

U.G. 6th Semester Examination - 2021**STATISTICS****Course Code : BSTSDSRC-3 & 4 (DSE 3 & 4)**

Full Marks : 30

Time : 2 Hours

*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.**This question papers contains both DSE 3 & 4. Students are thereby instructed to answer DSE paper out of these two (DSE 3 & DSE 4) as he/she opted for.***Title : Graph Theory****Code : BSTSDSRC-3 (DSE 3)**1. Answer any **ten** of the following questions:

1×10=10

- a) What is a simple graph?
- b) Write three problems solved by application of graph theory.
- c) What are finite graph?
- d) Define isolated vertex.
- e) What is a null graph?
- f) What is an end vertex?

- g) Define multigraph.
- h) What is a regular graph?
- i) What is a complete graph?
- j) What is length of a path?
- k) What is a subgraph?
- l) What is a Hamiltonian circuit?
- m) Define Tree.
- n) What is distance in a Tree?
- o) Define Branch and Chord of a tree.

2. Answer any **five** of the following questions:

2×5=10

- a) Write properties of cut set.
- b) Define seperable and non seperable graph.
- c) Define articulation point.
- d) What is network flows?
- e) Define block of graph.
- f) Define 2-isomorphism.
- g) Distinguish between Planner and non-Planner graphs.
- h) Define embedding graph.

3. Answer any **two** of the following questions:

$$5 \times 2 = 10$$

- a) Show that if a connected simple graph G is the union of the graphs G_1 and G_2 , then G_1 and G_2 have at least one common vertex.
- b) How many non isomorphic connected simple graphs are there with n vertices when n is (i) 2? (ii) 3? (iii) 4? (iv) 5?
- c) How many edges does a graph have if it has vertices of degree 4,3,3,2,2? Draw such a graph.

Title : Reliability Theory

Code : BSTSDSRC-4 (DSE 4)

1. Answer any **ten** of the following questions:

$$1 \times 10 = 10$$

- a) What is sample space?
- b) Two dice are rolled simultaneously. What is the probability of getting 10?
- c) What is failure rate?
- d) Give an example of a repairable item.
- e) If A and B are two independent events such that $P(\bar{A}) = 0.7$, $P(\bar{B}) = x$ and $P(A \cup B) = 0.8$, then find x .
- f) What is the mean of the Binomial distribution $B\left(1, \frac{1}{3}\right)$.
- g) The function defined by $f(x) = Cx(1-x)$, $0 < x < 1$
 $= 0$, elsewhere
is a probability density function. Find the value of C .
- h) What is the relationship between MTBF and failure rate?

- i) What is the interval in which reliability lies?
- j) Which distribution is memory less continuous distribution?
- k) Define hypergeometric distribution.
- l) What do you mean by moment generating function?
- m) For which types of items MTTF is used?
- n) Define parallel system.
- o) When are two events A and B said to be independent?

2. Answer any **five** of the following questions:

$$2 \times 5 = 10$$

- a) Define early failures. Give some examples.
- b) A problem in Mathematics is given to three students A, B and C. The chances of solving the problem by A, B and C are $\frac{1}{3}, \frac{1}{4}$ and $\frac{1}{5}$ respectively. Find the probability that the problem is solved.
- c) If X follows $N(0,1)$, then find the distribution of $Y = \frac{1}{2}X^2$.
- d) Define Hazard rate. What is the difference between failure rate and hazard rate?

- e) Let the total number of items at the beginning of a test was 1000 and during the first unit interval the number of components that failure was 130. Find the failure density.
- f) Define probability distribution whose mean and variance are same. Also check the symmetry of that distribution.
- g) What do you mean by reliability?
- h) In a box of 10 bulbs, 4 are defective. Find the probability that if you pick up a sample of 3 bulbs, no bulb will be defective.

3. Answer any **two** of the following questions :

$$5 \times 2 = 10$$

- a) What are the properties of reliability function?
- b) A box contains two coins, one of which is fair and other is two headed. One coin is chosen at random and tossed twice independently. If two heads appear, what is the probability that the chosen coin was two headed?
- c) How is the overall system reliability increased?