USN | | | | | | | | | | | **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.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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 $\frac{d^3y}{dx^3} + y = 0$ **(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 $\sin 5t \cos 2t$ **(06 Marks)**

b. Find the Laplace transforms of $(3t+4)^3$ **(06 Marks)**

c. Express $f(t) = \begin{cases} \sin 2t & 0 < t < \pi \\ 0 & t > \pi \end{cases}$, in terms of unit step function and hence find $L[f(t)]$. **(08 Marks)**

OR

6 a. Find the Laplace transforms of $\dfrac{\sin^2 t}{t}$ **(06 Marks)**

b. Find the Laplace transform of $2^t + t \sin t$ **(06 Marks)**

c. If $f(t) = t^2$, $0 < t < 2$ and $f(t+2) = f(t)$, for $t > 2$, find $L[f(t)]$. **(08 Marks)**

Module-4

7 a. Find the Laplace Inverse of $\dfrac{1}{(s+1)(s-1)(s+2)}$ **(08 Marks)**

b. Find the inverse Laplace transform of $\dfrac{3s+7}{s^2-2s-3}$. **(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 $\log\left(\dfrac{s+a}{s+b}\right)$ **(06 Marks)**

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

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