

Question Bank for III- internal

Part-1

A. Solve the following diff. equations by variation of parameters method.

1. Solve $(D^2 - 2D + 1)y = \frac{e^x}{x}$.
2. Solve $y'' - 6y' + 9y = \frac{e^{3x}}{x^2}$.
3. Solve $(D^2 - 2D + 1)y = e^x \log x$
4. Solve $(D^2 + 1)y = \sec x$.

B.

1. Solve $x^2 y'' - xy' + y = \log x$.
2. Solve $x^3 y''' + 3x^2 y'' + xy' + 8y = 65 \cos(\log x)$.
3. Solve $(1+x)^2 y'' + (1+x)y' + y = 4 \cos(\log(1+x))$.
4. Solve $(2x+3)^2 y'' - (2x+3)y' - 12y = 6x$.

Part-II (Similar questions for the III-internal)

1. Find the rank of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 1 & 4 & 2 \\ 2 & 6 & 5 \end{bmatrix}$
2. Find the rank of the matrix $\begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 2 & 1 & -1 & 1 \\ 1 & 1 & -2 & 0 \end{bmatrix}$
3. For what values of λ and μ do the system of equations: $2x + 3y + 5z = 9$, $7x + 3y - 2z = 8$, $2x + 3y + \lambda z = \mu$ have (i) no solution (ii) unique solution (iii) infinite solutions.
4. Test for consistency of the system $x + y + z = 3$, $2x + y + 3z = 5$, $x + 2y = 3$.
5. Applying Gauss elimination method solve the above system of equations, $2x + 3y - z = 5$, $4x + 4y - 3z = 3$, $2x - 3y + 2z = 2$.
6. Applying Gauss Jordan method solve, $x + y + z = 6$, $x - 2y + 3z = 8$, $2x + y - z = 3$.
7. Solve by Gauss-Seidel method $2x + y + 6z = 9$, $8x + 3y + 2z = 13$, $x + 5y + z = 7$. Carry out 4 iterations.
8. Solve by Gauss-Seidel method $83x + 11y - 4z = 95$, $7x + 52y + 13z = 104$, $3x + 8y + 29z = 71$. Carry out 3 iterations.
9. Find the Eigen values and Eigen vectors of the matrices $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$

10. Find the Eigen values and Eigen vectors of the following matrices $\begin{bmatrix} 3 & 1 & 1 \\ 1 & 3 & -1 \\ 1 & -1 & 3 \end{bmatrix}$.

11. Find the largest Eigen value and corresponding Eigen vector of the matrix by power method

$$\begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}, X_0 = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} . \text{ Carry out 4 iterations.}$$

12. Find the largest Eigen value and corresponding Eigen vector of the matrix by power method

$$\begin{bmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & -4 \end{bmatrix}, X_0 = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} . \text{ Carry out 4 iterations.}$$

Question paper pattern

Part- I		
1. a) 4 Marks b) 4 Marks	Or	2. a) 4 Marks b) 4Marks
Part- 2		
3. a) 4 Marks b) 4 Marks c) 4 Marks	Or	4. a) 4 Marks b) 4 Marks c) 4 Marks