Code No. 2882/AICTE/M

FACULTY OF ENGINEERING

B.E. II-Semester (AICTE) (Main & Backlog) Examination, November 2020

Subject : Mathematics - II

Time : 2 Hours **Max. Marks: 70**

Note: Answer Any five Questions from Part-A & Any Four Questions From Part-B.

PART – A (5x4=20 Marks)

1 Examine whether the vector (1, 2,), (3, 4), (3, 7) are linearly independent.
2 If 1, -1, 2 are the eigen values of a 3 x 3 matrix A, find the determinant of the matrix $A^3 - 2A^{-1} + I$.
3 Define exact differential equation.
4 Find the singular solution of the Clairant's equation $y + xy' - \frac{1}{y'}$.
5 Find the complementary function of $(D^2 + D + 1)^2 y = e^x \tan x$.
6 Solve $x\frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$.
7 Evaluate $\Gamma\left(-\frac{3}{2}\right)$.
8 State Rodrigue's formula and hence find $P_2(x)$.
9 Find $L\{e^{-t} \sin t \cos t\}$
10 Evaluate $\int_0^\infty \frac{\sin t}{t} dt$ using Laplace transform.

PART – B (4x15=60 Marks)

11 (a) Test for consistency and hence solve the following system of equations.

$$x_1 + 2x_2 + x_3 = 2,\quad 3x_1 + x_2 - 2x_3 = 1,\quad 4x_1 - 3x_2 - x_3 = 3,\quad 2x_1 + 4x_2 + 2x_3 = 4$$

(b) Find the characteristics equation of $A = \begin{pmatrix} 4 & 3 & 1 \\ 2 & 1 & -2 \\ 1 & 2 & 1 \end{pmatrix}$ and hence find A^{-1}.

12 (a) Solve $(3x^2y^4 + 2xy)dx + (2x^3y^3 - x^2)dy = 0$ .p
(b) Find the orthogonal trajectories of the family of parabolas $y^2 = 2cx + c^2$.

13 (a) Find the general solution of the differential equation

$$\frac{d^3y}{dx^3} - y = (e^x + 1)^2 .$$

(b) Solve $y'' + 2y' + 2y = e^{-x} \cos x$ by the method of variation of parameters.

14 (a) Evaluate $\int_0^1 \frac{dx}{\sqrt{1 - x^4}}$ using Beta and Gamma functions.

(b) Show that $P_{2n}(0) = (-1)^n \frac{1.3.5......(2n-1)}{2.4.6.......2n}$ and $P_{2n+1}(0)=0$.

15 (a) Find the inverse Laplace transform of $\log\left(\frac{5+a}{5+b}\right)$.

(b) Apply Laplace transforms to solve $y'' + y = 3\cos 2x$, $y'(0) = 0 = y(0)$.

16 Reduce the quadratic form $Q = 2(xy + yz + zx)$ to Canonical form using orthogonal transformation.

17 (a) Show that $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$.

(b) Apply convolution theorem to find $L^{-1}\left\{\frac{s}{(s^2+1)(s-1)}\right\}$.

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