CBCS SCHEME

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17MATDIP41

Fourth Semester B.E. Degree Examination, Feb./Mar. 2022
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 by elementary row transformation:
$$\begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$$ (06 Marks)

b. Solve the following system of linear equations by Gauss elimination method:
$x + y + z = 9$; $x - 2y + 3z = 8$; $2x + y - z = 3$ (07 Marks)

c. Find the eigen values and eigen vectors of the matrix $\begin{bmatrix} 1 & -2 \\ -5 & 4 \end{bmatrix}$. (07 Marks)

OR

2 a. Find the rank of the matrix by elementary row transformation
$$\begin{bmatrix} 1 & 2 & 3 \\ 1 & 4 & 2 \\ 2 & 6 & 5 \end{bmatrix}$$ (06 Marks)

b. Use Cayley-Hamilton theorem to find the inverse of $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$. (07 Marks)

c. Test for consistency and solve $x + y + z = 6$, $x - y + 2z = 5$, $3x + y + z = 8$. (07 Marks)

Module-2

3 a. Solve $(D^3 - 2D^2 + 4D - 8)y = 0$ where $D = \frac{d}{dx}$. (06 Marks)

b. Solve $(6D^2 + 17D + 12)y = e^{-x}$, where $D = \frac{d}{dx}$ (07 Marks)

c. Solve $(D^2 + a^2)y = \sec ax$ by the method of variation of parameters. (07 Marks)

OR

4 a. Solve $(D^3 - 3D + 2)y = 0$ where $D = \frac{d}{dx}$. (06 Marks)

b. Solve $(D^2 - 4D + 13)y = \cos 2x$ where $D = \frac{d}{dx}$. (07 Marks)

c. Solve $(D^2 + 2D + 1)y = 2x + x^2$ where $D = \frac{d}{dx}$. (07 Marks)

Module-3

5 a. Find the Laplace transform of the function $L\{e^{-2t}(2\cos 5t - \sin 5t)\}$. **(06 Marks)**

b. Find the Laplace transform of the function $L\{t \cdot \cos at\}$. **(07 Marks)**

c. If $f(t) = t^2, 0 < t < 2$, and $f(t+2) = f(t)$, for $t > 2$, find $L\{f(t)\}$ **(07 Marks)**

OR

6 a. Find the Laplace transform of the function $L\{e^{3t} \sin 5t \sin 3t\}$. **(06 Marks)**

b. Find the Laplace transform of $\dfrac{e^{-at} - e^{-bt}}{t}$. **(07 Marks)**

c. Find the Laplace transform of the function $L\{3t^2 + 4t + 5\}.u(t-3)$. **(07 Marks)**

Module-4

7 a. Find the inverse Laplace transform of the function $\left\{\dfrac{1}{s+2} + \dfrac{3}{2s+5} - \dfrac{4}{3s-2}\right\}$. **(06 Marks)**

b. Find the inverse Laplace transform of the function $\dfrac{3s+2}{(s-2)(s+1)}$. **(07 Marks)**

c. Solve by using Laplace transforms $\dfrac{d^2y}{dt^2 + K^2y = 0}$ given that $y(0) = 2, y'(0) = 0$. **(07 Marks)**

OR

8 a. Find the inverse Laplace transform of the function $\left\{\dfrac{s+2}{s^2+36} + \dfrac{4s-1}{s^2+25}\right\}$. **(06 Marks)**

b. Find the inverse Laplace transform of the function $\dfrac{s+2}{s^2(s+3)}$. **(07 Marks)**

c. Solve $\dfrac{d^2y}{dt^2} + 4\dfrac{dy}{dt} + 4y = e^{-t}$, $y(0) = 0, y'(0) = 0$ by using Laplace transform method. **(07 Marks)**

Module-5

9 a. A bag contains 7 white, 6 red and 5 black balls, two balls are drawn at random. Find the probability that they will both be white. **(06 Marks)**

b. If A and B are any two events, then prove that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$. **(07 Marks)**

c. State and prove Bayee's theorem. **(07 Marks)**

OR

10 a. A has 2 shares in a lottery in which there are 3 prizes and 5 blanks; B has 3 shares in a lottery in which there are 4 prizes and 6 blanks. Show that A's chance of success is to B's as 27:35. **(06 Marks)**

b. A card is drawn from a well-shuffled pack of playing cards. What is the probability that it is either a spade or an ace? **(07 Marks)**

c. A bag X contains 2 white and 3 red balls and a bag Y contains 4 white and 5 red balls. One ball is drawn at random from one of the bags and is found to the red. Find the probability that it was drawn from bag Y. **(07 Marks)**

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