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R-15

Code: 5GC13

I B.Tech. I Semester Supplementary Examinations December 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)

UNIT-I

1. a) Define interference of light. 4M
b) Explain Fraunhofer diffraction of light at single slit and its intensity distribution. 10M

OR

2. a) Write a note on applications of optical fibers in the field of sensors and medicine. 7M
b) Distinguish between interference and diffraction of light. 7M

UNIT-II

3. Show that FCC crystal is more tightly packed than BCC and SC crystal based on the packing fractions of the corresponding crystals. 14M

OR

4. a) Explain the terms (i) screw and edge dislocations (ii) Burger's vector. 10M
b) For a simple cubic lattice find the ratios of interplanar separation $d_{111}:d_{110}:d_{100}$ 4M

UNIT-III

5. a) Calculate the wavelength associated with electron with energy 2000eV. 7M
b) Distinguish between classical free electron theory and quantum free electron theory of metals. 7M

OR

6. a) Develop Schrodinger's time dependent wave equation. 9M
b) State and explain Heisenberg's uncertainty principle. 5M

UNIT-IV

7. Define magnetic dipole moment. List out various sources of magnetic dipole moment in magnetic materials. 14M

OR

8. a) Illustrate the intrinsic and extrinsic form of semiconductors and construct covalent and energy band diagrams. 7M
b) Express the working principle of pn junction diode with neat diagram. 7M

UNIT-V

9. a) Give an account of BCS theory of super conductivity. 9M
b) What are nano materials? Write the significance of nano scale. 5M

OR

10. a) Mention the significance of penetration depth in superconductors. 9M
b) Explain properties of superconductors. 5M

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R-15

Code: 5G111

I B.Tech. I Semester Supplementary Examinations December 2022

Problem Solving Techniques and Introduction to 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)

UNIT-I

- 1. a) Differentiate between computer hardware and software 7M
- b) Write an algorithm to find product of two integers using repetitive addition 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) Discuss about operator precedence in expression evaluation with a suitable example. 7M
- b) Give the format for conditional operator. When is it used? 7M
- OR**
- 4. a) Explain different data types supported by C language with their memory requirements. 7M
- b) Describe the structure of a C program with example 7M

UNIT-III

- 5. a) Write a C Program to check whether given number is Armstrong number or not 7M
- b) Explain the significance of 'break' and 'continue' statement with a sample program. 7M
- OR**
- 6. a) Write 'C' program to print the Fibonacci sequence. 7M
- b) In what way a do – while loop differs from while loop. Explain. 7M

UNIT-IV

- 7. a) Write a program to print an array in reverse order 7M
- b) Write a C Program to delete 'n' characters in a given string 7M
- OR**
- 8. a) What is an Array? How to declare and initialize a one dimensional array? 4M
- b) Explain different string manipulation functions with example 10M

UNIT-V

- 9. a) What is the scope of variables of type extern, auto, register and static? Explain with example. 10M
- b) What is meant by user defined function? Explain with an example C program 4M
- OR**
- 10. a) What is a function? What are its advantages? Explain various parameter passing techniques. 10M
- b) Write a function that checks whether a given year is leap year or not. 4M

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R-15

Code: 5GC14

I B.Tech. I Semester Supplementary Examinations December 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)

UNIT-I

1. a) A bacterial culture, growing exponentially, increases from 100 to 400 grams in 10 hours. How much was present after 3 hours 7M
- b) Find the Orthogonal trajectories of the family of parabolas $y^2 = 4ax$ 7M

OR

2. Find the Orthogonal trajectories of the family of curves $r = a(1 + \cos \theta)$ 14M

UNIT-II

3. Using the method of variation of parameters, solve $(D^2 + a^2)y = \sec ax$ 14M

OR

4. Solve $(D^2 + 4)y = \sin x$ 14M

UNIT-III

5. a) Expand $\sin x$, by using Maclaurin's theorem. 7M
- b) Verify Rolle's Theorem for $f(x) = e^x(\sin x - \cos x)$ in $\left(\frac{f}{4}, \frac{5f}{4}\right)$ 7M

OR

6. If $f(x) = \sin^{-1} x, 0 < a < b < 1$, use Mean value theorem to prove that
- $$\frac{b-a}{\sqrt{1-a^2}} < \sin^{-1} b - \sin^{-1} a < \frac{b-a}{\sqrt{1-b^2}}$$
- 14M

UNIT-IV

7. If $u = \sin^{-1}\left(\frac{x^2 + y^2}{x + y}\right)$, then prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \tan u$ 14M

OR

8. Given $x + y + z = a$, find the maximum value of $x^m y^n z^p$ 14M

UNIT-V

9. Trace the curve $x = a(\theta + \sin \theta), y = a(1 + \cos \theta)$ 14M

OR

10. Trace the curve $r = a(1 - \cos \theta)$ 14M
