CBCS SCHEME

USN

17MATDIP41

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 $A = \begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$ by elementary row transformations. **(07 Marks)**

b. Solve the following system of equations by Gauss – Elimination method.
$x + y + z = 9$, $x - 2y + 3z = 8$, $2x + y - z = 3$. **(07 Marks)**

c. Find the Eigen values and the Corresponding Eigen Vectors for the matrix
$A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$. **(06 Marks)**

OR

2 a. Solve the system of equations by Gauss Elimination
$2x + y + 4z = 12$, $4x + 11y - z = 33$, $8x - 3y + 2z = 20$. **(07 Marks)**

b. Using Caley – Hamilton theorem, find the inverse matrix $A = \begin{bmatrix} 2 & 4 \\ 7 & 3 \end{bmatrix}$. **(07 Marks)**

c. Test for Consistency and solve $5x + 3y + 7z = 5$, $3x + 26y + 2z = 9$, $7x + 2y + 10z = 5$. **(06 Marks)**

Module-2

3 a. Solve $\frac{d^3y}{dx^3} + 6\frac{d^2y}{dx^2} + 11\frac{dy}{dx} + 6y = 0$. **(07 Marks)**

b. Solve $y'' + 3y' + 2y = 12x^2$. **(07 Marks)**

c. Solve $\frac{d^2y}{dx^2} + y = \tan x$, by the method of Variation of parameters. **(06 Marks)**

OR

4 a. Solve $y'' - 4y' + 13y = \cos 2x$. **(07 Marks)**

b. Solve $6y'' + 17y' + 12y = e^{-x}$. **(07 Marks)**

c. Solve $y'' - 5y' + 6y = e^{3x}$ by the method of Undetermined coefficients. **(06 Marks)**

Module-3

5 a. Find $L[\cos t \ \cos 2t \ \cos 3t]$. **(07 Marks)**

b. Find $L[t^2 \sin at]$. **(07 Marks)**

c. If $f(t) = t^2$, $0 < t < 2$ and $f(t + 2) = f(t)$ for $t > 2$, find $L[f(t)]$. **(06 Marks)**

OR

6 a. Express $f(t) = \begin{cases} t, & 0 < t < 4 \\ 5, & t > 4 \end{cases}$ in terms of Heaviside unit step function and hence find $L[f(t)]$. **(07 Marks)**

b. Find the $L\left[\int_0^\infty \left(\frac{\cos 6t - \cos 4t}{t}\right)dt\right]$. **(07 Marks)**

c. Find $L[t^n]$, where n is a positive integer. **(06 Marks)**

Module-4

7 a. Find $L^{-1}\left[\frac{s^3 + 6s^2 + 12s + 8}{s^6}\right]$. **(07 Marks)**

b. Find $L^{-1}\left[\frac{1}{s(s+1)(s+2)(s+3)}\right]$. **(07 Marks)**

c. Solve $\frac{d^2y}{dx^2} + k^2y = 0$, given that $y(0) = 2$, $y'(0) = 0$. by using Laplace Transform. **(06 Marks)**

OR

8 a. Find $L^{-1}\left[\text{Log}\left(\frac{s^2+4}{s(s+4)(s-4)}\right)\right]$. **(07 Marks)**

b. Find $L^{-1}\left[\frac{e^{-\pi s}}{s^2+1} + \frac{s\ e^{-2\pi s}}{s^2+4}\right]$. **(07 Marks)**

c. Find $L^{-1}\left[\frac{1}{s(s^2+a^2)}\right]$ by using Convolution theorem. **(06 Marks)**

Module-5

9 a. If A and B are events with $P(A \cup B) = \frac{7}{8}$, $P(A \cap B) = \frac{1}{4}$, $P(A \cap \overline{B}) = \frac{1}{3}$. Find P(A), P(B) and $P(\overline{A} \cap B)$. **(07 Marks)**

b. A problem is given to four students A, B, C, D whose chances of solving it are 1/2, 1/3, 1/4, 1/5 respectively. Find the probability that the problem is solved. **(07 Marks)**

c. The probability of conducting an examination on time is 95%. If there is no delay in admissions and 60% if there is a delay. If the probability that there will be a delay in admission is 20%, find the probability of holding the examination on time. **(06 Marks)**

OR

10 a. Find the probability that a Leap year selected at random will contain 53 Sundays. **(07 Marks)**

b. A student 'A' can solve 75% of the problems given in the book and a student 'B' can solve 70%. What is the probability that A or B can solve a problem chose at random. **(07 Marks)**

c. A box contains 500 IC chips of which 100 are manufactured by Company X and the rest by Company Y. It is estimated that 10% of the chips made by Company X and 5% made by Company Y are defective. If a randomly selected chip is found to be defective, find the probability that it came from Company X. **(06 Marks)**

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