RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

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

FIRST YEAR

Date : 21/12/2012 **Statistics (General)**

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

(Use a separate answer book for each group)

Group : A

1. Answer **any three** questions of the following : (3 × 5)

   a) Illustrate with examples (i) ratio chart (ii) pie-chart. $(2\frac{1}{2}+2\frac{1}{2})$

   b) If $y = f(x)$ where f is a strictly monotone function, show that median of y is $f(x_M)$ where x_M is the median of x. (5)

   c) What restrictions are taken while constructing a price index number regarding the choice of the base period? (5)

   d) Find the formula for the composite standard deviation of two groups of observations. (5)

   e) Discuss the different measures of shewness. (5)

   f) The number of runs scored by cricketers A and B during a test series consisting 5 test matches are shown below for each of the test innings :

Cricketer A :	5	26	97	76	112	89	6	108	24	16
Cricketer B :	51	47	36	60	58	39	44	42	71	50

   Make a comparative study of their batting performance. (5)

2. Answer **any one** question of the following : (1 × 10)

   a) i) Show that the mean absolute deviation about mean cannot exceed the standard deviation. (6)

   ii) Discuss the errors in construction of Index numbers. (4)

   b) i) For a set of 250 observations of a certain variable x, the mean and standard deviation are respectively 65.7 and 4.4. However, on scrutinizing data it is found that two observations, which should correctly read as 71 and 83 had been wrongly recorded as 91 and 80. Obtain the correct value of mean and standard deviation. (6)

   ii) Explain the concepts of Lorenz curve and Gini coefficient. (4)

Group : B

3. Answer **any three** questions of the following : (3 × 5)

   a) Derive the Mean and Variance of a Binomial Distribution using Moment generating functions. (5)

   b) State and prove Bonferroni's inequality. (5)

   c) Prove that Binomial Distribution's limiting form is a Poisson Distribution. (5)

   d) If $P(B_i \cap C) > 0$ and the events B_i are exhaustive and mutually exclusive show that $P(A \mid C) = \sum_i P(B_i \mid C) P(A \mid B_i \cap C)$. (5)

e) Given :

$P(A \cap B) = P(A).P(B)$

$P[A \cap (B \cap C)] = P(A).P(B \cap C)$

$P[A \cap (B \cup C)] = P(A).P(B \cup C)$

Prove that : $P(A \cap C) = P(A).P(C)$. (5)

f) The nine digits 1, 2,....,9 are arranged in random order to form a nine-digit number. Find the probability that the number will be divisible by 4. (5)

4. Answer **any one** question of the following : (1 × 10)

a) State and prove the General Additive theorem for 'n' events. (2 + 8)

b) i) Find the recursion relation for central moments of a Poisson distribution. (4)

ii) Find the variance of a hyper geometric distribution. (6)