(2½ Hours) [Total Marks: 75]

N.B. 1) All questions are compulsory.

2) Figures to the right indicate marks.

3) Illustrations, in-depth answers and diagrams will be appreciated.

4) Mixing of sub-questions is not allowed.

5) Use of own non-programmable calculator is allowed.

Q. 1 **Attempt All(Each of 5Marks)** 15

(a) Multiple Choice Questions

   i. If $\beta_{YX} < 1$, then β_{XY} is

   A. Less than 1

   B. Greater than 1

   C. Equal to 1

   D. Equal to 0

   ii. If correlation coefficient will have positive sign then

   A. X is increasing and Y is decreasing

   B. Both X and Y are increasing

   C. X is increasing and Y is decreasing

   D. None of the above

   iii. For two independent events A and B, P(A) = 0.3 and P(B) = 0.4 than

   P(A ∩ B) = ---

   A. 0.12

   B. 0.3

   C. 0.4

   D. 0.2

   iv. If the lower and upper limits of a class are 10 and 40 then the class-mark (mid point) of the class is---

   A. 25.0

   B. 12.5

   C. 15.0

   D. 30.0

   v. The measure of central value which can not be calculated with open-end classes in case of grouped frequency distribution is ---

   A. Median

   B. Mean

   C. Mode

   D. Third quartile

(b) Fill in the blanks

   i. Median is same as ---- quartile.

   ii. More than cumulative frequency is --- in nature.

   iii. The average of the upper and lower class boundaries is called as----.

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      iv.   If correlation coefficient between X and Y is perfect then regression lines of X on Y and Y on X are---.

      v. $P(A \cup A') =$ -----

(c)   Short Answers

      i.   Define mutually exclusive events.

      ii.   State the probability of union of two events when they are independent.

      iii.   State relation between mean, median and mode when frequency distribution is positively skewed

      iv.   State range of correlation coefficient.

      v.   State relation between probabilities of two events A and B when B is subset of A.

Q. 2   **Attempt the following (Any THREE)(Each of 5Marks)**   **15**

(a)   Define mean, median and mode. Explain how to calculate them for continuous frequency distribution.

(b)   Explain the procedure of drawing less than ogive curve for continuous frequency distribution.

(c)   Prepare frequency distribution for the following data on number of mangoes; 3,0,0,1,3,2,1,0,4,2,3,3,0,1,3,2,1,4,3,2,0,1,4,2,1,1,1,3,2,2.

(d)   Represent the following information using, Histogram.

Monthly income	50-100	100-150	150-200	200-250	250-300
Number of employees	30	50	100	40	30

(e)   Explain the concepts of discrete and continuous variable using illustrations.

(f)   Find mean, variance, and standard deviation for the following data. 90,99,70,32,76, 68,75,31,39,89,40,66,42,93,53,97,43,92,95,36,67,55,47,37.

Q. 3   **Attempt the following (Any THREE) (Each of 5Marks)**   **15**

(a)   Define first four raw moments about zero and first four central moments. Write down the relations between raw and central moments.

(b)   What do you understand by kurtosis? Distinguish clearly by drawing figures between leptokurtic and platykurtic.

(c)   For the following frequency distribution obtain coefficient of skewness based on quartiles.

Marks	20-30	30-40	40-50	50-60	60-70	70-80
Number of students	5	20	14	10	8	5

(d)   Represent the positive and negative correlation coefficient by scatter diagram.

(e)   Explain the concept of correlation and regression. How regression is different than correlation?

(f)   For the following data obtain coefficient of regression line of X on Y.

X	45	44	50	53	66	30	48
Y	42	40	41	42	56	30	43

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Q. 4   Attempt the following (Any THREE) (Each of 5Marks)   **15**

(a)   Explain the following concepts;

      i.   Sample space

      ii.   Independent events.

(b)   Define conditional probability and state Bayes' theorem.

(c)   The probability that a student passes a Physics test is 2/3 and the probability that he passes both the Physics test and English test is 14/45. The probability that he passes at least one test is 4/5. What is the probability that he passes the English test?

(d)   A box contains 6 red, 4 white and 5 back balls. A person draws 4 balls from the box at random. Find the probability that among the balls drawn there is at least one ball of each colour.

(e)   In 2002 there will be three candidates for the position of principal, Dr. X, Dr. Y and Dr. Z – whose chances of getting the appointment are in the proportion 4:2:3 respectively. The probability that Dr. X if selected would introduce co-education in the college is 0.3. The probabilities of DR. Y and Dr. Z doing the same are respectively 0.5 and 0.8.

      i.   What is the probability that there will be co-education in the college in 2003?

      ii.   If there is co-education in the college in 2003, what is the probability that Dr. Z is the principal?

(f)   Bag I contains 6 blue and 4 red balls. Bag II contains 2 bue and 6 red balls. Bag III contains 1 blue and 8 red balls. A bag is chosen at random and two balls are drawn without replacement from this bag. Both the balls were blue. Find the probability that bag II was chosen.

Q. 5   Attempt the following (Any THREE) (Each of 5Marks)   **15**

(a)   Define variance, standard deviation and coefficient of variation. Explain how to calculate them for raw data.

(b)   Explain regression model and write the properties of regression coefficient.

(c)   An MBA applies for a job in two firms X and Y. The probability of his being selected in firm X is 0.7 and being rejected at Y is 0.5. The probability of at least one of his applications being rejected is 0.6. What is probability that he will be selected in one of the firms.

(d)   The probabilities of X, Y, and Z becoming managers are 4/9, 2/9 and 1/3 respectively. the probabilities that the bonus scheme will be introduced if X, Y, and Z becomes managers are 3/10 , 1/2, 4/5 respectively.

    i. What is the probabilities that bonus scheme will be introduced and

    ii. If the bonus scheme has been introduced, what is the probability that the manager appointed was X ?

(e)   Represent the following data by Stem and Leaf diagram:

86,46,44,68,47,81,77,48,50,87,41,88,59,80,52,85,56,61,58,72,69,82,78,60,54,71.