Code No: F-13010/O/AICTE

FACULTY OF ENGINEERING

B.E. II - Semester (AICTE) (Backlog) (Old) Examination, February/March 2024

Subject: Mathematics-II

ime: 3 Hours **Max. Marks: 70**

(Missing data, if any, may be suitably assumed)

PART – A

ote: Answer all the questions. **(10 x 2 = 20 Marks)**

1. Define Echelon form of a matrix.
2. If 1, -1,2 are the eigen values of the Matrix A then Eigen values of the matrix $B = A^3 - A^{-1} + I$.
3. Find the integrating factor of $x^2ydx-(x^3+y^3)dy=0$.
4. Solve (y-px)(p-1)=p.
5. If $(\alpha \pm i\beta)$ and $(\gamma \pm i\delta)$ are the roots of the Auxiliary equation of a differential equation then write the complimentary function.
6. Write the Particular integral of $(D^2 + 4)y = sin2x$.
7. Define ordinary and singular points.
8. Determine the value of $P_2(x)$ using Rodrigue's formula.
9. State and prove change of scale property.
10. Find the Laplace transform of $e^{2t} + 4t^3 - 2sin3t + 3cos3t$.

PART – B

ote: Answer any five questions. **(5 x 10 = 50 Marks)**

11. Reduce the quadratic form $6x^2 + 3y^2 + 3z^2 - 2yz + 4zx - 4xy$ to the canonical form by orthogonalization. Also, find the rank, index, signature.

12. a) Find the general solution to the differential equation $y' = y^2 - (2x - 1)y + x^2 - x + 1$ if y=x is one of the solution to the differential equation.

    b) Solve $\frac{dy}{dx} + \frac{y}{x} = y^2x$.

13. Solve $(D^4 + D^2 + 1)y = ax^2 + be^{-x}sin2x$.

14. Obtain the relation between Beta and Gamma function.

15. a) Find $L^{-1}\left\{\frac{s}{(s+3)^2+4}\right\}$.

    b) Solve the differential equation $(D^2 + 4D + 4)y = e^{-t}$ given $y(0) = 0$ and $y'(0) = 0$.

16. a) Find the orthogonal trajectories of $r = a(1 - cos\theta)$, where 'a' is a parameter.

    b) Solve the system of equations $2x + 6y + 11 = 0, 6x + 20y - 6z + 3 = 0, 6y - 18z + 1 = 0$.

17. a) Solve $y'' + y = secx$.

    b) Evaluate $L\{te^tsint\}$.

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