Model Question Paper-1 with effect from 2019-20 (CBCS Scheme)

USN ⬜⬜⬜⬜⬜⬜⬜⬜⬜⬜   **18MATDIP41**

Fourth Semester B.E.(CBCS) Examination
Additional Mathematics - II
(Common to all Branches)

Time: **3 Hrs**   Max.Marks: **100**

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

Module-1

1 (a) Find the rank of the following matrix by applying elementary row transformations **(06 Marks)**

$$\begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \end{bmatrix}$$

(b) Solve the following system of linear equations by Gauss elimination method: **(07Marks)**
$5x + 10y + z = 28; x + y + z = 6; 4x + 8y + 3z = 29.$

(c) Find all the eigenvalues and the corresponding eigenvectors of $\begin{bmatrix} -5 & 9 \\ -6 & 10 \end{bmatrix}$ **(07Marks)**

OR

2 (a) Reduce the matrix into its echelon form and hence find its rank **(06 Marks)**
$$\begin{bmatrix} 3 & 2 & 1 \\ 2 & 1 & 1 \\ 6 & 2 & 4 \end{bmatrix}$$

(b) Find all the eigenvalues and the corresponding eigenvectors of **(07Marks)**

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

(c) Solve the system of linear equations $3x + y - z = 3; 2x - 8y + z = -5; x - 2y + 9z = 8,$ **(07Marks)**
by applying Gauss elimination method.

Module-2

3 (a) Find a real root of $x \log_{10} x - 1.2 = 0$, correct to three decimal places lying in the interval **(06 Marks)**
(2,3), by using Regula-Falsi method.

(b) Use an appropriate interpolation formula to compute $f(2.18)$ for the following data **(07Marks)**

x	1.7	1.8	1.9	2.0	2.1	2.2
$f(x)$	5.474	6.050	6.686	7.389	8.166	9.025

(c) Use Weddle's rule to evaluate $\int_{-\pi/2}^{\pi/2} \cos x \, dx$, by dividing $[-\pi/2, \pi/2]$ into six equal parts. **(07Marks)**

OR

4 (a) Find a real root of the equation $x^3 + x^2 + 3x + 4 = 0$ near $x = -1$ correct to four decimal places, by using Newton- Raphson method. **(06 Marks)**

(b) Use an appropriate interpolation formula to compute $f(42)$ for the following data: **(07Marks)**

x	40	50	60	70	80	90
$f(x)$	184	204	226	250	276	304

(c) Using Simpson's $(1/3)^{rd}$ rule, evaluate $\int_0^3 \frac{dx}{(1+x)^2}$ by taking 6 equidistant ordinates. **(07Marks)**

Module-3

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

(b) Solve : $(D^2 - 7D + 10)y = (1 + e^x)^2$. **(07Marks)**

(c) Solve : $(D^2 + 2D + 3)y = \sin x$. **(07Marks)**

OR

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

(b) Solve $\frac{d^2 y}{dx^2} - 4y = \cosh(2x - 1) + 3^x$. **(07Marks)**

(c) Solve $(D^2 + a^2)y = \cos a\, x$. **(07Marks)**

Module-4

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

(b) Form the partial differential equation by eliminating the arbitrary functions from
$z = f(y + 2x) + g(y - 3x)$

(c) Solve $\frac{\partial^2 z}{\partial x \partial y} = \sin x \sin y$, for which $\frac{\partial z}{\partial y} = -2 \sin y$, when $x = 0$ and $z = 0$ when y is odd. **(07Marks)**

OR

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

(b) Form the partial differential equation by eliminating the arbitrary functions from
$z = xf_1(x + y) + f_2(x + y)$. **(07Marks)**

(c) Solve $\frac{\partial^2 z}{\partial x \partial y} = \frac{x}{y}$ for which $\frac{\partial z}{\partial x} = \log x$ when $y = 1$ and $z = 0$ when $x = 1$. **(07Marks)**

Module-5

9 (a) State the axiomatic definition of probability. For any two arbitrary events *A* and *B*, prove that **(06 Marks)**
P($A \cup B$) = P(A) + P(B) − P($A \cap B$).

(b) The probability that a team wins a match is $3/5$. If this team play 3 matches in a tournament, **(07Marks)** what is the probability that the team (i) win and (ii) loose, all the matches.

(c) In an UG class of a reputed engineering college, 70% are boys and 30% are girls; 5% of boys **(07Marks)** and 3% of the girls are irregular to the classes. What is the probability of a student selected at random is irregular to the classes and what is the probability that the irregular student is a girl?

OR

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

(b) The chance that a doctor will diagonise a disease correctly is 60%. The chance that a patient will **(07Marks)** die after correct diagonise is 40% and the chance of death by wrong diagonise is 70%. If a patient dies, what is the chance that his disease was correctly diagonised?

(c) Three students *A,B,C* write an entrance examination, their chances of passing are $1/2, 1/3$ and **(07Marks)** $1/4$ respectively. Find the probability that (i) atleast one of them passes (ii) atleast two of them passes (iii) all of them passes.

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