

CBCS SCHEME

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17MATDIP41

Fourth Semester B.E. Degree Examination, Dec.2019/Jan.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:

$$A = \begin{vmatrix} 2 & 3 & 5 & 4 \\ 0 & 2 & 3 & 4 \\ 4 & 8 & 13 & 12 \end{vmatrix}$$

by elementary row transformations.

(08 Marks)

b. Solve by Gauss elimination method

$$2x + y + 4z = 12$$

$$4x + 11y - z = 33$$

$$8x - 3y + 2z = 20$$

(06 Marks)

c. Find all the eigen values for the matrix A

$$A = \begin{vmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{vmatrix}$$

(06 Marks)

OR

2 a. Reduce the matrix

$$\begin{vmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{vmatrix}$$

into its echelon form and hence find its rank.

(06 Marks)

b. Applying Gauss elimination method, solve the system of equations

$$2x + 5y + 7z = 52$$

$$2x + y - z = 0$$

$$x + y + z = 9$$

(06 Marks)

$$\begin{vmatrix} 7 & -2 & 0 \\ 2 & 6 & -2 \\ 0 & -2 & 5 \end{vmatrix}$$

c. Find all the eigen values for the matrix A =

$$\begin{vmatrix} 2 & 6 & -2 \\ 0 & -2 & 5 \end{vmatrix}$$

(08 Marks)

Module-2

 3 a. Solve $\frac{d^4 y}{dx^4} - 2\frac{d^2 y}{dx^2} + \frac{d^2 y}{dx^2} = 0$

(06 Marks)

 b. Solve $\frac{d^2 y}{dx^2} + 9y = 5e^{-2x}$

(06 Marks)

 c. Solve $\frac{d^2 y}{dx^2} + y = \sec x$ by the method of variation of parameters.

(08 Marks)

OR

 4 a. Solve $\frac{dy}{dx} + y = 0$

(06 Marks)

 b. Solve $y'' + 3y' + 2y = 12x^2$

(06 Marks)

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c. Solve by the method of undetermined coefficients :

$$y'' - 4y' + 4y = e^x$$

(08 Marks)

Module-3

5 a. Find the Laplace transforms of $\sin 5t \cos 2t$

(06 Marks)

b. Find the Laplace transforms of $(3t + 4)^3$

(06 Marks)

c. Express $f(t) = \begin{cases} \sin 2t & 0 < t < \pi \\ 0 & \text{in} \end{cases}$

in terms of unit step function and hence find $L[f(t)]$.

(08 Marks)

OR

6 a. Find the Laplace transforms of $\frac{1}{t}$

(06 Marks)

b. Find the Laplace transform of $2' + t \sin t$

(06 Marks)

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

(08 Marks)

Module-4

7 a. Find the Laplace Inverse of

$$\frac{3s + 7}{(s + 1)(s - 1)(s + 2)}$$

(08 Marks)

b. Find the inverse Laplace transform of $\frac{3s + 7}{s^2 - 2s - 3}$

(06 Marks)

c. Solve $y'' + 2y' - 3y = \sin t$, $y(0) = 0$, $y'(0) = 0$

(06 Marks)

OR

8 a. Find the inverse Laplace transform of

$$\log \frac{s + a}{s + b}$$

(06 Marks)

b. Find the inverse Laplace transform of $\frac{4s - 1}{s^2 + 25}$

(06 Marks)

c. Find the inverse Laplace of $y'' - 5y' + 6y = e^t$ with $y(0) = y'(0) = 0$.

(08 Marks)

Module-5

9 a. State and prove Addition theorem on probability.

(05 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 chosen at random. (06 Marks)

c. Three machines A, B, C produce 50%, 30% and 20% of the items in a factory. The percentage of defective outputs of these machines are 3, 4 and 5 respectively. If an item is selected at random, what is the probability that it is defective? If a selected item is defective, what is the probability that it is from machine A? (09 Marks)

OR

10 a. Find the probability that the birth days of 5 persons chosen **at random** will fall in 12 different calendar months. (05 Marks)

b. A box A contains 2 white balls and 4 black balls. Another box B contains 5 white balls and 7 black balls. A ball is transferred from box A to box B. Then a ball is drawn from box B. Find the probability that it is white. (06 Marks)

c. State and prove Baye's theorem. (09 Marks)
