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**STE 451****II Semester M.Sc. Examination, Sept./Oct. 2022****STATISTICS****Statistical Methods (Open Elective)**

Time : 3 Hours

Max. Marks : 70

Instructions : 1) Question No. 1 is **compulsory**.2) Answer **any four** questions from the remaining **seven** questions.3) Figures to the **right** indicate marks to sub-questions.1. Answer **any six** of the following :**(3×6=18)**

a) Obtain Geometric mean for the following data.

2.5, 3.8, 1.3, 4.2, 5.9, 6.3, 3.9, 5.4.

b) Mention the properties of standard deviation.

c) How Binomial distribution can be related to normal distribution ?

d) Define random variable, discrete random variable and continuous random variable.

e) Discuss the determination of sample size for normally distributed observations.

f) Define finite population and infinite population along with examples.

g) For a bivariate data set with ten paired observations, it is found that $\sum xy = 220$, $\sum x = 40$, $\sum y = 50$, $\sum x^2 = 200$ and $\sum y^2 = 262$. Compute Karl Pearson's Correlation Coefficient.

h) Explain the procedure of resolving ties in ranks when computing rank correlation coefficient.

2. a) The following data gives literacy rate (in percentage) in 40 cities.

Literacy rate (in %)	45 – 55	55 – 65	65 – 75	75 – 85	85 – 95
Number of cities	4	11	12	9	4

Find mean, median and standard deviation of literacy rate.

b) Mention the advantages and disadvantages of measure of central tendency.

(9+4)**P.T.O.**



3. a) The following distribution gives the daily income of 50 workers in a factory.

Daily income (in Rs.)	100 – 120	120 – 140	140 – 160	160 – 180	180 – 200
Number of workers	12	14	8	6	10

Draw the ogives and mention the median using graph.

- b) Explain type and part of the presentation table. (7+6)
4. a) Define normal distribution with example and mention the properties.
- b) Define sample space. A fair of coin tossed and fair of die thrown. Write down sample spaces for (a) the toss of the coin, (b) the throw of the die, (c) the combination of two experiment. (9+4)
5. a) Assume that in a family, each child is equally likely to be a boy or a girl. A family with three children is chosen at random. Find the probability that eldest child is a girl given that a family has at least one girl.
- b) A discrete random variable X has the probability distribution given as

X	1	2	3	4
$P(X)$	k	k^2	$2k^2$	k

- i) Find the value of k .
- ii) Determine the mean and standard deviation of the distribution.
- c) Explain systematic sampling and write the steps involving in systematic sampling. (4+5+4)
6. a) Distinguish census survey and sample survey.
- b) Define sampling unit, sampling strategy and sampling design.
- c) Explain the procedure for calculating sample size. (5+3+5)



7. a) Explain the scatter plot technique to analyze the bivariate data. Mention its merits and demerits.
- b) Explain the properties of correlation coefficients.
- c) Explain a test procedure to test the significance of correlation coefficient. **(5+4+4)**
8. a) Calculate the correlation coefficient between the time in years (x) that an employee spent at a company and the employee's hourly pay (y). Comment on it.

x	3	5	8	11	13	15	16
y	20	25	30	38	38	40	45

- b) For the data set given in 8(a), fit a suitable linear regression line and compute the value of coefficient of determination. Estimate the employee's hourly pay when he spent 18 years at the same company. **(6+7)**
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