CBCS SCHEME

USN | | | | | | | | | |

17MATDIP41

Fourth Semester B.E. Degree Examination, Aug./Sept. 2020
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 $A = \begin{bmatrix} 1 & 2 & 3 & -1 \\ 2 & -1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & -1 \end{bmatrix}$. **(07 Marks)**

b. Find the inverse of the matrix $\begin{bmatrix} 3 & 1 \\ 1 & 2 \end{bmatrix}$ using Cayley-Hamilton theorem. **(07 Marks)**

c. Find the Eigen values of the matrix $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$. **(06 Marks)**

OR

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

b. Using Cayley-Hamilton theorem find A^{-1}, given
$A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$. **(07 Marks)**

c. Find the rank of the matrix by reducing in to row echelon form, given
$A = \begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$. **(06 Marks)**

Module-2

3 a. Solve by method of undetermined co-efficient $y'' - 4y' + 4y = e^x$. **(07 Marks)**

b. Solve $\frac{d^3y}{dx^3} - 2\frac{d^2y}{dx^2} + 4\frac{dy}{dx} - 8y = 0$. **(07 Marks)**

c. Solve $y'' + 2y' + y = 2x$. **(06 Marks)**

OR

4 a. Solve $\frac{d^2y}{dx^2} + y = \sec x \tan x$ by method of variation of parameter. **(07 Marks)**

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

c. Solve $6\frac{d^2y}{dx^2} + 17\frac{dy}{dx} + 12y = e^{-x}$. **(06 Marks)**

Module-3

5 a. Express the following function into unit step function and hence find $L[f(t)]$ given $f(t) = \begin{cases} t, & 0 < t < 4 \\ 5, & t > 4 \end{cases}$. **(07 Marks)**

b. Find $L\left[\dfrac{1-e^{-at}}{t}\right]$. **(07 Marks)**

c. Find $L[t.\cos at]$. **(06 Marks)**

OR

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

b. Find $L\left[e^{-t}\cos^2 3t\right]$. **(07 Marks)**

c. Find $L[\cos 3t.\cos 2t.\cos t]$. **(06 Marks)**

Module-4

7 a. Employ Laplace transform to solve the equation $y'' + 5y' + 6y = 5e^{2x}$ given $y(0) = 2,\ y'(0) = 1$. **(07 Marks)**

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

c. Find $L^{-1}\left[\dfrac{s+5}{s^2-6s+13}\right]$. **(06 Marks)**

OR

8 a. Using Laplace transforms solve $y'' + 4y' + 4y = e^{-t}$ given $y(0) = 0,\ y'(0) = 0$. **(07 Marks)**

b. Find $L^{-1}\left[\log\left(\dfrac{s+a}{s+b}\right)\right]$. **(07 Marks)**

c. Find $L^{-1}\left[\dfrac{2s-5}{4s^2+25}\right] + L^{-1}\left[\dfrac{8-6s}{16s^2+9}\right]$. **(06 Marks)**

Module-5

9 a. State and prove Baye's theorem. **(07 Marks)**

b. A shooter can hit a target in 3 out of 4 shots and another shooter can hit the target in 2 out of 3 shots. Find the probability that the target is being hit.
   (i) When both of them try.
   (ii) By only one shooter. **(07 Marks)**

c. If A and B are any two mutually exclusive events of S, then show that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$. **(06 Marks)**

OR

10 a. Three machines A, B and C produce respectively 60%, 30%, 10% of the total number of items of a factory. The percentages of defective out put of these machines are respectively 2%, 3% and 4%. An item is selected at random and is found defective. Find the probability that the item non produced by machine C. **(07 Marks)**

b. Prove the following : (i) $P(\phi) = 0$ (ii) $P(\overline{A}) = 1 - P(A)$ **(07 Marks)**

c. If A and B are events with $P(AUB) = \dfrac{7}{8}$, $P(A \cap B) = \dfrac{1}{4}$ and $P(\overline{A}) = \dfrac{5}{8}$ find P(A), P(B) and $P(A \cap \overline{B})$. **(06 Marks)**

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