RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

B.A./B.SC. FIRST SEMESTER EXAMINATION, DECEMBER 2012

FIRST YEAR

Date : 24/12/2012 **Statistic (General)**

Time : 11am – 1pm Paper : I Full Marks : 50

(Use separate answer book for each group)

Group : A

1. Answer **any three** questions : (3×5)
   a) What is Ratio chart? Discuss the cases in which it is more advantageous to use it compared to simple line diagram. (3+2)
   b) Show that the mean deviation about mean cannot exceed the standard deviation. When are they equal? (4+1)
   c) What are the characteristics of a satisfactory measure of central tendency? (5)
   d) The first three moments of a distribution about the value 3 of the variable are 2, 10 and 30 respectively. Obtain the first three moments about zero. (5)
   e) Suggest a measure of skewness in case of open ended classes. Show that it lies between -1 to +1. (5)
   f) Form an ordinary frequency table from the following cumulative frequency distribution table, stating clearly the reasons underlying the steps you followed : (5)

Marks	Number of Students
Below 10	3
Below 20	8
Below 30	17
Below 40	20
Below 50	22

2. Answer **any one** questions : (1×10)
   a) i) Show that mean deviation is least when measured about mediam. (5)
   ii) Show that for a set of n non-negative values $AM \geq GM$. (5)
   b) What do you mean by dispersion?
   If a variable x takes the values $x_1, x_2, ...x_n$ then show that $\frac{R^2}{2n} \leq S^2 \leq \frac{R^2}{4}$ where symbols have their usual meaning. Discuss the cases of equality. (2+6+2)

Group : B

3. Answer **any three** questions : (3×5)
   a) Define mutually exclusive and exhaustive set of events with suitable examples.
   b) State the classical definition of probability. What are the limitations of it?
   c) What do you mean by cumulative distribution function? State its properties.
   d) Two squares are chosen at random from the small squares drawn on a chessboard. What is the probability that the two chosen squares have exactly one corner in common?
   e) Show that the probability that exactly one of the events A and B occurs is $P(A) + P(B) - 2P(A \cap B)$.
   f) Give an example to show that three events A, B, C can be pairwise independent but not mutually independent.

4. Answer **any one** questions : (1×10)

a) Distinguish between elementary and composite events. (3+7)

Show that for events $A_1, A_2, ...A_n$

$$P\left(\bigcup_{i=1}^{n} A_i\right) = \sum_{i=1}^{n} P(A_i) - \sum_{i<j} P(A_i \cap A_j) + \sum_{i<j<k} P(A_i \cap A_j \cap A_k) + ...$$

$$+(-1)^{n-1} P\left(\bigcap_{i-1}^{n} P(A_i)\right).$$

b) i) A fair die is rolled until 6 appears twice. Let X be the number of rolling needed. Find the expectation of X. (6)

ii) Show that under suitable conditions, both the binomial and the Poison distributions can be obtained as limiting cases of a hypergeometric distribution. (4)

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