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|  | **JAIPUR ENGINEERING COLLEGE AND RESEARCH CENTRE**  **JECRC Campus, Shri Ram Ki Nangal, Via-Vatika,Jaipur** |

**Department of Mathematics**

**Question Bank**

**Academic Year – 2020-21**

**Subject: Engineering Mathematics-2**

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| **Course Outcomes** | |
| **CO1** | **To understand the concept of rank of matrix, inverse, Eigen values &amp; vectors along with solution of linear simultaneous equation determine inverse of a matrix using Cayley Hamilton Theorem.** |
| **CO2** | **To solve Ordinary D.E of first order, first degree and first order higher degree using various methods.** |
| **CO3** | **To find the complete solution of D.E of higher order with constant coefficient & variable coefficients & their methods of solution** |
| **CO4** | **To solve partial differential equations with its applications in Laplace equation, Heat & Wave equation** |

Q1. An ordinary differential equation is given below. Find its general solution

(Gate CE 2020)

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Q2. A 4 X 4 matrix is given below . Find its Eigen Values

(Gate CE 2020)

Q3. Consider the homogeneous equation Find its general solution given that y(1) =1 and y(2) = 14. Also find y(1.5) (Gate EE 2019)

Q4. For the differential equation with y(0) = 2.25, Find the general solution. (Gate ME 2019)

Q5. The solution of the differential equations in terms of constants is

Q6. The families of curves represented by the solution of the equation , for n=1 and n=-1 respectively. (Gate E&C 2019)

Q.7 An ordinary differential equation is given herewith. Find its solution

(Gate CE 2019)

Q8. The inverse of the matrix is………… (Gate CE 2019)

Q9. If X is an invertible square matrix then comment on its determinant.

(Gate CSE 2019)

Q10. The rank of the matrix is M = (Gate EE 2019)

Q11. Find the general solution of the differential equation y=(2y4+2x)y′.

Q12. Solve the DE

Q13.Solve the following differential equation:(2y2+3x)dx+2xydy=0.

Q14. Solve (y + xy2 )dx − xdy = 0.

Q15. Solve the equation y′′+25y=0.

Q16. Solve t y″ + 4 y′ = t 2

Q17. If a particular integral of the differential equation (D2+2D−1)y=eax is (−4/7)eax then the value of a is ?

Q18. Solve the differential equation .

Q19. Solve equation .

Q20. Solve the equation (2D2 + D – 1)y = 16cos2x

Q21. Solve the differential equation (D4 + 16D2 )y = x2 + 5.

Q22. Solve , using method of variation of parameter.

Q23. Solve .

Q24. Solve the differential equation

Q25. Solve

Q26. Solve ,

Q 27. Find the rank of the following matrix

Q28. Verify Cayley-Hamilton theorem for the matrix and find its inverse . Also express as linear polynomial in .

Q29. Find the Eigen value and Eigen vector of the matrix

Q30. Find the value of a and b for which the equation

x+ay+z=3 , x+2y+2z=b ,x+5y+3z=9 are consistent. When these equation have solution.

Q31. Reduce the matrix to the diagonal form.

Q 32. Solve the following equation by the method of separation of variable: given when

Q33. Using the method of separation of variables Solve where

Q34. Find all the regular singular and irregular singular points of the differential equation (x 2 − 4)2 y’’ + (x − 2)y’ + y = 0.

Q 35. Solve

Q36. Solve where m is a constant.

Q37. Find the complete integral of q=3p2 using Charpits method.

Q38. Find the complete integral of pxy +pq+qy= yz.

Q39. Solve in series the equation − 𝒙𝒚 = 𝟎.

Q40. Solve the following differential equations in series + 𝑥 + 𝑦 = 0.

Q41. Solve

Q42. Solve

Q43. Solve

Q44. Solve

Q45. Explain the classification of second order partial differential equations.

Q46. State and prove Cayley – Hamilton theorem.

Q47. Write the auxiliary equation of Charpit’s method.

Q48. Reduce the following matrix into its normal form and hence find its Rank

Q49. Write two dimensional heat, wave and laplace equations.

Q50. Discuss the method of variation of parameters