b) Prove that the system of parabolas $y^2 = 4a(x+a)$ is self orthogonal.   7M

OR

6. a) A body is kept in air with temperature 25⁰c cools from 140⁰c to 80⁰c in 20 minutes. Find the when the body cools down to 35⁰c   7M

   b) Find the orthogonal Trajectories of the family of curves $r^n = a^n \cos n_{_n}$ 7M

UNIT–IV

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

   b) Solve $(D^2 + 1)y = \sin x \sin 2x + e^x x^2$ 7M

OR

8. a) Solve $(D+2)(D-1)^2 y = e^{-2x} + 2\sinh x$ 7M

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

UNIT–V

9. a) If $x + y + z = u, y + z = uv, z = uvw, then\ evaluate\ \dfrac{\partial(x, y, z)}{\partial(u, v, w)}$ 7M

   b) Verify lagrange's mean value theorem for
   $f(x) = (x-1)(x-2)(x-3)$ in $[0, 4]$ 7M

OR

10. a) Let $r^2 = x^2 + y^2 + z^2$ and $V = r^m$ then prove that
    $V_{xx} + V_{yy} + V_{zz} = m(m+1) r^{m-2}$ 7M

    b) Find the maxima and minima of $z = x^3 + 3x y^2 - 3x^2 - 3y^2 + 4$ 7M

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