

Code: 5GC24

I B.Tech. II Semester Supplementary Examinations November 2023

Engineering Mathematics – II

(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) Show that the area between the parabolas $y^2 = 4ax$ and $x^2 = 4ay$ is $\frac{16}{3}a^2$ 7M

b) Evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} xyz \, dx \, dy \, dz$ 7M

OR

2. a) Change of order of integration and evaluate $\int_0^\infty \int_x^\infty \frac{e^{-y}}{y} \, dx \, dy$ 7M

b) Evaluate $\int_0^1 \int_0^{1-z} \int_0^{1-x-y} (x+y+z) \, dx \, dy \, dz$ 7M

UNIT-II

3. a) Write the Laplace Transforms of some standard functions 6M

- b) Find the Laplace Transform of i) $\cos 2t$ ii) $\sin 2t \sin 3t$ 8M

OR

4. a) Using Convolution Theorem, Evaluate $L^{-1} \left\{ \frac{s+2}{s^2-4s+13} \right\}$ 7M

- b) Find the Laplace Transform of $t \sin 3t$ 7M

UNIT-III

5. Solve the differential equation $\frac{d^2x}{dt^2} + 9x = \sin t$ given that $x(0) = 1, x\left(\frac{f}{2}\right) = 1$ using Laplace Transform 14M

OR

6. Solve $y'' + 2y' - 3y = \sin t, y(0) = 0, y'(0) = 0$ Using Laplace Transform 14M

UNIT-IV

7. a) Show that $\nabla^2 \left(\frac{1}{r} \right) = 0$ 7M

- b) Find the angle between the surfaces $x^2 + y^2 + z^2 = 9$ and $z = x^2 + y^2 - 3$ at the point $(2, -1, 2)$ 7M

OR

8. a) Evaluate the line integral of $\int_c (xy + y^2) dx + x^2 dy$ where 'c' is the square formed by the lines $y = \pm 1$ and $x = \pm 1$ 7M

- b) Using the line integral, calculate the work done by the force, $\vec{F} = (3x^2 - 6yz)\vec{i} + (2y + 3xz)\vec{j} + (1 - 4xyz^2)\vec{k}$ in moving a particle from the point $(0,0,0)$ to the point $(1,1,1)$ along the curve $C: x = t, y = t^2, z = t^3$. 7M

UNIT-V

9. Verify by Green's Theorem for $\int_c [(xy + y^2) dx + x^2 dy]$ where 'c' is bounded by $y = x$ and $y = x^2$ 14M

OR

10. Verify divergence theorem for $\vec{F} = 4xz\vec{i} - y^2\vec{j} + yz\vec{k}$ taken over the cube bounded by $x = 0, x = 1; y = 0, y = 1; z = 0, z = 1$ 14M

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| R-15 |
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Code: 5GC23

I B.Tech. II Semester Supplementary Examinations November 2023

Engineering Physics

(Common to CE, ME & CSE)

Max. Marks: 70

Time: 3 Hours

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

| | Marks |
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| UNIT-I | |
| 1. a) Analyze Einstein's co-efficient for spontaneous and Stimulated emission of radiation | 8M |
| b) Summarize Ruby, He-Ne and Semiconductor Lasers | 6M |
| OR | |
| 2. a) Recite the ruby laser for production of laser | 8M |
| b) Describe construction of optical fiber | 6M |
| UNIT-II | |
| 3. a) Write steps to find Miller indices | 6M |
| b) Define ultrasonics and write its properties | 8M |
| OR | |
| 4. a) Illustrate the powder method to describe the structure of crystal | 6M |
| b) Explain production and detection of ultrasonics in detail | 8M |
| UNIT-III | |
| 5. Analyze motion of electron in periodic potential of metal | 14M |
| OR | |
| 6. a) Brief the physical importance of Schrodinger's equation | 7M |
| b) Explain postulates of free electron model | 7M |
| UNIT-IV | |
| 7. a) What is photo diode explain it | 6M |
| b) Explain direct and indirect band gap semiconductors | 8M |
| OR | |
| 8. a) Derive Hall voltage and justify its importance | 6M |
| b) Define and explain drift and diffusion currents in semiconductors | 8M |
| UNIT-V | |
| 9. a) Classify the ferromagnetics by hysteresis property | 6M |
| b) What is CNT and explain it | 8M |
| OR | |
| 10. a) Define magnetic materials write any two examples | 5M |
| b) Brief the basic principles of nano materials | 9M |

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R-15

Code: 5G121

I B.Tech. II Semester Supplementary Examinations November 2023

C Programming and Data Structures

(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) Write a program to read and display array elements using pointers 7M
- b) What is a pointer? What are the features of pointers? Write a C program to print address of a variable 7M

OR

- 2. a) Write a C program to swap two numbers using pointers. 6M
- b) Write a program to perform addition of array elements using pointer to array. 8M

UNIT-II

- 3. a) Explain different modes to open a file 7M
- b) How to copy and compare structure variables? Illustrate with example. 7M

OR

- 4. a) Define union. List out the differences between unions and structures 7M
- b) Write a C program to copy the contents from one file to another file. 7M

UNIT-III

- 5. Write a C Program to perform the following operations on a queue 14M
 a) Insert b) Delete c) Display

OR

- 6. Show the stack after each operation of the following sequence that starts with the empty stack: push(a), push(b), pop, push(c), push(d), pop. 14M

UNIT-IV

- 7. What is a Doubly Linked List.? Explain different operations of a Doubly linked list with suitable examples. 14M

OR

- 8. Write a C program to implement the following operations on a singly Linked List 14M
 a) Insert at beginning b) deletion at end c) Traversing a List

UNIT-V

- 9. a) Define and describe the terms: 9M
 Tree, Binary Tree, Complete Binary Tree and Degree of a tree.
- b) Draw a complete undirected graph having five nodes. 5M

OR

- 10. Define Graph and describe various representations of a graph with suitable examples. 14M
