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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech.

SEM: III - THEORY EXAMINATION (2021 - 2022) (ONLINE)

Subject: Statistics and Probability

Time: 02:00 Hours

Max. Marks: 100

General Instructions:

1. All questions are compulsory. It comprises of two Sections A and B.

- Section A - Question No- 1 has 35 objective type questions carrying 2 marks each.
- Section B - Question No- 2 has 12 subjective type questions carrying 3 marks each. You have to attempt any 10 out of 12 question.
- No sheet should be left blank. Any written material after a Blank sheet will not be evaluated/checked.

SECTION A

35 x 2 = 70

1. Attempt ALL parts:-

- 1.1.a Which of the following is a absolute measure of dispersion? CO1 1
- (a) Standard Deviation
(b) Mean Deviation
(c) Variance
(d) All of the above
- 1.1.b The first four moments of a distribution are 3, 10.5, 40.5, 168. Comment upon the nature of the distribution. CO1 1
- (a) Symmetrical
(b) Platykurtic
(c) Leptokurtic
(d) Mesokurtic
- 1.1.c Karl Pearson coefficient of skewness of a distribution is 0.32, its standard deviation is 6.5 and mean is 29.6. find the mode of the distribution. (CO1) 1
- (a) 17.52
(b) 22
(c) 27.52
(d) 13.52
- 1.1.d The Spearman rank correlation coefficient is given by- CO1 1
- (a) $r = 1 - 6 \frac{\sum (d^2)}{n(n^2 - 1)}$
(b) $r = 1 - 6 \frac{\sum (d^2)}{(n^2 - n)}$
(c) $r = 1 - \frac{\sum (d^2)}{n(n^2 - 1)}$
(d) $r = 1 - 6 \frac{\sum (d^2)}{(n^3 - 1)}$

1.1.e	The Multiple linear Regression plane of x on y and z is	CO 1	1
	(a) $x = a + by^2 + cz^2$		
	(b) $x = ax + by + cz^2$		
	(c) $x = a + by + cz$		
	(d) $x = a + by^2 + cz$		
1.1.f	Sum of squares of deviations about Arithmetic mean is:	CO 1	1
	(a) Maximum		
	(b) Minimum		
	(c) Zero		
	(d) None of the above		
1.1.g	Median for 2, 13, 5, 6, 8, 9, 10 is.....	CO 1	1
	(a) 8		
	(b) 13		
	(c) 7		
	(d) 10		
1.2.a	One Card is drawn from a standard pack of 52. What is the probability that it is either a king or a Queen? (CO2)		1
	(a) $\frac{1}{13}$		
	(b) $\frac{2}{13}$		
	(c) $\frac{3}{13}$		
	(d) None		
1.2.b	One bag contains 4 white and 2 black balls. Another contains 3 white and 5 black balls. If one ball is drawn from each bag, what is the probability that one is white and one is black ? CO2		1
	(a) $\frac{11}{24}$		
	(b) $\frac{7}{24}$		
	(c) $\frac{13}{24}$		
	(d) $\frac{17}{24}$		
1.2.c	If the values taken by a random variable X are negative, Then the negative values of X will have : CO2		1
	(a) Positive Probability		
	(b) Negative Probability		
	(c) May have -ve or +ve Probabilities		
	(d) Insufficient data		
1.2.d	The probability that a man fishing at a particular place will catch 1,2,3,4 fish are 0.4, 0.3, 0.2 and 0.1 respectively. What is the expected number of fish caught?		1
	(a) 3		
	(b) 4		
	(c) 2		
	(d) 1		

1.2.e	The moment generating function $M_x(t)$ is equal to: CO2	1
	(a) $E(e^{tx})$	
	(b) $E(tx)$	
	(c) $E(x)$	
	(d) $E(cx)$	
1.2.f	What is the value of k so that $f(x,y) = kxy, 1 \leq x \leq y \leq 2$ will be a probability density function? (CO2)	1
	(a) $\frac{7}{9}$	
	(b) $\frac{5}{9}$	
	(c) $\frac{8}{9}$	
	(d) $\frac{1}{9}$	
1.2.g	The linear combinations of independent variables developed by discriminant analysis that will best discriminate between the categories of the dependent variable are _____. 1	
	(a) discriminant scores	
	(b) discriminant function	
	(c) classification matrix	
	(d) None of these	
1.3.a	In a Binomial Distribution, if p, q and n are probability of success, failure and number of trials respectively then variance is given by _____ CO 3	1
	(a) np	
	(b) npq	
	(c) n ² pq	
	(d) nq	
1.3.b	It is suitable to use Binomial Distribution only for _____ CO 3	1
	(a) Large values of 'n'	
	(b) Fractional values of 'n'	
	(c) Small values of 'n'	
	(d) Any value of 'n'	
1.3.c	If 'm' is the mean of Poisson Distribution, the P(0) is given by _____ CO 3	1
	(a) e^{-m}	
	(b) e^m	
	(c) e	
	(d) m^{-e}	
1.3.d	Normal Distribution is applied for _____ CO 3	1
	(a) Continuous Random Distribution	
	(b) Discrete Random Variable	
	(c) Irregular Random Variable	
	(d) Uncertain Random Variable	
1.3.e	The area under a standard normal curve is? CO 3	1
	(a) 0	
	(b) 1	

- (c) ∞
 (d) Not defined.
- 1.3.f A mobile conversation follows a exponential distribution $f(x) = (1/3)e^{-x/3}$. What is the probability that the conversation takes more than 5 minutes? CO 3 1
- (a) $e^{-5/3}$
 (b) e^{-15}
 (c) $5e^{-15}$
 (d) $e^{-5/3}$
- 1.3.g A random variable X has an exponential distribution with probability distribution function is given by CO 3 1
- $$f(x) = \begin{cases} 3e^{-3x} & \text{for } x > 0 \\ 0, & \text{otherwise} \end{cases}$$
 Find probability that X is not less than 2.
- (a) e^{-3}
 (b) $e^{-6} - 3$
 (c) e^{-6}
 (d) $e^{-6} - 1$
- 1.4.a 95% confidential limits of population mean are :(CO4) 1
- (a) $\bar{x} \pm 3 S.E.$
 (b) $\bar{x} \pm 2.58 S.E.$
 (c) $\bar{x} \pm 1.96 S.E.$
 (d) None of these
- 1.4.b The standard error of mean of a large random sample of size n from a population with Standard deviation σ is : CO4 1
- (a) $\sigma\sqrt{n}$
 (b) σ/\sqrt{n}
 (c) $\sqrt{\sigma/n}$
 (d) σn
- 1.4.c The value of χ^2 is calculate from : CO4 1
- (a) $\sum_{i=1}^n \left[\frac{(O_i - E_i)^2}{E_i} \right]$
 (b) $\sum_{i=1}^n \left[\frac{(O_i - E_i)}{E_i} \right]$
 (c) $\sum_{i=1}^n \left[\frac{(O_i + E_i)^2}{E_i} \right]$
 (d) None of these
- 1.4.d The test Statistic for the significance of mean for a small random sample is given by: CO4 1
- (a) $\frac{\bar{x} - \mu}{S\sqrt{n}}$
 (b) $\frac{\bar{x} - \mu}{S/\sqrt{n}}$

- (c) $\frac{\bar{x} - \mu}{S/n}$
- (d) $\frac{\bar{x} - \mu}{S}$
- 1.4.e The degree of freedom for small sample of significance for a mean is : CO4 1
- (a) $n + 1$
- (b) $n - 2$
- (c) $n - 1$
- (d) n
- 1.4.f The relation between the standard deviations s and S of random sample and population respectively, is given by : CO4 1
- (a) $(n - 1)s^2 = nS^2$
- (b) $ns^2 = (n - 1)S^2$
- (c) $\frac{s^2}{n} = \frac{S^2}{n - 1}$
- (d) None of these
- 1.4.g The test Statistic in One-Way ANOVA is given by: CO4 1
- (a) Variance within the samples : Variance between the samples
- (b) Variance between the samples : Variance within the samples
- (c) Variance between the samples : Degree of freedom between the samples
- (d) None of these
- 1.5.a It is between 3 P.M. and 4 P.M. and the distance between the hour and the minute hand of clock is 18 minute spaces. What time does the clock show? CO 5 1
- (a) Monday
- (b) Tuesday
- (c) Wednesday
- (d) Sunday
- 1.5.b A man takes 2.2 times as long to row a distance upstream as to row the same distance downstream. If he can row 55 km downstream in 2 hours 30 minutes, what is the speed of the boat in still water? (CO 5) 1
- (a) 152 m
- (b) 125 m
- (c) 250 m
- (d) 120 m
- 1.5.c The speed of the boat in still water is 5 times that of the current, it takes 1.1 hours to row to point B from point A downstream. The distance between point A and point B is 13.2km. How much distance (in km) will it cover in 312 minutes upstream? CO 5 1
- (a) 32
- (b) 31
- (c) 33
- (d) 30
- 1.5.d Two trains start at the same time from A and B and proceed toward each other at the speed of 75 km/hr and 50 km/hr respectively. When both meet at a point in between, one train was found to have travelled 175 km more than the other. Find the distance between A and B? CO 5 1
- (a) 84 metres and 54 km/hr
- (b) 64 metres and 44 km/hr

- (c) 64 metres and 54 km/hr
(d) 84 metres and 60 km/hr
- 1.5.e A car travels the first one third of a certain distance with a speed of 10 km/hr, the next one third distance with a speed of 20 km/hr and the last one third distance with a speed of 60 km/hr. Find the average speed of the car for the whole journey ? CO 5 1
- (a) 90 m
(b) 100 m
(c) 120 m
(d) 140 m
- 1.5.f Two pipes A and B can fill a tank in 24h and 30 h respectively. If both the pipes are opened simultaneously in the empty tank, how much time will be taken by them to fill it? (CO5) 1
- (a) 1/6
(b) 1/9
(c) 2/5
(d) 2/7
- 1.5.g How many days are there in x weeks x days? CO 5 1
- (a) 0.16
(b) 0.40
(c) 0.80
(d) None of these

SECTION B

10 X 3 = 30

2. Answer any TEN of the following:-

- 2.1.a Write down the formula for first four Moments about mean. (CO1) 2
- 2.1.b For certain data, $3X+2Y-26=0$ and $6X+Y-31=0$ are the two regression equations. Find the values of means and coefficient of correlation. CO 1 2
- 2.2.a Six cards are drawn at random from a pack of 52 cards. What is the probability that 3 will be red and 3 black? CO2 2
- 2.2.b Two dice are thrown at random. It is known that first die shows 6. Find the probability that the sum of numbers showing on the dice is 7 (CO2) 2
- 2.2.c The joint probability density function of the two dimensional variable (X,Y) is the form: CO2 2
- $$f(x,y) = \begin{cases} ke^{-(x+y)}, & 0 \leq y < x < \infty \\ 0, & \text{elsewhere} \end{cases}$$
- then determine the value k.
- 2.3.a Out of 800 families with four children each, how many families would be expected to have at most two girls are (Assume equal probabilities for boys and girls). CO 3 2
- 2.3.b For Poisson distribution if $P(X=2) = \frac{2}{3} P(X=1)$ then find mean of the Poisson distribution. CO 3 2
- 2.3.c Find the mean of exponential distribution. (CO3) 2
- 2.4.a What is the difference between Population and sample in sampling theory? (CO4) 2
- 2.4.b A sample of 18 items has mean 24 units and standard deviation 3 units. Test the hypothesis that it is a random sample from a normal population with mean 27 units. CO4 2
- 2.5.a Two pipes A and B can fill a tank in 24h and 30 h respectively. If both the pipes are opened simultaneously in the empty tank, how much time will be taken by them to fill it? CO 5 2
- 2.5.b Dev completed the school project in 20 days. How many days will Arun take to complete the same work if he is 25% more efficient than Dev? CO 5 2