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17MATDIP41

Fourth Semester B.E. Degree Examination, June/July 2019 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 $\begin{bmatrix} 2 & 3 & 4 \\ -1 & 2 & 3 \\ 1 & 5 & 7 \end{bmatrix}$ by elementary row operations. (08 Marks)
- b. Test for consistency and solve $x + y + z = 6$, $x - y + 2z = 5$, $3x + y + z = 8$. (06 Marks)
- c. Solve the system of equations by Gauss elimination method : (06 Marks)
 $x + y + z = 9$ $x - 2y + 3z = 8$ $2x + y - z = 3$

OR

- 2 a. Find all the eigen values and the corresponding eigen vectors of the matrix (08 Marks)

$$A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$$
- b. Solve by Gauss elimination method $x_1 - 2x_2 + 3x_3 = 2$, $3x_1 - x_2 + 4x_3 = 4$, $2x_1 + x_2 - 2x_3 = 5$. (06 Marks)
- c. If $A = \begin{bmatrix} 2 & -3 \\ 3 & 4 \end{bmatrix}$ find A^{-1} by Cayley Hamilton theorem. (06 Marks)

Module-2

- 3 a. Solve $\frac{d^3y}{dx^3} - 2\frac{d^2y}{dx^2} + 4\frac{dy}{dx} - 8y = 0$. (08 Marks)
- b. Solve $6\frac{d^2y}{dx^2} + 17\frac{dy}{dx} + 12y = e^{-x}$. (06 Marks)
- c. Solve $y'' - 4y' + 13y = \cos 2x$. (06 Marks)

OR

- 4 a. Solve $\frac{d^3y}{dx^3} + 6\frac{d^2y}{dx^2} + 11\frac{dy}{dx} + 6y = 0$. (08 Marks)
- b. Solve $y'' + 2y + y = \frac{e^{\frac{x}{2}} + e^{-\frac{x}{2}}}{2}$. (06 Marks)
- c. Solve $y'' + 2y' + y = 2x + x^2$. (06 Marks)

Module-3

- 5 a. Find $L[\cosh at]$. (08 Marks)
- b. Find $L[e^{-2t} \sinh 4t]$ (06 Marks)
- c. Find $R\{\sin 2t\}$. (06 Marks)



OR

- 6 a. Show that $\int_0^{\infty} t^3 e^{-st} \sin t dt = 0$. (08 Marks)
- b. If $f(t) = t^2$, $0 < t < 2$ and $f(t+2) = f(t)$ for $t > 2$, find $L[f(t)]$. (06 Marks)
- c. Express $f(t) = \begin{cases} t, & 0 < t < 4 \\ 5, & t > 4 \end{cases}$ in terms of unit step function and hence find their Laplace Transforms. (06 Marks)

Module-4

- 7 a. Find the inverse Laplace Transform of $\frac{3}{s^2} + \frac{2e^{-s}}{s^3} - \frac{3e^{-2s}}{s}$. (08 Marks)
- b. Find $L^{-1}\left[\frac{s^3 + 6s^2 + 12s + 8}{s^6}\right]$. (06 Marks)
- c. Find the inverse Laplace Transform of $\frac{s+5}{s^2 - 6s + 13}$. (06 Marks)

OR

- 8 a. Solve by using Laplace Transform $\frac{d^2 y}{dt^2} + k^2 y = 0$, given that $y(0) = 2$, $y'(0) = 0$. (08 Marks)
- b. Find inverse Laplace Transform of $\frac{1}{(s+1)(s+2)(s+3)}$. (06 Marks)
- c. Find $L^{-1}\left[\frac{s+1}{s^2 + 6s + 9}\right]$. (06 Marks)

Module-5

- 9 a. Find the probability that a leap year selected at random will contain 53 Sundays. (08 Marks)
- b. A six faced die on which the numbers 1 to 6 are marked is thrown. Find the probability of (i) 3 (ii) an odd number coming up. (06 Marks)
- c. State and prove Bayes's theorem. (06 Marks)

OR

- 10 a. A problem is given to three students A, B, C whose chances of solving it are $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$ respectively. Find the probability that the problem is solved. (08 Marks)
- b. For any three events A, B, C, prove that $P\{(A \cup B)/C\} = P(A/C) + P(B/C) - P\{(A \cap B)/C\}$. (06 Marks)
- c. Three machines A, B and C produce respectively 60%, 30% and 10% of the total number of items of a factory. The percentages of defective output 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 was produced by machine C. (06 Marks)

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