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:

$$A = \begin{bmatrix} 2 & 3 & 5 & 4 \\ 0 & 2 & 3 & 4 \\ 4 & 8 & 13 & 12 \end{bmatrix}$$ 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 $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ **(06 Marks)**

OR

2 a. Reduce the matrix
$$\begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$$ 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)**

c. Find all the eigen values for the matrix $A = \begin{bmatrix} 7 & -2 & 0 \\ 2 & 6 & -2 \\ 0 & -2 & 5 \end{bmatrix}$ **(08 Marks)**

Module-2

3 a. Solve $\frac{d^4y}{dx^4} \; \frac{2d^3y}{dx^3} \; \frac{d^2y}{dx^2} = 0$ **(06 Marks)**

b. Solve $\frac{d^2y}{dx^2} \; \frac{6dy}{dx} + 9y = 5e^{-2x}$. **(06 Marks)**

c. Solve $\frac{d^2y}{dx^2} + y = \sec x$ by the method of variation of parameters. **(08 Marks)**

OR

4 a. Solve $\frac{d^2y}{dx^2} \; y = 0$ **(06 Marks)**

b. Solve $y'' + 3y' + 2y = 12x^2$ **(06 Marks)**

c. Solve by the method of undetermined coefficients :
$y'' - 4y' + 4y = e^x$ **(08 Marks)**

Module-3

5 a. Find the Laplace transforms of sin5t cos2t **(06 Marks)**
b. Find the Laplace transforms of $(3t + 4)^3$ **(06 Marks)**
c. Express f(t) sin 2t 0 < t <
0 tin
in terms of unit step function and hence find L[f(t)]. **(08 Marks)**

OR

6 a. Find the Laplace transforms of . 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) = fft) , for t > 2, find L[Rt)j. **(08 Marks)**

Module-4

7 a_ Find the Laplace Inverse of

$$\frac{}{(s+1)(s-1)(s+2)}$$ **(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) **(06 Marks)**

OR

8 a. Find the inverse Laplace transform of

$\log \frac{+a}{s+b}$ 1 **(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' with y(0) = yr(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, vvrhat 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)**

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