Code No: 153BN **R18**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year I Semester Examinations, October - 2020

PROBABILITY AND STATISTICS

(Civil Engineering)

Time: 2 Hours **Max. Marks: 75**

Answer any five questions

All questions carry equal marks

1.a) The Probabilities that students A,B,C and D solve a problem are $\frac{1}{3}, \frac{2}{5}, \frac{1}{5}$ *and* $\frac{1}{4}$ respectively. If all of them try to solve the problem, what is the probability that the problem is solved?

b) A continuous Random variable has the p.d.f $f(x) = \begin{cases} K(1-x^2), & if \quad 0 \le x \le 1 \\ 0, & otherwise \end{cases}$

Determine: i) K ii) The mean iii) Variance. [8+7]

2.a) Three machines I, II and III produce 20%,25% and 55% of the total number of items of a factory. The percentages of defective items of these machines are 7%, 3% and 3%. An item is selected at random and found to be defective. Find the probability that it is from
i) Machine- I ii) Machine-II iii) Machine-III

b) If a random variable has the probability density function $f(x) = \begin{cases} 2e^{-2P}, & for \quad x > 0 \\ 0, & for \quad x \le 0 \end{cases}$

Find the probabilities:
i) $P(1 < x < 3)$ ii) $P(x \ge 0.5)$. [8+7]

3.a) Six cards are drawn from a pack of 52 cards. Getting a diamond is a success. Find the probability of getting the success
i) At least once ii) 4 times

b) If the variance of a Poisson variate X is 2, find the probability that
i) $X = 0$ ii) $1 < X < 4$ [8+7]

4.a) Asumming that half of the population are consumer of rice and X represent the number of individuals consuming rice, if 8 individuals are taken find the probability that
i) $X \ge 2$ ii) $1 \le X \le 4$.

b) If x is a Poisson variate such that $3P(x=4)=1/2P(x=2)+P(x=0)$
Find i) μ ii) $P(x \le 2)$ [8+7]

5.a) On an average, a certain computer part lasts in ten years. The length of time the computer part lasts is exponentially distributed. What is the probability that a computer part lasts more than 7 years?

b) In a sample of 1000 cases, the mean of a certain test is 14 and standard deviation is 2.5. Assuming the distribution to be normal, find
i) How many students score between 12 and 15
ii) How many score above 18 [7+8]

6. 800 students appear for an examination. It was found that the marks are normally distributed with mean 60 and standard deviation 12. The division/classes are per the marks secured were given as follows

Marks (m)	$M < 40$	$40 \le m < 50$	$50 \le m < 60$	$60 \le m < 75$	$m \ge 75$
Division/class	Fail	3rd division	2nd division	1st class	Distinction

Find the number of students who
a) Get 1st division b) get 3rd division c) Failed. [15]

7. Fit the curve of the form $y = ae^{bx}$ for the following data [15]

x	1	2	3	4	5	6
y	1.6	4.5	13.8	40.2	125	300

8.a) A sample of 121 students is found to have a mean weight of 68 kgs. Can this be regarded as a sample from a population with mean weight 75 kgs and standard deviation 31 kgs.
b) Two independent random samples of sizes 100 and 120 have means 50 and 60 with S.D of 5 and 6. Construct 95% confidence interval for the difference of two means. [7+8]

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