RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

FIRST YEAR

B.A./B.SC. FIRST SEMESTER (July – December) 2014

Mid-Semester Examination, September 2014

Date : 17/09/2014 **STATISTICS (General)**

Time : 12 noon – 1 pm Paper : I Full Marks : 25

[Use a separate answer book for each group]

Group – A

(*Answer **any two** questions*)

1. Show that $R^2/2n \le S^2 \le R^2/4$, where R is the range & S^2 is the square of the standard deviation of a set of a variables $x_1, x_2, ...,x_n$. [5]

2. a) Let $y_i = a + bx_i$, i = 1,2,...,n then show that $S_y^2 = b^2.S_x^2$, where S_y^2 & S_x^2 are square of standard deviation of y & x respectively.
   b) Give two situations where median is better than mean. [3+2]

3. a) Give what type of graphs can be used in the following situations :
      i) Percentage distribution of income of an individual under different heads.
      ii) Amount of profit & loss of a particular Company over 10 years.
      iii) Sale of a company available for 10 years.
   b) Explain the difference between class limit and class interval. [(3×1)+2]

Group – B

(*Answer **any three** questions*)

4. The total life time (in years) of five-year-old dogs of a certain breed is a random variable whose distribution function is given by :

$$F(x) = \begin{cases} 0 & \text{for } x \le 5 \\ 1 - \dfrac{25}{x^2} & \text{for } x > 5 \end{cases}$$

   Find the probabilities that such a five-year-old dog will live
   a) beyond 10 years
   b) anywhere from 12 to 15 years. [5]

5. A die is thrown twice the event space S consists of the 36 possible pairs of outcomes (a,b), each assigned with probabilities $1/36$. Let A, B, C denote the events :

   $A = \{(a,b) \mid a \text{ is odd}\}$; $B = \{(a,b) \mid b \text{ is odd}\}$; $C = \{(a,b) \mid a+b \text{ is odd}\}$

   Verify whether A, B & C are mutually independent or independent in pairs only. [5]

6. From a vessel containing 3 white & 5 black balls, 4 balls are transferred into an empty vessel. From this vessel, a ball is drawn and it is found to be white. What is the probability that out of 4 balls transferred, 3 are white & 1 black? [5]

7. What are the properties of a distribution function? Examine whether the following function is a distribution function : [1+4]

$$F(x) = \begin{cases} 0 & \text{if } x \le 1 \\ 1 - \dfrac{1}{2x} & \text{if } x > 1 \end{cases}$$

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