

Code: 5GC14

I B.Tech. I Semester Supplementary Examinations August 2021

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) Solve $(x^3 y^2 + xy)dx = dy$ 7M
 b) Find the orthogonal trajectories of the family of curve $xy = c$ 7M

OR

2. a) Solve $(1-x^2)\frac{dy}{dx} - xy = 1$ 7M
 b) A tank contains 5000 liters of fresh water salt water which contains 100gm of salt per liter flows into it at the rate of 10 liters per minute and the mixture kept uniform by stirring runs out at the same rate. When will the tank contain 200000gm? And how long will it take for the quantity of salt in the tank of increase from 150000gm to 250000gm? 7M

UNIT-II

3. a) Solve $(D-2)y = 8(e^{2x} + \sin 2x + x^2)$ 7M
 b) Using the method of variation of parameters, Solve $\frac{d^2 y}{dx^2} + 4y = \tan 2x$ 7M

OR

4. a) Solve $\frac{d^2 y}{dx^2} - 3\frac{dy}{dx} + 2y = e^{3x}$ 7M
 b) In an L.C.R circuit the charge q on a plate of a condenser is given by $L\frac{d^2 q}{dt^2} + R\frac{dq}{dt} + \frac{q}{C} = E \sin pt$ the circuit is turned to resonance so that $p^2 = \frac{1}{LC}$ find the current i 7M

UNIT-III

5. a) Verify Lagrange's Mean value theorem for $f(x) = e^x$ in $[0,1]$ 7M
 b) Using Maclaurin's series, expand $f(x) = \log(1+x)$ 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. a) Find first and second partial derivatives of $f(x, y) = ax^2 + 2hxy + by^2$ and verify

$$\frac{\partial^2 f}{\partial x \partial y} = \frac{\partial^2 f}{\partial y \partial x}$$
 7M
 b) Find the maximum and minimum values of $f(x, y) = x^3 + 3xy^2 - 3x^2 - 3y^2 + 4$ 7M

OR

8. a) If $U = \log(x^3 + y^3 + z^3 - 3xyz)$ prove that $\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}\right)^2 U = \frac{-9}{(x+y+z)^2}$ 7M
 b) Find the maximum and minimum values of $f(x, y) = x^2 + y^2 + z^2$ if $ax^2 + by^2 + cz^2 = 1$ and $lx + my + nz = 0$ 7M

UNIT-V

9. Trace the curve $r = a(1 - \cos \theta)$ 14M
OR
 10. Trace the curve $r = a \cos 2\theta$ 14M

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R-15

Code: 5GC13

I B.Tech. I Semester Supplementary Examinations August 2021

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) Write the characteristics of grating spectrum 7M
b) Derive the relation between Einstein's coefficients. 7M

OR

2. a) Analyze the working function of different parts in optical fiber communication system. 9M
b) An optical fiber has a numerical aperture of 0.20 and a cladding refractive index of 1.59. Find the acceptance angle for the fiber in water which has the refractive index of 1.33. 5M

UNIT-II

3. a) Derive the expression for inter planar spacing. 7M
b) Classify the crystal systems into 7 types based on lattice parameters. 7M

OR

4. a) Explain the construction and working of piezo electric method for production of ultrasonics with neat diagram. 7M
b) Describe Non Destructive Testing of materials. 7M

UNIT-III

5. a) Explain the classification of solids on the basis of energy band theory 7M
b) Describe Fermi-Dirac distribution function 7M

OR

6. a) Find de-Broglie wave length of an electron accelerated in field of potential 1600V 7M
b) Derive 1-D Schrödinger wave equation 7M

UNIT-IV

7. a) Describe drift and diffusion currents in a semiconductor. Derive their expressions. 7M
b) Derive the equation of continuity equation for electrons. 7M

OR

8. a) Explain hysteresis of a ferromagnetic materials. 7M
b) Explain the classification of magnetic materials. 7M

UNIT-V

9. a) Describe BCS theory of superconductivity. 7M
b) Write applications of superconductors. 7M

OR

10. a) Explain the basic principles of nanomaterials. 7M
b) Write the applications of nanomaterials. 7M

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R-15

Code: 5G111

I B.Tech. I Semester Supplementary Examinations August 2021

Problem Solving Techniques and C programming

(Common to All Branches)

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit (5 x 14 = 70 Marks)

UNIT-I

1. a) Describe computer hardware and computer software. 7M
b) Define Algorithm. Write an Algorithm to read 20 numbers and print their sum. 7M

OR

2. a) Discuss briefly about computer languages. 7M
b) Explain the software development method in detail. 7M

UNIT-II

3. a) Describe structure of C program with suitable example. 7M
b) Write a program to find out total and average of three subject marks. 7M

OR

4. a) What is conditional operator? Write a program to enter two numbers and find the smallest out of them. Use conditional operator. 7M
b) Explain in detail about C data types. 7M

UNIT-III

5. a) With Examples, explain while, do while and for loops 6M
b) Write a program to find out whether the given number is perfect number or not. 8M

OR

6. Write a program to generate prime numbers between 1 and 1000. (use break statement to reduce number of iterations) 14M

UNIT-IV

7. a) What is an array? How is one dimensional array declared and initialized? 7M
b) Write a program to find the sum of all elements in an array. 7M

OR

8. a) Discuss all string handling functions in C Language. 7M
b) Write a program to find whether a given string is palindrome or not. 7M

UNIT-V

9. Explain different storage classes with examples 14M

OR

10. a) Explain the differences between call by value and call by reference with examples. 8M
b) What is recursive function? Write a program to find factorial of integer value using recursive function. 6M
