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Sr. No. of Question Paper : 894

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Your Roll No.....

Unique Paper Code : 219261

Name of the Course : B.Sc. (H) Geology

Name of the Paper : Probability and Statistics [GEHT-404]

Semester : IV

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt at least **one** question from each section. Attempt **five** questions in total.
3. **All** questions carry equal marks.
4. Use of standard normal distribution table is allowed.
5. Use of scientific calculator is allowed.

SECTION I

1. (a) The mean and standard deviation of a sample of 100 observations were found to be 40 and 5.1 respectively by a student who wrongly recorded an observation as 50. Recalculate the mean and standard deviation if
 - (i) the wrong observation is deleted.
 - (ii) the wrong observation 50 is replaced by the correct observation 40.
- (b) Calculate the mean deviation from the median of the following distribution :

C.I.	0-10	10-20	20-30	30-40	40-50
Frequency	5	8	15	16	6

P.T.O.

2. (a) The scores of two golfers for 10 rounds are :

A	58	59	60	54	65	66	52	75	69	52
B	84	56	92	65	86	78	44	54	78	68

Which one may be regarded as more consistent player ?

- (b) Calculate the coefficient of correlation between x and y from the following table :

X	1	2	3	4	5	6	7	8	9
Y	12	11	13	15	14	17	16	19	18

3. (a) The first four moments of a distribution about the value 5 of the variable are 2, 20, 40 and 50. Show that the mean is 7, variance is 16, $\mu_3 = -64$, $\mu_4 = 162$, $\beta_1 = 1$ and $\beta_2 = 0.63$.
- (b) For two variables x and y , the two regression lines are $x + 2y - 5 = 0$ and $2x + 3y - 8 = 0$. If $\text{var}(x) = 12$, find \bar{x} , \bar{y} , s_y and r .

SECTION II

4. (a) Define Poisson distribution and find its moment generating function, mean and variance.
- (b) A manufacturer of cotter pins knows that 5% of his product is defective. If he sells cotter pins in boxes of 100 and guarantees that not more than 2 pins will be defective, what is the approximate probability that a box will meet the guarantee ? (use : $e^{-5} = 0.006738$).
5. (a) Show that for the normal distribution, all odd order moments about the mean vanish and the even order moments about the mean are equal to
- $$\mu_{2n} = 1.3.5. \dots (2n-1)\sigma^{2n}.$$

- (b) State central limit theorem for independent and identically distributed random variables and use it to find the approximate probability that the sum obtained is between 30 and 40, when 10 fair dice are rolled.
6. (a) Two cards are drawn from a well-shuffled pack of 52 cards without replacement. Find the probability distribution of number of kings. Hence, find its mean and variance.
- (b) Let X be normally distributed with mean $\mu = 8$ and standard deviation $\sigma = 4$. Find
- (i) $P(5 \leq X \leq 10)$ (ii) $P(X \geq 15)$

SECTION III

7. (a) A sample of 20 items has mean 42 and standard deviation 5 units. Test the hypothesis that the random sample is drawn from a normal population with mean 45 units. (Given that $t_{0.05} = 2.09$ for 19 d.f.).
- (b) The nine items of a sample had the following values :

45, 47, 50, 52, 48, 47, 49, 53, 51

Does the mean of the nine items differ significantly from the assumed population mean of 47.5 ?

8. (a) Five coins are tossed 3200 times and the following results are obtained :

No. of heads	0	1	2	3	4	5
Frequency	80	570	1100	900	500	50

If $\chi^2_{0.05} = 11.070$ for 5 d.f., test the hypothesis that the coins are unbiased.

- (b) Write a note on any two of the following :
- (i) Correlation coefficient

- (ii) Stochastic process
- (iii) Markovian Chains

9. (a) A sample of 50 associate degree graduates (sample A) and a sample of 60 baccalaureate graduates (sample B) yielded the following means and standard deviations :

Sample	\bar{x}	σ
A	52.5	10.5
B	49.6	11.2

On the basis of these data, what should the researcher conclude ? ($\alpha = 0.05$).

- (b) A sample of 146 children were examined for anaemia, 21 were found to be anemic. Can we conclude that 20% of these children are anaemic.