CBCS SCHEME

USN | | | | | | | | | | |

17MATDIP41

Fourth Semester B.E. Degree Examination, Dec.2023/Jan.2024
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 elementary row transformation. $A = \begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$ **(07 Marks)**

b. Investigate the consistency of the following equations and if possible find the solutions. $4x - 2y + 6z = 8$; $x + y - 3z = -1$; $15x - 3y + 9z = 21$. **(07 Marks)**

c. Reduce the following matrix to Echelon form and hence find the ranks of A.

$$A = \begin{bmatrix} 1 & 3 & -1 & 2 \\ 0 & 11 & -5 & 3 \\ 2 & -5 & 3 & 1 \\ 4 & 1 & 1 & 5 \end{bmatrix}.$$ **(06 Marks)**

OR

2 a. Find all the eigen values and the corresponding eigen vectors of the matrix $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$. **(07 Marks)**

b. Apply Gauss elimination method to solve the system of equations, $2x + 5y + 7z = 52$, $2x + y - z = 0$, $x + y + z = 9$ **(07 Marks)**

c. Verify Cayley-Hamilton theorem for the matrix, $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$. Hence compute A^{-1}. **(06 Marks)**

Module-2

3 a. Solve : $\frac{d^3y}{dx^3} - 7\frac{dy}{dx} - 6y = 0$. **(07 Marks)**

b. Solve : $(4D^2 + 4D - 3)y = e^{2x}$. **(07 Marks)**

c. Solve : $(D^2 + 9)y = \sin 4x$ **(06 Marks)**

OR

4 a. Solve : $(D^2 + 5D + 4)y = x^2 + 7x + 9$. **(07 Marks)**

b. Apply the method of variation of parameters to solve $\frac{d^2y}{dx^2} + 4y = 4\sec^2(2x)$. **(07 Marks)**

c. Solve : $(D^2 - 2D + 5)y = 25x^2 + 12$ by the method of undetermined co-efficient. **(06 Marks)**

Module-3

5 a. Find the Laplace transforms of,
$e^{2t}+4t^3-2\sin 3t+3\cos 3t$ **(07 Marks)**

b. Find the Laplace transform sin2t.cos3t **(07 Marks)**

c. Find the Laplace transform of $(t+1)^2.e^t$. **(06 Marks)**

OR

6 a. Find the Laplace transform of, $\frac{(1-\cos t)}{t}$. **(07 Marks)**

b. Find the Laplace transform of,
$f(t)=\begin{cases} t, & 0<t<1 \\ 0, & 1<t<2 \end{cases}$ if $f(t+2)=f(t)$ **(07 Marks)**

c. Find the Laplace transform of $t^2.u(t-2)$. **(06 Marks)**

Module-4

7 a. Find the inverse laplace transforms of, $\frac{4s+15}{16s^2-25}$. **(07 Marks)**

b. Find the inverse Laplace transform of, $\frac{s+2}{s(s+1)(s+3)}$. **(07 Marks)**

c. Find the inverse Laplace transform of, $\frac{s+2}{s^2(s+3)}$ **(06 Marks)**

OR

8 a. Find the inverse laplace transform of $\log\left(\frac{s+a}{s+b}\right)$. **(07 Marks)**

b. Find the inverse laplace transform of $\frac{1}{s(s+1)^3}$. **(07 Marks)**

c. Solve : $\frac{dy}{dt}+2y=e^{-3t}$, $y(0)=1$. **(06 Marks)**

Module-5

9 a. A bag contains 7 white, 6 red and 5 black balls. Two balls are drawn at random. Find the probability that they will both be white. **(07 Marks)**

b. If A and B are any two events, then prove that $P(A\cup B)=P(A)+P(B)-P(A\cap B)$. **(07 Marks)**

c. Define the following terms :
(i) Trial and Event
(ii) Exhaustic Events.
(iii) Mutually exclusive events. **(06 Marks)**

OR

10 a. A has 2 shares in a lottery in which there are 3 prizes and 5 blanks ; B has 3 shares in a lottery in which there are 4 prizes and 6 blanks. Show that A's chance of success is to B's as 27 : 35. **(07 Marks)**

b. State and prove the Baye's theorem. **(07 Marks)**

c. A bag X contains 2 white and 3 red balls and a bag Y contains 4 white and 5 red balls. One ball is drawn at random from one of the bags and is found to be red. Find the probability that it was drawn from bag Y. **(06 Marks)**

* * * * *