Seat No. : _____

15G-101

May-2015

B.Sc., Sem.-II

Core Course-3 : Statistics

Paper-103

(Basic Probability Theory-I)

Time : 3 Hours] **[Max. Marks : 70**

Instructions : (1) **All** questions carry equal marks.
(2) Scientific calculator is allowed.

1. (a) Explain various measures of dispersion along with their merits and demerits. **7**

OR

Write a short note on skewness and kurtosis.

(b) Define moments. Establish relation between first four row moments and central moments. **7**

OR

The first four moments about the value 4 of a variable are –1.5, 17, –30 and 108. Find moments about mean, $\beta 1$ and $\beta 2$.

2. (a) (i) State and prove Baye's theorem. **7**

(ii) Define conditional probability and in usual notations prove that $P(A \cap B) = P(A) \cdot P(A/B)$.

OR

An urn contains 5 white and 5 black balls. 4 balls are drawn from these urn and put into another urn. From the second urn a ball is drawn and is found to be white. What is the probability of drawing a white ball again at the next draw ?

(b) Ravi speaks truth 4 out of 5 times. He tossed a die and reports that there is a six. What is the chance that actually there was six ? **7**

OR

There are 10 urns of which each of 3 contains 1 white and 9 black balls, each of other 3 contains 9 white and 1 black ball and of the remaining 4 each contains 5 white and 5 black balls. One of the urn is selected at random and a ball taken blindly from it turns out to be white. What is the probability that an urn containing 1 white and 9 black balls was selected ?

3. (a) Explain various components of time series and show their importance by taking few illustrations. **7**

OR

Describe the method of least squares for measuring secular trends in time series. Also explain the procedure for fitting 2nd degree parabola by the method of least square.

(b) Explain the method of moving averages for measuring the trend. **7**

OR

What do you mean by seasonal indices in time series ? What are the various methods of determining seasonal indices ? Explain any one of them.

4. (a) What are the different steps in the process of decision making ? Define the following terms : **7**

(i) State of Nature (ii) Strategy

(iii) Pay-off Matrix.

OR

Explain the following :

(i) Maxi-min principle (ii) Horwich's principle

(iii) Laplace's principle

(b) Find the best act by using EMV principle for the following payoff matrix : **7**

Event	Probability	Act			
		A	B	C	D
S_1	0.40	15	50	10	15
S_2	0.30	20	15	50	10
S_3	0.20	40	20	15	50
S_4	0.10	60	40	20	15

OR

Determine the best act for the following pay-off matrix by applying :

(i) Maxi-min principle

(ii) Maxi-max principle

(iii) Horwich's principle (with $\alpha = 0.4$)

(iv) Laplace principle

Event	Act			
	A	B	C	D
S_1	10	6	3	–2
S_2	5	–2	4	8
S_3	–3	7	–1	6

5. Write answers in brief : **14**

(i) The marks (out of 50) obtained by two students in three subjects are Student A : 25, 30, 5; Student B : 20, 20, 22. Which student's marks shows greater variability ? Justify.

(ii) Why Range is not the best measure of dispersion ?

(iii) Which component of time series is mainly applicable in the following cases ?

(1) Fire in a factory

(2) Sales of new year greeting cards.

(iv) Give the limitation of method of moving average.

(v) Give the condition of independence of two events A and B in terms of probability.

(vi) Define EMV and EVPI.

(vii) Give the relation between EMV and EVPI.

(viii) Define central moments.

(ix) Give the formula for Karl Pearson's coefficient of skewness.

(x) Define EOL.

(xi) Standard deviation is the best measure of dispersion – Justify.

(xii) What is the usage of coefficient of variation ?

(xiii) If $\beta 1 = 1$ and $\beta 2 = 4$, comment upon the nature of the distribution.

(xiv) How cyclical variations differ from seasonal variations ?