MA 5155 Applied Mathematics for Electrical Engineers

Important 2 Mark Questions

Unit I

1. Define complement of a fuzzy set with an example.
2. Write down the set of truth values of the 5-valued logic defined on the interval [0, 1].
3. Find a generalized eigenvector of rank a and λ=5 for the matrix $\mathbf{A} = \begin{vmatrix} 5 & 1 & 0 \\ 0 & 5 & 1 \\ 0 & 0 & 5 \end{vmatrix}$.
4. Define singular values of a matrix.
5. Define Toeplitz matrix.
6. Determine the inner product of the vectors (1, 2, 3) and (3, -2, 1).
7. Define: Pseudo inverse.
8. Define the classical logic.
9. Define three valued logic with example.
10. Name the connectives used in fuzzy logic.

Unit II

1. Find the extremal of the functional $I = \int_{x_0}^{x_1} (y^2 - y^2) dx$.
2. Find the generalized eigenvector of rank 3 corresponding to the eigenvalue λ=7 for the matrix $\mathbf{A} = \begin{vmatrix} 7 & 1 & 2 \\ 0 & 7 & 1 \\ 0 & 0 & 7 \end{vmatrix}$
3. Define canonical basis.
4. Write briefly on the LU decomposition of a matrix.
5. State the principle of least square method.
6. State the Cholesky factorization.
7. What is meant by Toeplitz matrix?
8. Define feasible solution and basic feasible solution to a general L.P.P.
9. What are the advantages of the two-phase simple method?
10. Why an artificial variable is introduced in LPP while solving by Simplex method?

Unit III

1. If the probability that an applicant for a driver's license will pass the road test on any given trial is 0.8, what is the probability that he will finally pass the test on the fourth trial?
2. If X is a continuous random variable with pdf $f(x) = kx(1-x), 0 < x < 1,$ find the value of k.
3. Examine whether $f(x) = |x|, -|< x <|$ is the pdf of x.
4. Find E(x) and V(x), if x follows uniform distribution in (3, 5).
5. If X is a uniform random variable in [-3, 3], then find the pdf of X and Var(X).
6. Find the M. G. F of a Poisson distribution.
7. State Runge – Kutta method of the order in the most general form.

8. What is meant by finite difference method?
9. When is a numerical method called as unconditionally unstable?
10. What is meant by finite elements?

Unit IV

1. State Bellman's principle of optimality.
2. Write any two characteristics of Dynamic programming.
3. Write down the optimality principle of DPP.
4. Bring out the important features of DPP.
5. State the Principle of optimality.
6. Define the state variables
7. The joint probability density function of a two-dimensional random variable (X, Y) is given by $f(x,y) = ke^{-3(x+y)}, x > 0, y > 0$. Find the value of k.
8. If A, B and C are any 3 events such that $P(A) = P(B) = P(C) = \frac{1}{4}, P(A \cap B) = P(B \cap C) = 0; P(C \cap A) = \frac{1}{8}$. Find the probability that at least 1 of the events A, B and C occurs.
9. State any two properties of correlation coefficient.
10. The joint probability mass function of (X, Y) is given $p(x,y) = k(2x + 3y), x = 0, 1, 2; y = 1, 2, 3$. Find the value of k.

Unit V

1. A radioactive source emits particles at a rate of 6 per minute in accordance with Poisson process. Each particle emitted has a probability of $\frac{1}{6}$ of being recorded. Find the probability that 3 particles are recorded in 2 minutes period.
2. State Little's formulae.
3. What are the elements of a queuing model?
4. Mention the significance of Little's formula.
5. State any four properties of Poisson process.
6. Write down the Little's formulae for (M/M/1): (∞/FIFO).
7. What is the characteristics of a queueing system?
8. Write down the Little's formulas that hold good for the infinite capacity Poisson queue models.
9. Give an example of the self-service queuing model.
10. Arrivals at a telephone booth are considered to be Poisson with an average time of 12 minutes between one arrival and the next. The length of a phone call is assumed to be distributed exponentially with mean 4 minutes. What is the probability that it will take him more than 10 minutes to complete his call?