

Model Question Paper (CBCS) with effect from 2018-19

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17MATDIP41

Fourth Semester B.E.(CBCS) Examination Additional Mathematics - II

(Common to all Branches)

Time: 3 Hrs

Max.Marks: 100

Note: Answer any FIVE full questions, choosing at least ONE question from each module.

Module-I

1. (a) Find the rank of the matrix $\begin{bmatrix} 1 & 2 & 0 & 1 \\ 3 & 4 & 1 & 2 \\ -2 & 3 & 2 & 5 \end{bmatrix}$ by elementary applying row transformations. (06 Marks)
- (b) Solve the following system of linear equations by Gauss elimination method:
 $5x + 10y + z = 28; x + y + z = 6; 4x + 8y + 3z = 29.$ (07 Marks)
- (c) Find the inverse of the matrix $\begin{bmatrix} 1 & 3 \\ 1 & -4 \end{bmatrix}$ using Cayley-Hamilton theorem. (07 Marks)

OR

2. (a) Find all the eigenvalues and eigenvector corresponding the smallest eigenvalue of $\begin{bmatrix} 4 & 2 & 1 \\ 2 & 5 & -2 \\ 1 & -2 & 7 \end{bmatrix}$ (06 Marks)
- (b) Reduce the matrix $\begin{bmatrix} 3 & 2 & 1 \\ 2 & 1 & 1 \\ 6 & 2 & 4 \end{bmatrix}$ into its echelon form and hence find its rank. (07 Marks)
- (c) Solve the system of linear equations $2x + y + z = 7; x + 3y + z = 10; x + y + z = 15$ by applying Gauss elimination method. (07 Marks)

Module-II

3. (a) Solve: $(D^3 - 5D^2 + 8D - 4)y = e^{2x}$, where $D = d/dx$ (06 Marks)
- (b) Solve: $(D^2 + D + 1)y = (1 - e^x)^2$, where $D = d/dx$ (07 Marks)
- (c) Solve: $(D^2 + a^2)y = \sec ax$ by the method of variation of parameters. (07 Marks)
- OR**
4. (a) Solve: $(D^3 - 7D + 6)y = 1 - x + x^2$, where $D = d/dx$ (06 Marks)
- (b) $(D^2 - 3D + 2)y = \cosh x$, where $D = d/dx$ (07 Marks)
- (c) Solve: $(D^2 - 2D + 3)y = x^3 + \cos x$ by the method of undetermined coefficients. (07 Marks)

Module-III

5. (a) Find the Laplace transforms of (i) $L\{5\sqrt{t} + 6/\sqrt{t}\}$ (ii) $(1 - e^t)/t$ (06 Marks)
 (b) Find (i) $t^2 \sin 3t$ (ii) $L\{\sin t \sin 2t\}$ (07 Marks)
 (c) Find the Laplace transform of $f(t) = \begin{cases} E, & 0 \leq t \leq a/2 \\ -E, & a/2 \leq t \leq a \end{cases}$ where $f(t+a) = f(t)$. (07 Marks)

OR

6. (a) Find the Laplace transforms of (i) $[\sqrt{t} + 1/\sqrt{t}]^3$ (ii) $e^{3t} \cos 5t$ (06 Marks)
 (b) Find (i) $L\{(1 + e^{-4t})^2\}$ (ii) $L\{e^t \sin^2 t\}$ (07 Marks)
 (c) Express $f(t) = \begin{cases} t & 0 \leq t \leq 4 \\ 5, & t > 4 \end{cases}$ in terms of unit step function and hence find $L\{f(t)\}$. (07 Marks)

Module-IV

7. (a) Using Laplace transforms, solve $\frac{d^2 y}{dt^2} + 4\frac{dy}{dt} + 4y = e^{-t}$ subject to the initial conditions $y(0) = 0 = y'(0)$ (06 Marks)
 (a) Find the inverse Laplace transforms of (i) $L^{-1}\{(s+4)^3/s^6\}$ (ii) $L^{-1}\{(2s-1)/(s^2+4s+29)\}$ (07 Marks)
 (c) Find (i) $L^{-1}[\log\{(s+4)/(s-4)\}]$ (ii) $L^{-1}[4s+5/\{(s+2)(s+1)^2\}]$ (07 Marks)

OR

8. (a) By applying Laplace transforms, solve $\frac{d^2 y}{dx^2} + 4\frac{dy}{dx} + 3y = 10 \sin t$ subject to the initial conditions $y(0) = 0 = y'(0)$. (06 Marks)
 (a) Find the inverse Laplace transforms of (i) $L^{-1}\{3s + 5\sqrt{5}/(s^2 + 8)\}$ (ii) $L^{-1}\{(s+1)/(s^2 + 6s + 9)\}$ (07 Marks)
 (c) Find (i) $L^{-1}[\tan^{-1}(2/s^2)]$ (ii) $L^{-1}\{3s + 2/(s^2 - s - 2)\}$ (07 Marks)

Module-V

9. (a) Define conditional probability. For any two events A and B , prove that $P(A \cap B) = P(A)P(B/A)$. (06 Marks)
 (b) The probability that 3 students A, B, C solve a problem is $1/2, 1/3, 1/4$ respectively. If the problem is simultaneously assigned to all of them, what is the probability that the problem is solved? (07 Marks)
 (c) An office has 4 secretaries handling respectively 20%, 60%, 15% and 5% of the files of all government reports. The probability that they misfile such reports is respectively, 0.05, 0.1, 0.1 and 0.05. Find the probability that the misfiled report can be blamed on the first secretary. (07 Marks)

OR

10. (a) State and prove Bayes's theorem. (06 Marks)
 (b) The chance that a doctor will diagnose a disease correctly is 60%. The chance that a patient will die after correct diagnose is 40% and the chance of death by wrong diagnosis is 70%. If a patient dies, what is the chance that his disease was correctly diagnosed? (07 Marks)
 (c) A pair of dice is tossed. Find the probability of scoring "7" points? (07 Marks)