



CBCS SCHEME

18MATDIP41

Fourth Semester B.E. Degree Examination, June/July 2023 Additional Mathematics – II

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Find the rank of the matrix by applying elementary row operations :

$$A = \begin{bmatrix} 0 & 2 & 3 & 4 \\ 2 & 3 & 8 & 4 \\ 4 & 8 & 13 & 12 \end{bmatrix}$$

(06 Marks)

- b. Test for consistency and solve the system :

$$\begin{aligned} x + y + z &= 6 \\ x - y + 2z &= 5 \\ 3x + y + z &= 8. \end{aligned}$$

(07 Marks)

- c. Find the eigen value and the corresponding eigen vectors of the matrix :

$$A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$$

(07 Marks)

OR

- 2 a. Reduce the matrix A to the echelon form, where

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

(06 Marks)

- b. Find the values of λ and μ such that the system

$$\begin{aligned} x + y + z &= 6 \\ x + 2y + 3z &= 10 \\ x + 2y + \lambda z &= \mu \end{aligned}$$

may have

- unique solution
- infinite solution
- no solution.

(07 Marks)

- c. Solve :

$$\begin{aligned} 2x + y + 4z &= 12 \\ 4x + 11y - z &= 33 \\ 8x - 3y + 2z &= 20 \end{aligned}$$

By Gauss elimination method.

(07 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, $42+8=50$, will be treated as malpractice.

Module-2

- 3 a. The area of a circle (A) corresponding to diameter (D) is given in the following table :

D	80	85	90	95	100
A	5026	5674	6362	7088	7854

- Find the area when $D = 105$ using an appropriate interpolation formula. (06 Marks)
- b. Find the real root of the equation $\cos x = 3x - 1$ correct to three decimal places using Regula – Falsi method. (07 Marks)
- c. Evaluate $\int_0^1 \frac{x \, dx}{1+x^2}$ using Weddle's rule. Take seven ordinates. (07 Marks)

OR

- 4 a. Find $u_{0.5}$ from the data $u_0 = 225$, $u_1 = 238$, $u_2 = 320$, $u_3 = 340$ by using an appropriate interpolation formula. (06 Marks)
- b. Use Newton – Raphson method to find a real root of the equation $x^3 + 5x - 11 = 0$ correct to the three decimal places. (07 Marks)
- c. Using Simpson's $1/3^{\text{rd}}$ rule, evaluate $\int_0^1 \frac{dx}{1+x^2}$ by dividing the interval $[0, 1]$ into six equal parts. Hence deduce the value of $\log_e 2$. (07 Marks)

Module-3

- 5 a. Solve $(D^3 - 6D^2 + 11D - 6)y = 0$. (06 Marks)
- b. Solve $(D^2 - 4)y = \cos h(2x - 1) + 3^x$. (07 Marks)
- c. Solve $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = 4\cos^2 x$. (07 Marks)

OR

- 6 a. Solve $\frac{d^3y}{dx^3} + y = 0$. (06 Marks)
- b. Solve $y'' + 9y = \cos 2x \cdot \cos x$ (07 Marks)
- c. Solve $y'' - (a + b)y' + aby = e^{ax} + e^{bx}$. (07 Marks)

Module-4

- 7 a. Form a partial differential equation by eliminating the arbitrary constants in $ax^2 + by^2 + z^2 = 1$. (06 Marks)
- b. Form the partial differential equation by eliminating the arbitrary function from $\ell x + my + nz = \phi(x^2 + y^2 + z^2)$. (07 Marks)
- c. Solve $\frac{\partial^2 z}{\partial x^2} = a^2 z$, given that when $x = 0$, $z = 0$ and $\frac{\partial z}{\partial x} = a \sin y$. (07 Marks)