

MSc DEGREE EXAMINATION MAY 2018

(Second Semester)

Branch – **COMPUTER SCIENCE**

STATISTICAL METHODS AND APPLIED OPERATIONS RESEARCH

Time: Three Hours

Maximum: 75 Marks

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(5 x 15 = 75)

- 1 a Explain with examples the concept of independent events, dependent event and mutually exclusive events in probability .
- b A company has four production section viz., S_1 , S_2 , S_3 and S_4 which contributes 30%, 20%, 28% and 22% respectively to the total output. It was observed that these sections respectively produce 1%, 2%, 3% and 4% defective units. If units selected at random and found to be defective, what is the probability that the unit so selected has come from either section S_1 or S_4 ?

OR

- c Explain, what is meant by random variable? Distinguish between discrete and continuous random variable.
- d Define Binomial distribution and Poisson distribution. State its important properties.
- 2 a Explain briefly the general procedure for testing of hypothesis.
- b In a sample of 600 men from ascertain city, 50 men are found to be smokers. In a sample of 900 from another city, 50 are found to be smokers. Do the data indicate that the two cities are significantly different with respect to put balance of smoking habit among men.

OR

- c Explain briefly the paired 't'- test.
- d Suppose that, in a public opinion survey, answers to the questions
(i) Do you drink?
(ii) Are you in favour of local option on sale of liquor?
were as tabulated below :

		Question (ii)	
		Yes	No
Question (i)	Yes	56	31
	No	18	6

Can you infer that opinion on local option is dependent on whether or not an individual drinks?

- 3 a Enumerate various types of inventory models.
- b Explain the various cost related to inventory.

OR

- c Derive the Economic lot size formula for the manufacturing model without shortage.

Cont...

3 Cont...

- d Find the optimum order quantity for a product for which the price breaks are as follows :

Quantity	Unit Cost (Rs.)
$0 \leq Q_1 < 500$	10.00
$500 \leq Q_2$	5.25

The monthly demand for the product is 200 units, the cost of storage is 2% of the unit cost and the cost of ordering is Rs. 350.00

- 4 a With respect to the queue system, explain the following :
- (i) Input process (ii) Queue discipline (iii) Capacity of the system
(iv) Jockeying
- b Assume that the goods trains are coming in a yard at the rate of 30 trains per day and suppose that the inter-arrival times follow an exponential distribution. The service time for each train is assumed to be exponential with an average of 36 minutes. If the yard can admit 9 trains at a time (there being 10 lines, one of which is reserved for shunting purpose), calculate the probability that the yard is empty and find the average queue length.
- OR
- c A hospital clinic has a doctor examining every patient brought in for a general check-up. The doctor averages 4 minutes on each phase of the check-up although the distribution of time spent on each phase is approximately exponential. If each patient goes through four phase in the check-up and if the arrivals of the patients to the doctor's office are approximately Poisson at the average rate of three per hour. What is the average time spent by a patient waiting in the doctor's office? What is the average time spent in the examination? What is the most probable time spent in the examination?
- d In $M / E_k / 1 / \text{FIFO}$ queue model, find the steady distribution of the queue size. Derive the average waiting time in the queue.

- 5 a Describe the two-person zero-sum game.
- b Solve the following 2×3 game graphically.

Player B

Player A $\begin{bmatrix} 1 & 3 & 11 \\ 8 & 5 & 2 \end{bmatrix}$

OR

- c Explain the graphical method of solving $(2 \times n)$ and $(m \times 2)$ games.
- d For a game with the following pay-off matrix, determine the optimum strategies and the value of the game :

$$\begin{bmatrix} 5 & 1 \\ 3 & 4 \end{bmatrix}$$