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**HPAS (M)—2015**

**STATISTICS**

**Paper I**

*Time : 3 Hours*

*Maximum Marks : 150*

*Note :— Attempt Question Number 1 which is compulsory and any other four questions from the rest, five in all. All questions carry equal marks. Symbols used in questions have their usual meanings.*

1. (a) Write down the sample space for each of the following random experiments :
- (i) Tossing a coin thrice
  - (ii) Tossing of two dice
  - (iii) Tossing a coin till a head appears
  - (iv) Tossing a coin till two heads or two tails appear in succession.

P.T.O.

(b) Let A, B and C be three events associated with a random experiment. Express the following verbal statements in set notations :

- (i) At least one of the events occurs
- (ii) Exactly one of the events occurs
- (iii) Exactly two of the events occur
- (iv) Not more than two of the events occur simultaneously.

(c) Explain the following :

- (i) Primary and Secondary data
- (ii) Measures of Central tendency
- (iii) Difference between Correlation and Regression analysis
- (iv) Requirements of a good estimator.

2. Define conditional probability. State and prove the theorem of compound probability. What is meant by saying that a number of events are independent ?

3. (a) Distinguish between classification and tabulation.

Discuss the purpose, methods and importance of classification.

(b) Describe with sketches the following types of diagrammatic representation of statistical data :

(i) Bar Diagram

(ii) Line Diagram

(iii) Pie Diagram.

4. (a) Explain the properties of a good average. In the light of these properties, which average do you think is the best and why ?

(b) Prove that mean deviation is least about median.

5. (a) The mean of 5 observations is 4.4 and the variance is 8.24. If three of the five observations are 1, 2 and 6, find the other two.
- (b) Show that correlation coefficient between two variables X and Y always lies between  $-1$  and  $+1$ .
6. (a) How, in your opinion, should a measure of dispersion change when all values of the variable are increased or decreased :
- (i) by the same amount ?
- (ii) in the same proportion ?
- Judge in this light the different measures of dispersion.
- (b) Prove that  $\beta_2 \geq \beta_1$ .
7. (a) Define normal distribution and write down its properties and applications.

- (b) Let  $X_1, X_2, X_3$  and  $X_4$  are mutually independent standard normal variates. Find out the probability distribution of :

$$\frac{1}{2}(X_1 - X_2)^2 + X_3^2 + X_4^2.$$

8. State and prove Cramer-Rao Inequality, and explain its utility in finding out UMVU estimator with the help of an example.