Reg. No. : | | | | | | | | | | |

Question Paper Code: 52186

M.E. DEGREE EXAMINATION, DECEMBER 2015

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. In *QR* decomposition, if the matrix $A = QR$ and if A is a square matrix then matrix Q is

   (a) null (b) diagonal (c) unitary (d) hermitian

2. In a simplex method if the net evaluation $(Z_j - C_j) \geq 0$, then the current solution is

   (a) feasible (b) not optimal (c) optimal (d) not feasible

3. $f(x)$ is called a probability density function of a continuous random variable X if

   (a) $f(x) \geq 0$ and $\int f(x)dx = 1$ (b) $f(x) = 1$ and $\int f(x) = 0$
   (c) $f(x) = 1$ and $\sum f(x) = 0$ (d) $f(x) = 0$ and $\sum f(x) = 1$

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

   (a) parabolic (b) ellipse (c) hyperbolic (d) none of these

5. Crank – Nicholson recurrence scheme is useful to solve

   (a) one dimensional wave equation (b) two dimensional heat equation
   (c) one dimensional heat equation (d) poisson equation

PART - B (5 x 3 = 15 Marks)

6. Define generalized eigen vector.

7. List any two basic differences between a transportation and assignment problem.

8. Find the moment generating function of Poisson distribution.

9. State convergence of the series.

10. What is the value of C^2 in one dimensional wave equation?

PART - C (5 x 16 = 80 Marks)

11. (a) Construct a QR decomposition for the matrix $A = \begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}$. (16)

Or

(b) Find a generalized eigen vector of rank 3 corresponding to the eigen value $\lambda = 7$ for the matrix $A = \begin{bmatrix} 7 & 1 & 2 \\ 0 & 7 & 1 \\ 0 & 0 & 7 \end{bmatrix}$. (16)

12. (a) Solve the LPP using simplex method $Max\, Z = 5x_1 + 4x_2$ subject to the constraints $4x_1 + 5x_2 \le 10,\ 3x_1 + 2x_2 \le 9,\ 8x_1 + 3x_2 \le 12,\ x_1,\ x_2 \ge 0$. (16)

Or

(b) Solve the transportation problem. (16)

Destination

Source		A	B	C	D	Availability
	I	21	16	25	13	11
	II	17	18	14	23	13
	III	32	27	18	41	19
Requirement		6	10	12	15	43

13. (a) (i) Define binomial distribution. Find its moment generating function. Hence find its mean and variance. (8)

(ii) The mileage which car owners get with certain kind of radial tire is a random variable having exponential distribution with mean 4000 *km*. Find the probability that one of these tires will last (1) atleast 20000 *km* (2) atmost 30000 *km*. (8)

Or

(b) (i) State the memoryless property of geometric distribution. (8)

(ii) If X is uniformly distributed random variable in (0, 1), find the probability density function of $Y = 2X + 1$. (8)

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

Or

(b) Calculate the averge power of the periodic signal, period $T = 2$,
$f(t) = 2 \cos 6\pi t + \sin 5\pi t$. Using
(i) Time domain analysis and
(ii) Frequency domain analysis. (16)

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

Or

(b) Find the solution of $\frac{\partial^2 u}{\partial x^2} - 2\frac{\partial u}{\partial t} = 0$, when $u(0, t) = 0 = u(4, t)$, $u(x, 0) = x(4 - x)$. Assume $h = 1$ and find the values upto $t = 5$ using Bender - Schmidt's method. (16)
