Printed Page:- **Subject Code**:- **AAS0303**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: III - THEORY EXAMINATION (20..... - 20.....)

Subject: Statistics and Probability

Time: 3 Hours **Max. Marks: 100**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* ***three Sections -A, B, & C.*** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION-A 20

1. Attempt all parts:-

1-a. The first moment about mean for any distribution is (CO1,K2) 1

(a) 0

(b) 1

(c) 2

(d) 3

1-b. For a distribution Karl Pearson's coefficient of skewness is 0.64, standard deviation is 13 and mean is 59.2 The mode is... (CO1,K3) 1

(a) 51.5

(b) 50.88

(c) 56.42

(d) None of thes

1-c. If $\Sigma P(x) = k^2 - 9$ then, the value of k is...(CO2,K3) 1

(a) 0

(b) 1

(c) 3

(d) None of these

1-d. If A and B are mutually exclusive events then P(A U B) is given by (CO2,K2) 1

(a) P(A) + P(B)

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(b) P(A) - P(B)

(c) P(A) + P(B) - P(A∩B)

(d) None of these

1-e. In Standard normal distribution, the value of mode is _____ .(CO3,K2) 1

(a) 2

(b) 1

(c) 0

(d) Not fixed

1-f. The mean of Exponential distribution is...(CO3,K2) 1

(a) $\frac{1}{\lambda}$

(b) $\frac{2}{\lambda^2}$

(c) $\frac{1}{\lambda^2}$

(d) $\frac{1}{\lambda^3}$

1-g. The standard error of mean of a large random sample of size n from a population with Standard deviation σ is (CO4,K2) 1

(a) $\sigma\sqrt{n}$

(b) $\sigma/\sqrt{n}$

(c) $\sqrt{\sigma/n}$

(d) $\sigma\, n$

1-h. Consider a hypothesis H_0 where $\phi_0 = 5$ against H_1 where $\phi_1 > 5$. The test is... (CO4,K2) 1

(a) Two tailed

(b) Left tailed

(c) Center tailed

(d) Right tailed

1-i. The calendar for the year 2007 will be the same for the year: (CO5,K2) 1

(a) 2014

(b) 2017

(c) 2018

(d) None of these

1-j. If X can do a piece of work in 10 days while Y can do it in 15 days. In how many days can X and Y working together do it? (CO5,K3) 1

(a) 7 Days

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(b) 8 Days

(c) 6 Days

(d) 12.5 Days

2. Attempt all parts:-

2.a. Write down normal equations for fitting of the curve y=a+bx. (CO1,K2) 2

2.b. If the probability density function $f(x)=\begin{cases} kx^3, If & 0\le x\le 3 \\ 0 & , elsewhere \end{cases}$, Determine the value of k.(CO2,K3) 2

2.c. Determine the mean of Poisson distribution. (CO3,K2) 2

2.d. Define Type I and Type II Errors in Sampling theory. (CO4,K1) 2

2.e. The distance between two stations is 540 km. A train takes 3 hours to cover this distance. Calculate the speed of the train in km/hr.(CO5,K3) 2

SECTION-B 30

3. Answer any five of the following:-

3-a. From the following data of weight of 122 persons calculate the Median. (CO1,K3) 6

Weight	100-110	110-120	120-130	130-140	140-150	150-160	160-170	170-180
No. of Persons	4	6	20	32	33	17	8	2

3-b. Fit a straight line trend by the method of least squares to the following data (Taking 2000 as origin): (CO1,K3) 6

Year :	2001	2002	2003	2004	2005	2006	2007	2008
Earning : (in Lakh)	38	40	65	72	69	60	87	95

3-c. State the addition theorem of probability. A bag contains 7 white, 6 red and 5 black balls . Two balls are drawn at random. Determine the probability that they will both be white. (CO2,K3) 6

3-d. Four cards are drawn from a pack of cards. Determine the probability that I). All are spades. II). There are two diamonds and two hearts. (CO2,K3) 6

3.e. It is given that 5% of the electric bulbs manufactured by a company are defective. Using Poisson distribution find the probability that a sample of 120 bulbs will contain i) no defective bulb. and ii) 2 defective bulb (CO3,K3) 6

3.f. A random sample of 900 members has a mean 3.4 cm. Can it be reasonably regarded as a sample from a large population of mean 3.2 cm and S.D. 2.3 cm? (Test at 5% level of significance) Use tablulated value 1.96.(CO4,K3) 6

3.g. A man rows boat to a place covering 72 km distance and back in 15 hours. He finds that he can row 3 km with the stream in the same time as 2 km against the stream. Find the speed of the stream. (CO5,K3) 6

SECTION-C 50

4. Answer any one of the following:-

4-a. Calculate the Moment coefficient of skewness and kurtosis of the following data: (CO1,K3) 10

C.I.	0-10	10-20	20-30	30-40
Freq.	1	3	4	2

4-b. The following table gives the age (x) in years of cars and annual maintenance cost (y) in hundred rupees: (CO1,K3) 10

x	1	3	5	7	9
y	15	18	21	23	22

Estimate the maintenance cost a four year old car after finding the regression equation.

5. Answer any one of the following:-

5-a. A random variable X has the following probability distribution: (CO2,K3) 10

x	0	1	2
P(X=x)	$(2k^2+k-3)$	6k	$(8k^2+2k+3)$

Calculate the value of k and also find mean and variance for the distribution.

5-b. In a Neighbourhood, 90% children were falling sick due flu and 10% due to measles and no other disease. The probability of observing rashes for measles is 0.95 and for flu is 0.08. If a child develops rashes, find the child's probability of having flu. (CO2, K3) 10

6. Answer any one of the following:-

6-a. If X is a normal variate with mean 17 and Standard deviation 3. Determine the probabilities that i) $15.5 \leq X \leq 20$ ii) $X \geq 20$. (CO3,K3) 10
(Area for $0 \leq Z \leq 0.5$ is 0.1915 and $0 \leq Z \leq 1$ is 0.3413)

6-b. The distribution of typing mistakes committed by a typist is given below. Assuming a Poisson model, calculate the expected frequencies:(CO3,K3) 10

Mistakes per page	0	1	2	3	4	5
No. of Pages	142	156	69	27	5	1

7. Answer any one of the following:-

7-a. 5 identical coins are tossed 320 times, and the no. of heads appearing each time is recorded and the results are: (CO4,K3) 10

No. of heads	0	1	2	3	4	5
frequency	14	15	80	112	61	8

Would you conclude that coins are biased? (tabulated value at 5% level of significance is 11.07)

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7-b. The following figures relate to the production in kg of three varieties I, II, III of wheat shown in 12 plots: (CO4,K3) 10

Variety I: 14 16 18
Variety II: 14 13 15 22
Variety III: 18 16 19 19 20

Is there any significant difference in the production of three varieties of wheat? Given the tabulated value of F with d.f. (2,9) at 5% level of significance is 4.26.

8. Answer any <u>one</u> of the following:-

8-a. (i) Two pipes A and B together can fill a cistern in 4 hours. Had they been opened separately, then B would have taken 6 hours more than A to fill the cistern. How much time will be taken by A alone to fill the cistern? 10
(ii) 16 men can finish a work in 24 days and 48 boys can finish the same work in 16 days. 12 men started the work and after 4 days 12 boys joined them. In how many days can they finish the remaining work? (CO 5, K3)

8-b. Read the information given below and answer the following questions: 10
Six friends are sitting in a circle and are facing the centre of the circle. Deepa is between Prakash and Pankaj. Priti is between Mukesh and Lalit. Prakash and Mukesh are opposite to each other. (CO5,K2)
i) Who is sitting right to Prakash ?
ii) Who is just right to Pankaj ?
iii) Who are the neighbours of Mukesh ?
iv) Who is sitting opposite to Priti ?

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