

Total No. of Questions – [09 ]  
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G.R. No.	
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Paper Code - P119-131 (ESE)

**DECEMBER 2019 / ENDSEM**  
**F. Y. M.TECH. (COMPUTER ENGINEERING) (SEMESTER - I)**  
**COURSE NAME: MATHEMATICAL FOUNDATION OF COMPUTER**  
**SCIENCE**  
**COURSE CODE: CSPA11181**

**(PATTERN 2018:R1)**

Time: [3 Hours]

[Max. Marks: 50]

(\*) Instructions to candidates:

- 1) Answer Q.1, Q.2, Q.3, Q.4 OR Q.5, Q.6 OR Q.7, Q.8 OR Q.9
- 2) Figures to the right indicate full marks.
- 3) Use of scientific calculator is allowed.
- 4) Assume suitable data where ever required.

Q.1) a) Define Planar graph and briefly explain with suitable example. [3]

OR

b) Consider the graph  $G(V,E)$ , Where  $V=\{v_1, v_2, v_3, v_4\}$  and  $E=\{(v_1,v_2), (v_2,v_3), (v_2,v_4), (v_3,v_4)\}$  Determine whether or not  $H(V', E')$  is a subgraph of  $G(V,E)$ , where [3]

- i)  $V' = \{1,2,6\}$ ,  $E' = \{(v_1,v_2), (v_1,v_6)\}$
- ii)  $V' = \{1,2,4\}$ ,  $E' = \{(v_1,v_2), (v_1,v_4)\}$
- iii)  $V' = \{1,2,3\}$ ,  $E' = \{(v_1,v_2), (v_2,v_3), (v_2,v_4)\}$
- iv)  $V' = \{2,3,4\}$ ,  $E' = \{(v_2,v_3), (v_2,v_4)\}$

Q.2) a) Consider the spinner whose job is to spin and produces the landing outcome as 1 or 2. This spinner is spun two times. The probability of landing on the 1 is 0.25. The probability of landing on the 2 is 0.75. Let  $x$  be the sum of the two spins. Construct a probability distribution for the random variable  $x$ . [3]

OR

b) List the steps of constructing a discrete probability distribution. [3]

Q.3) a) Differentiate between probabilistic and non-probabilistic sampling. [2]

OR

b) Discuss the null and alternative hypothesis used in testing. [2]

- Q.4) a) Define Linear Regression. Explain it in detail with suitable example. [8]
- b) What is significance of trend detection rule. What are different trend detection tests. Explain any one in detail. [6]
- OR
- Q.5) a) Explain least-squares curve fitting. [6]
- b) What do you mean by Analysis of variance [4]
- c) Differentiate between Curve fitting and Interpolation. [4]
- Q.6) a) Assume that a man's profession can be classified as professional, skilled labourer, or unskilled labourer. Assume that, of the sons of professional men, 80 percent are professional, 10 percent are skilled labourers, and 10 percent are unskilled labourers. In the case of sons of skilled labourers, 60 percent are skilled labourers, 20 percent are professional, and 20 percent are unskilled. Finally, in the case of unskilled labourers, 50 percent of the sons are unskilled labourers, and 25 percent each are in the other two categories. Assume that every man has at least one son, and form a Markov chain by following the profession of a randomly chosen son of a given family through several generations. Set up the matrix of transition probabilities. Find the probability that a randomly chosen grandson of an unskilled labourer is a professional man. [10]
- b) Explain the Bernoulli Process in detail [4]
- OR
- Q.7) a) Explain how a queueing problem can be considered as the Stochastic Processes with Discrete Parameter and State Spaces. [6]
- b) How the distribution of time between state changes [4]
- c) Explain whether Poisson process is a Markov chain or not. [4]
- Q.8) a) Explain Continuous-Time Markov Chains. [8]
- b) Enlist the conditions for Existence of Solution for Birth-Death Chain [6]
- OR
- Q.9) a) What are Birth-Death processes and non-Birth -Death processes. [8]
- b) Enlist the special cases of the Birth-Death model [6]