CBCS SCHEME

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18MATDIP41

Fourth Semester B.E. Degree Examination, July/August 2022
Additional Mathematics – II

Time: 3 hrs. Max. Marks: 100

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

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-1

1 a. Find the rank of the matrix
$$A=\begin{bmatrix}1 & 0 & -3 & -1\\ 0 & 0 & 1 & 1\\ 3 & 1 & 0 & 2\\ 1 & 1 & -2 & 0\end{bmatrix}$$ (06 Marks)

b. Solve the system of equations: $x + y + z = 9$; $x - 2y + 3z = 8$; $2x + y - z = 3$ by Gauss elimination method. (07 Marks)

c. Find all the eigen values and corresponding eigen vectors of $\begin{pmatrix}-5 & 9\\ -6 & 10\end{pmatrix}$ (07 Marks)

OR

2 a. Find the rank of the matrix
$$\begin{pmatrix}1 & 2 & 3\\ 1 & 4 & 2\\ 2 & 6 & 5\end{pmatrix}$$ (06 Marks)

b. Using Gauss elimination method solve the system of equations
$x + 2y + 3z = 6$; $2x + 4y + z = 7$; $3x + 2y + 9z = 14$. (07 Marks)

c. Find the eigen values of the matrix $\begin{pmatrix}1 & 2 & 3\\ 0 & -2 & 6\\ 0 & 0 & -3\end{pmatrix}$ (07 Marks)

Module-2

3 a. Use an appropriate Interpolation formula to compute f(6).

x	1	2	3	4	5
y	1	-1	1	-1	1

(07 Marks)

b. Evaluate $\int_0^6 3x^2 dx$ by using Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule by taking n = 6. (07 Marks)

c. Find a real root of the equation $x^3 - 2x - 5 = 0$ by Newton Raphson method. (06 Marks)

OR

4 a. Find solution using Newton's Interpolation formula, at $x = -1$.

x	0	1	2	3
f(x)	1	0	1	10

(07 Marks)

b. Find the real root of the equation cosx = 3x – 1 using Regula Falsi method. (07 Marks)

c. Evaluate $\int_{4}^{5.2} \log_e x$ taking n = 6 by Weddle's rule. (06 Marks)

Module-3

5 a. Solve : $(D^3 - 2D^2 + 4D - 8)y = 0$ (06 Marks)

b. Solve : $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 3y = e^{2x}$ (07 Marks)

c. Solve : $\frac{d^2y}{dx^2} + 4y = \cos 4x$ (07 Marks)

OR

6 a. Solve : $\frac{d^3y}{dx^3} - 3\frac{dy}{dx} + 2y = 0$ (06 Marks)

b. Solve : $(D^2 - 6D + 9)y = 7e^{-2x} - \log 2$ (07 Marks)

c. Solve : $\frac{d^2y}{dx^2} - 16y = \sin 16x$ (07 Marks)

Module-4

7 a. Form the partial differential equation by eliminating the arbitrary constants from $z = (x - a)^2 + (y - b)^2$ (06 Marks)

b. Solve : $\frac{\partial^2 z}{\partial x \partial y} = x^2 y$ (07 Marks)

c. Solve : $\frac{\partial^2 z}{\partial y^2} - z = 0$; given that z = cos x and $\frac{\partial z}{\partial y} = \sin x$, when y = 0. (07 Marks)

OR

8 a. Form the partial differential equation by eliminating the arbitrary function 'f' from $f(x^2 + y^2, z - xy) = 0$ (06 Marks)

b. Solve the equation $\frac{\partial^2 z}{\partial y^2} = \sin xy$ (07 Marks)

c. Form the partial differential equation by eliminating the arbitrary constants $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$ (07 Marks)

Module-5

9 a. Define : (i) Mathematical definition of probability
(ii) Mutually exclusive events
(iii) Independent events (06 Marks)

b. If A and B are two events with $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$ and $P(A \cap B) = \frac{1}{4}$.
Find (i) P(A/B) (ii) P(B/A) (iii) $P(\bar{A}/\bar{B})$ (iv) $P(\bar{B}/\bar{A})$ (07 Marks)

c. In a bolt factory there are four machines A, B, C, D manufacturing respectively 20%, 15%, 25%, 40% of the total production. Out of these 5%, 4%, 3%, 2% are defective. If a bolt drawn at random was found defective, what is the probability that it was manufactured by A? (07 Marks)

OR

10 a. State and prove Baye's theorem. **(06 Marks)**

b. A card is drawn at random from a pack of cards. (i) What is the probability that it is a heart? (ii) If it is known that the card drawn is red, what is the probability that it is a heart? **(07 Marks)**

c. An Urn 'A' contains 2 white and 4 black balls. Another Urn 'B' contains 5 white and 7 black balls. A ball is transferred from the Urn A to the Urn B. Then a ball is drawn from the Urn B. Find the probability that it is white. **(07 Marks)**

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