

Code: 5GC24

I B.Tech. II Semester Supplementary Examinations April 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) Evaluate $\int_0^5 \int_0^{x^2} x(x^2 + y^2) dy dx$

7M

b) Evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} x y z dx dy dz$

7M

OR

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

7M

b) Change the order of integration in $\int_0^1 \int_0^{\sqrt{1-x^2}} y^2 dy dx$.

7M

UNIT-II

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

6M

b) Find the Laplace Transform of $f(t) = \begin{cases} 2, & 0 \leq t \leq 1 \\ 2t, & t \geq 1 \end{cases}$

8M

OR

4. a) Find the Laplace Transform of i) $\cos 2t$ ii) $\sin 2t \sin 3t$

7M

b) Find $L^{-1} \left\{ \frac{1}{(s-1)(s+3)} \right\}$

7M

UNIT-III

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

14M

OR

6. Solve the differential equation $\frac{d^2x}{dt^2} - 4\frac{dx}{dt} - 12x = e^{3t}$ given that $x(0) = 1$, $x'(0) = -2$ using Laplace Transform

14M

UNIT-IV

7. a) Find $\text{div } \bar{F}$ and $\text{curl } \bar{F}$ where $\bar{F} = \text{grad}(x^3 + y^3 + z^3 - 3xyz)$

7M

b) Show that $\text{div}(\text{grad } r^n) = n(n+1)r^{n-2}$

7M

OR

8. a) 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

b) Prove that $\nabla r^n = nr^{n-2}\bar{r}$ where $\bar{r} = x\bar{i} + y\bar{j} + z\bar{k}$ and $r = |\bar{r}|$

7M

UNIT-V

9. Verify by Gauss Divergence theorem for $\bar{F} = x^3\bar{i} + y^3\bar{j} + z^3\bar{k}$ taken over the cube bounded by $x=0, x=a; y=0, y=a; z=0, z=a$

14M

OR

10. Verify Green's Theorem in the plane for $\int_c [(3x^2 - 8y^2)dx + (4y - 6xy)dy]$ where 'c'encloses the region bounded by $y = \sqrt{x}$ and $y = x^2$

14M

Important Note: 1. On completing your answers. Compulsorily draw diagonal cross line on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 32+8=40, will be treated as malpractice.

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R-15

Code: 5GC23

I B.Tech. II Semester Supplementary Examinations April 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

UNIT-I

- 1. a) Recite the ruby laser for production of laser 8M
- b) Describe construction of optical fiber 6M

OR

- 2. a) Discuss the working of He-Ne laser 8M
- b) Summarize the applications of LASER 6M

UNIT-II

- 3. a) Illustrate the powder method to describe the structure of crystal 6M
- b) What is Unit cell & describe the Seven Crystal Systems. 8M

OR

- 4. Show that FCC is closely packed than SC and BCC structures 14M

UNIT-III

- 5. a) Find energy of an electron in second state moving in a box of width 1nm 7M
- b) Describe Fermi-Dirac distribution function 7M

OR

- 6. Derive Eigen energies of a particle in one dimensional potential box 14M

UNIT-IV

- 7. a) Explain Hall effect and write its applications 8M
- b) What is photo diode explain it 6M

OR

- 8. a) Explain the diamagnetic nature of superconductors by Meissner's effect 8M
- b) Mention the applications of superconductors 6M

UNIT-V

- 9. a) Define magnetic materials write any two examples 4M
- b) Write the properties of dia, para and ferro magnetic materials 10M

OR

- 10. a) Explain Hysterisis loop of ferromagnet 6M
- b) Derive magnetic moment of magnetic material through origin 8M

Code: 5GC25

I B.Tech. II Semester Supplementary Examinations April 2023

Mathematical Methods-II

(Common to CSE & IT)

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) Fit a straight line
- $y = ax + b$
- for following data

X	1	2	3	4	5
Y	14	27	40	55	68

7M

- b) By the method of least squares, fit a parabola of the form
- $y = a + bx + cx^2$
- for the following data.

X	1	2	3	4	5	6	7
Y	2.3	5.2	9.7	16.5	29.4	35.5	54.4

7M

OR

2. a) Fit a straight line for the following data

x	1	2	3	4	5	6
y	6	4	3	5	4	2

7M

- b) For the following data, fit a Parabola
- $y = a + bx + cx^2$
- .

x	2	3	6	8	10
y	3.07	12.85	31.47	57.38	91.29

7M

UNIT-II

3. Use Milne's method to find
- $y(0.4)$
- given that
- $\frac{dy}{dx} = 1 + xy^2$
- , find the required initial values by using Taylor's series method.

14M

OR

4. a) Using R-K method to evaluate
- $y(0.1)$
- given that
- $y' = y^2 + x$
- ,
- $y(0) = 1$

7M

- b) Find the values of
- y
- at
- $x = 0.1$
- from
- $\frac{dy}{dx} = x^2 - y$
- ,
- $y(0) = 1$
- by Taylor's series method.

7M

UNIT-III

5. a) Obtain the Fourier Series for
- $f(x) = x$
- in
- $(0, 2)$

7M

- b) Express
- $f(x) = x$
- as half range sine series in
- $0 < x < 2$

7M

OR

6. a) Find the Fourier series for the function
- $f(x) = x$
- in
- $(-1, 1)$

7M

- b) Express
- $f(x) = ax + b$
- as half range sine series in
- $0 < x < 1$

7M

UNIT-IV

7. a) Derive the Fourier transform of
- $f(x) = \begin{cases} x, & |x| \leq a \\ 0, & |x| > a \end{cases}$

7M

- b) Find the Fourier sine and cosine transforms of
- $f(x) = 2e^{-5x} + 5e^{-2x}$

7M

OR

8. a) Find the Fourier transform of
- $f(x)$
- given by
- $f(x) = \begin{cases} 1, & \text{for } |x| < 1 \\ 0, & \text{for } |x| > 1 \end{cases}$

7M

- b) Find the Fourier cosine transform of
- $f(x) = e^{-ax}$
- (
- $x > 0, a > 0$
-).

7M

UNIT-V

9. a) Form the partial differential equation by eliminating the arbitrary functions from
- $z = f_1(y + 2x) + f_2(y - 3x)$

7M

- b) Obtain the solution of PDE
- $x^2(y - z)p + y^2(z - x)q = z^2(x - y)$

7M

OR

10. a) Form the partial differential equation by eliminating the arbitrary constants from

$$z = ax + by + a^2 + b^2$$

7M

- b) Solve
- $x(y - z)p + y(z - x)q = z(x - y)$

7M

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R-15

Code: 5G121

I B.Tech. II Semester Supplementary Examinations April 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)

Marks

UNIT-I

1. a) What is a pointer? What are the features of pointers? Write a C program to print address of a variable 7M
b) Write a C program to swap two numbers using pointers. 7M

OR

2. a) Using pointers write a C program which finds the maximum among the list of elements. 7M
b) Explain in detail about Dynamic Memory allocation with examples 7M

UNIT-II

3. a) Define union. List out the differences between unions and structures 7M
b) Explain different modes to open a file 7M

OR

4. a) Describe the uses and limitations of getc and putc. 7M
b) Write a program for sorting given numbers using selection sort technique 7M

UNIT-III

5. Write a 'C' program for implementation of various operations on queue. 14M

OR

6. What is a stack? How it can be represented in "C" using arrays? 14M

UNIT-IV

7. Represent a doubly linked list using an array. Write routines to insert and delete elements for this representation. 14M

OR

8. List the operations that can be performed on single linked list. In how many ways a node can be deleted from single linked list? Explain. 14M

UNIT-V

9. a) Define and describe the terms: Tree, Binary Tree, Complete Binary Tree and Degree of a tree. 8M
b) Define the following terms of graphs. i) Undirected graph ii) In degree iii) Digraph 6M

OR

10. a) Explain the operations on Binary Tree. 7M
b) Define graph. Explain About the basic Terminology of graphs. 7M

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