**C** **Reg. No. :** | | | | | | | | | | |

**Question Paper Code: 51026**

M.E. DEGREE EXAMINATION, APRIL 2019

First Semester

Power Electronics and Drives

15PMA126 – APPLIED MATHEMATICS FOR ELECTRICAL ENGINEERS

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART - A (5 x 1= 5 Marks)

1. Every matrix of order m x n can be factor into two product of Q having vectors of its columns and matrix R CO1- R

(a) Upper triangular (b) Lower triangular (c) Orthogonal (d) Equivalent

2. Total number of allotment in transportation problem for m rows and n columns CO2 -R

(a) m+n (b) m+n-1 (c) m+n-2 (d) m-n

3. A continuous random variable x has a PDF $f(x) = kx^2e^{-x}$, find k CO3- R

(a) 1 (b) 0 (c) 1/2 (d) 3/2

4. What is the classification of $f_x + 2f_{xx} = 0$ ? CO4 -R

(a) Parabolic (b) Ellipse (c) Hyperbolic (d) None of these

5. $\nabla^2 u$ = f(x, y) then it is called CO5- R

(a) Laplace (b) Poisson

(c) One dimensional heat equation (d) None of these

PART – B (5 x 3= 15 Marks)

6. Define Unitary matrix. CO1-U

7. Distinguish between Transportation problem and Assignment problem. CO2-U

8. If the rth moment of a cumulative random variable X about the origin is r!, Find the MGF of X. CO3-App

9. State convergence of the series. CO4-U

10. Write down the SFPF for solving Laplace equation. CO5-U

PART – C (5 x 16= 80 Marks)

11. (a) **Find the Pseudo inverse of** CO1- App (16)

$$\begin{bmatrix} 0 & 0 & 1 & 2 \\ 1 & 2 & 2 & 3 \end{bmatrix}$$

Or

(b) **Find the Pseudo inverse of the matrix** CO1- App (16)

$$A = \begin{bmatrix} 1 & 2 & 3 & 0 & 1 \\ -1 & 0 & 2 & -2 & 3 \end{bmatrix}$$

12. (a) Use Two Phase method, Solve CO2- App (16)

$$\text{Minimise } Z = 60x_1 + 80x_2$$

$$\text{Subject to } 20x_1 + 30x_2 \geq 900; 40x_1 + 30x_2 \geq 1200; \; x_1, x_2 \geq 0$$

Or

(b) Use Two Big - M method, Solve CO2- App (16)

$$\text{Maximize } Z = 5x_1 - 4x_2 + 3x_3$$

$$\text{Subject to } 2x_1 + x_2 - 6x_3 = 20; 6x_1 + 5x_2 + 10x_3 \leq 76;$$

$$8x_1 - 3x_2 + 6x_3 \leq 50; x_1, x_2, x_3 \geq 0$$

13. (a) (i) Find the M.G.F of Poisson distribution and hence find mean and variance CO3-App (8)

(ii) Find the M.G.F of Exponential distribution and hence find mean and variance CO3-App (8)

Or

(b) If X has the distribution function CO3-App (16)

$$F(x) = \begin{cases} 0 & x < 1 \\ \frac{1}{3} & for \ \ 1 \le x < 4 \\ \frac{1}{2} & for \ \ 4 \le x < 6 \\ \frac{5}{6} & for \ \ 6 \le x < 10 \\ 1 & for \ \ x \ge 10 \end{cases}$$

Find (i). p.d.f (ii) P(2<x<6), (iii). Variance of X

14. (a) Find the eigen values and eigen functions of CO4 -App (16)
$y'' + \lambda y = 0, 0 < x < 1, y(0) = 0, y(1) + y'(1) = 0.$

Or

(b) Find the DFT of the four point sequence {x(k)}={1, 1, 0, 0} and then calculate inverse DFT of the points. Faddeev-Leverrier method. CO4 -App (16)

15. (a) Solve the Poisson equation $\nabla^2 u = -10(x^2 + y^2 + 10)$ over the square $= y, x = 3 = y$ with $u = 0$ on the boundary and mesh length is 1. CO5-App (16)

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Or

(b) Solve CO5-App (16)

$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ in $0 < x < 1, t \ge 0$ given that u (x, 0) = 0, u (0, t) = 0, u(1, t) = t. Compute u for the time step with h = ¼ by Crank-Nicholson method

**51026**