CBCS SCHEME

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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 :
$x+y+z=9$ $x-2y+3z=8$ $2x+y-z=3$ **(06 Marks)**

OR

2 a. Find all the eigen values and the corresponding eigen vectors of the matrix
$A=\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ **(08 Marks)**

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 $\frac{d^3y}{dx^2}-2\frac{d^2y}{dx^2}+4\frac{dy}{dx}-8y=0$. **(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 $R\{t\sin 2t\}$. **(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 $\frac{d^2y}{dt^2} + k^2 y = 0$, 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 Bayee'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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