COM4CJ205:BUSINESS STATISTICS
Section-A-Mark-3

1. Define Business Statistics.
2. Explain the scope of Business Statistics.
3. Describe any three functions of Statistics in business decision-making.
4. Explain any three applications of Statistics in business and management.
5. Describe the role of Statistics in planning and forecasting.
6. Explain how statistics helps in quality control.
7. State the importance of statistics in marketing management.
8. Explain the use of statistics in financial analysis.
9. Explain Statistical Methods.
10. Explain the Descriptive Statistical Methods.
11. Describe any two types of Descriptive Statistics.
12. Explain the inferential statistical Methods.
13. Explain measures of central tendency.
14. Explain measures of dispersion.
15. Explain the measures of frequency distribution.
16. Distinguish between descriptive statistics and inferential statistics.
17. State the purpose of Inferential Statistical Methods.
18. Mention any two tools used in Inferential Statistics.
19. State any two measures of dispersion.
20. State any two examples of bivariate analysis.
21. Define multivariate analysis.
22. Describe the types of univariate analysis.
23. Explain the meaning of bivariate analysis.
24. Explain statistical methods used in data analysis.

25. Describe the types of bivariate analysis.
26. Define hypothesis.
27. Distinguish point estimation and interval estimation
28. Illustrate with an example how a hypothesis is framed.
29. Define estimation in statistics.
30. Explain the concept of point estimation.
31. Explain the term correlation.
32. Describe the difference between positive and negative correlation with an example.
33. Illustrate the concept of perfect correlation using numerical values.
34. Classify different types of correlation based on direction
35. Explain the value of the correlation coefficient helps in understanding the strength and direction of a relationship between two variables.
36. Identify the type of correlation that exists in the following situations:(a) Height and weight (b) Price and demand (c) Income and expenditure
37. Explain linear Correlation
38. Explain Non-linear correlation
39. Distinguish between linear and non-linear correlation using examples or diagrams.
40. Explain how the degree of correlation helps in interpreting the strength of the relationship between two variables.
41. Explain the purpose of using a scatter diagram in studying the relationship between two variables.
42. Describe how the pattern of points on a scatter diagram indicates the type of correlation.
43. Interpret the meaning of a closely clustered set of points in a scatter diagram.
44. Distinguish between the scatter diagrams of positive, negative, and no correlation.

45. Illustrate with an example how a scatter diagram can visually represent linear and non-linear relationships.

46. Explain the term probable error.

47. Explain the purpose of calculating Probable Error in correlation analysis.

48. Describe how sample size affects the Probable Error of correlation coefficient.

49. Explain the meaning and purpose of the Karl Pearson correlation coefficient.

50. Explain the term covariance

51. Identify the conditions under which Karl Pearson's correlation coefficient can be applied accurately.

52. Explain the Properties of Correlation Coefficient

53. Explain Pearson Product-Moment Correlation Coefficient

54. Describe the relationship between the correlation coefficient (r) and the coefficient of determination (r^2).

55. Explain the concept of lag correlation

56. Explain the concept of lead correlation

57. Define rank correlation and give an example of its use.

58. Explain the difference between correlation and regression

59. State the types of regression

60. Write a note on regression line.

61. Define a set and give an example.

62. If A = {1, 2, 3, 4} and B = {3, 4, 5, 6}, find ($A \cup B$) and ($A \cap B$).

63. What is the probability that a leap year selected at random will contain 53 Sundays?

64. Define the term probability.

65. Define (a) random experiment, (b) Sample Point, (c) Sample space.

66. Explain sure, impossible and uncertain events.

67. Explain the term mutually exclusive event and equally likely event with example.

68. Find the probability of drawing an ace or a spade from a pack of cards.

69. State addition theorem of probability

70. If p(A)=0.5, P(B)=0.7, P(A∩B) =0.3. Find P(AUB).

71. If P(A)=1/4, P(B)=1/3 and P(AUB)=1/2. Find the values of (i) P(A∩B) (ii) P(A∩BI) (iii) P(AI∩BI)

72. A card is drawn from a pack of cards. What is the probability that it is (i) a King or a Queen, (ii) a King or a Spade.

73. State multiplication theorem of probability

74. How many words can be formed with the letters of the word RAJESH.

75. Explain the difference between permutation and combination

76. Find the values of 10 C3, 10C0 and 10 C10

77. Three cards are drawn from a pack of 52 cards. What is the probability that (i) all the three will be Kings.

78. Define conditional probability.

79. If p(A)=1/13, P(B)=1/4, P(A∩B) =1/52. Find (i) P(A/B),(ii) P(B/A).

80. State Baye's theorem.

81. Define random Variable

82. Explain theoretical distribution

83. Explain the difference between a discrete random variable and a continuous random variable?

84. State any two examples of theoretical probability distributions.

85. Explain the importance of theoretical distributions in statistical analysis

86. Explain the uses of theoretical distributions in real-life decision making

87. Explain the Fitting of a Probability Distribution

88. Define Binomial distribution

89. Explain the steps involved in fitting a binomial distribution

90. State why the binomial distribution is also known as discrete probability distribution.

91. Bring out the fallacy in the following statement “the mean of the binomial distribution is 5 and the S.D is 3”.

92. Four coins are tossed simultaneously. What is the probability of getting 2 heads?

93. Define poisson distribution.

94. Explain the conditions under which a binomial distribution can be approximated by a Poisson distribution.

95. X follows poisson distribution with parameter ‘m=2’. Find (i) P(X=0) (ii) P(X=1)

96. Give five examples which conform to poisson distribution

97. Define a normal distribution.

98. Describe the shape of the normal distribution curve.

99. Explain what the area under the normal curve represents.

100. Explain standard normal distribution

101. Out of 40 students, 22 like football and 18 like cricket. If 10 like both games, find how many students like: (a) only football (b) only cricket.

102. In a class of 20 students, 12 like Mathematics and 8 like Science. How many students like both subjects? (Assume all students like at least one subject.)

103. A die is thrown.
(a) Write the sample space
(b) Find the probability of getting a number less than 5.

104. A card is drawn from a pack of 52 cards. Find the probability that the card drawn is
(a) a red card
(b) not a face card.

105. Two dice are thrown together. Find the probability that the sum of the numbers is 8.

106. A bag contains 6 red, 5 blue, and 4 green balls. How many ways can 5 balls be selected if at least 1 ball is red?

107. In how many ways can 3 books be arranged on a shelf from 5 books?

108. How many ways can the letters of the word BOOK be arranged?

109. From 6 men and 4 women, a committee of 4 is to be formed. How many ways can it include exactly 3 men?

110. From 6 people, a team of 3 is to be formed. How many ways can this be done?

111. In a group of 30 people, 18 like tea and 12 like coffee. 5 like both tea and coffee. Find the probability that a person likes coffee given that the person likes tea.

112. A card is drawn from a standard deck of 52 cards. Find the probability that the card is a king given that it is a face card.

Section-B-Mark-6

1. Draw a Venn diagram for two sets A and B and shade the region representing A ∪ B.

2. Draw a Venn diagram for two sets A and B and shade the region representing A ∩ B.

3. Two cions are tossed, what is the probability of getting (1) both heads, (2) one head, (3) at least one head, (4) no head.

4. Three unbiased coins are tossed. What is the probability of obtaining (1) all heads (2) two heads (3) one head (4) at least one head

5. A ball is drawn from a bag containing 4 white, 6 black and 5 green balls. Find the probability that a ball drawn is (1) white, (2) green, (3) black, (4) not green, (5) green or white.

6. There are 17 balls numbered from 1 to 17 in a bag. If a person selects one at random what is the probability that the number printed on the ball be an even number greater than 9?

7. If odds in favour of A solving a problem are 2 to 3 and odds against B solving problem are 3 to 5. Find probability for (1) A solving the problem, (2) B solving the problem.

8. A die is thrown. Find the probability (1) an even number (2) '3' or '5' and (3) less than 3.

9. A committee of 5 is to be formed from a group of 8 boys and 7 girls. Find the probability that the committee consists of (1) 3 boys and 2 girls (2) at least one girl.

10. A committee of four people is to be appointed from 3 officers of the production department, 4 officers of purchase department, two officers of sales department and one chartered accountant. Find the probability of forming the committee in the following manner (1) there must one from each category, (2) it should have

at least one from the purchase department, (3) the chartered accountant must be in the committee.

11. A subcommittee of 6 members is to be formed out of a group of 7 men and 4 ladies. Obtain the probability that the subcommittee will consist of (1) exactly 2 ladies (2) at least 2 ladies (3) utmost 2 ladies.

12. The probability that a contractor will get a plumbing contract is 2/3 and the probability that he will not get an electric contract is 5/9. If the probability of getting at least one contract is 4/5, what is the probability that he will get both the contracts?

13. The probability of a student passes Statistics is 2/3, the probability that he passes both, statistics and Accountancy tests is 14/45. The probability of passing at least one subject is 4/5, what is the probability he passes the Accountancy test?

14. The probability that a student Mr X passes Mathematics is 2/3, the probability that he passes statistics is 4/9. If the probability of passing at least one subject is 4/5, what is the probability that Mr X will pass both the subject?

15. Probability that A will pass paper I is 0.3 and probability that he will pass paper II is 0.7. What is the probability that he will pass both the papers (Assume passing the two papers as independent)

16. The probability that A solves a problem in statistics is 2/5 and the probability that B solves it is 3/8. If they try independently find the probability that (1) both solve the problem (2) none solves the problem, (3) at least one solves the problem.

17. A university has to select an examiner from a list of 50 persons. 20 of them are women and 30 men. 10 of them know Hindi and 40 do not, 15 of them are teachers and remaining are not. What is the probability of the University selecting a Hindi knowing Woman Teacher?

18. Two persons A and B attempt independently to solve a puzzle. The probability that A will solve is 3/5 and the probability that B will solve is 1/3. Find the probability that the puzzle will be solved by at least one of them.

19. The odds against X solving a business statistics problem are 8 to 6 and odds in favour of student Y solving the same problem are 14 to 16. What is the probability that (1) problem is solved (2) problem is not solved.

20. Probability that A solves the problem is 0.5, probability that B solves is 0.4. What is the probability that the problem is solved by at least one of them?

21. If the probability of a horse A winning a race is 1/5 and the probability of a horse B winning the same is 1/6. What is the probability that one of the horses will win.

22. The probability that boy will get a scholarship is 0.9 and a girl will get is 0.8. What is the probability that at least one of them will get the scholarship?

23. A problem in Statistics is given to students A, B and C their chances of solving are 1/2, 1/3 and 1/4 respectively. What is the probability that the problem will not be solved?

24. A class consists of 80 students, 25 of them are girls and 55 boys. 10 of them are rich and remaining poor. 20 of them are fair complexioned. What is the probability of selecting a fair complexioned rich girl?

25. State the addition and multiplication theorems of probability.

26. Three persons A, B and C are simultaneously shooting a target. Probability of A hitting the target is 1/4 that of B is 1/2 and that of C is 2/3. Find the probability (1) exactly one of them will hit the target, (2) at least one of them will hit the target.

27. A candidate is selected for interview for three posts. For the first post there are 3 candidates, for the second there are 4 and for the third there are 2. What are the chances of his getting at least one post?

28. Given A, B and C are independent events P(A)=0.3, P(B)=0.2 and P(c)=0.4. Find the probability for (1) all occurring and (2) none occurring.

29. A certain player say X, is known to win with probability 0.3 if the track is fast and 0.4 if the track is slow. For Monday there is a 0.7 probability of a fast track and 0.3 probability of a slow track. What is the probability that player X will win on Monday.

30. In how many ways can 4 red balls be drawn from a bag containing 10 red balls

31. What is the probability of getting 3 white balls in a draw of 3 balls from a box containing 5 white and 4 black balls?

32. The letters of the word 'STATISTICS' are written on 10 identical cards. If two cards are drawn at random, what is the probability that (1) one 'S' and one 'I' will occur (2) two 'T' will occur

33. What is the probability of selecting two 'M' from the letters of the word 'MANAGEMENT' ?

34. Three letters are selected from the letters of the word 'ASSASSINATIONS' What is the probability that (1) all are 'S' (2) Exactly one is 'I'

35. If A and B are two mutually exclusive events and P(A) =0.45 and P (B)=0.35, find P(A or B)

36. A bag contains 4 white, 2 black, 3 yellow and 3 red balls. What is the probability of getting a white or a red ball at random in a single draw of one.

37. If $P(A)=1/5$, $P(B)=1/4$ and $P(A \cap B)=1/10$. Find $P(A \cup B)$.

38. If $P(A)=1/13$, $P(B)=1/4$ and $P(A \cup B)=4/13$. Find $P(A \cap B)$.

39. A bag contains 6 white and 4 black balls, then what is the probability of (1) drawing 2 white and 2 black balls, (2) drawing 1 white and 3 black balls

40. A committee is to be constituted by selecting 2 people at random from a group consisting of 3 economists and 4 statisticians. Find the probability that the committee will consist of (1)2 economist, (2) 2 statisticians (3) 1 economist and 1 statistician

41. One bag contains 4 white and 2 black balls. Another contains 3 white and 5 black balls. One ball is drawn from each bag. Find the probability that both are of same colour

42. An urn 'A' contains 2 white and 4 black balls. Another urn 'B' contains 5 white and 7 black balls. A ball is transferred from urn 'A' to urn 'B'. Then a ball is drawn from urn 'B'. Find the probability, that it will be white.

43. 20% of all students in a university are graduates and 80% are undergraduates. The probability that a graduate student is married is 0.50 and the probability that an undergraduate student is married is 0.10. One student is selected at random, what is the probability that the student selected is married?

44. A speaks truth in 70% cases and B in 85% cases. In what percentage of cases are they likely to contradict each other in stating the same fact.

45. A speaks truth in 60% cases and B in 70% cases. In what percentage of cases are they likely to contradict each other in stating the same fact.

46. There are two urns on containing 5 white and 4 black balls and other containing 6 white and 5 black balls. One urn is chosen and one ball is drawn. If it is white,

what is the probability that the urn selected is the first.

47. The probability that a doctor will diagnose a particular disease correctly is 0.6. The probability that a patient will die by his treatment after correctly diagnosis is 0.4 and the probability of death by wrong diagnosis is 0.7. A patient of the doctor who had the disease died. What is the probability that his disease was not correctly diagnosed.

48. The chance that a female worker in a chemical factory will contact an occupational disease is 0.04 and the chance for a male worker is 0.06. Out of 1000 workers in a factory 200 are females. One worker is selected at random and is found to have contacted the disease. What is the probability that the worker is female?

49. In a bolt factory machine A, B & C manufacture respectively 25%, 35% and 40% of the total. Of their output,5,4 and 2 percent are defective bolts. A bolt is drawn at random from the product and is found to be defective. What is the probability that it was manufactured by Machine A?

50. A bag contains 2 white and 3 black balls another contains 3 white and 2 black balls. A ball is drawn from one of the bags and found to be white. What is the probability that it is from first bag?

51. Explain the basic assumptions of a theoretical probability distribution. Illustrate with example.

52. In an online shopping platform, the number of orders placed per hour and the amount spent by customers are studied. Explain which probability distributions are suitable and why.

53. In a quality control process, each manufactured item is classified as defective or non-defective.Explain how the properties of the binomial distribution apply to this inspection process.

54. Three coins are tossed simultaneously. What is the probability of getting (1) utmost 2 heads, (2) at least one head?

55. The probability that a batsman scores a century in a cricket match is 1/3. What is the probability that out of 5 matches, he may score century in (1) exactly 2 matches (2) no match.

56. Eight unbiased coins were tossed simultaneously. Find the probability of getting (1) exactly 4 heads, (2) no heads at all (3) 6 or more heads (4) utmost 2 heads

57. Assuming that 1/2 of the population is vegetarian so that choice of an individual being a vegetarian is 1/2. Assuming that 100 investigators can take a sample of

10 individuals each to see whether they are vegetarians, how many investigators would you expect to report that three people or less were vegetarians.

58. Six dice are thrown together and appearing of 3 on a dice is counted as a success. Find the probability that there will be 4 success.

59. The overall percentage of failure in a certain examination is 40%. What is the probability that out of a group of 6 candidates at least 4 passed the examination.

60. If the chance of workers suffering from occupational hazards is 25%, what is the probability that out of 6 workers selected at a random, 4 or more will suffer from the hazards?

61. Write down all the terms of the binomial distribution with parameters n=4, p=1/3

62. For a binomial distribution mean =4 and variance is 12/9. Write down all the terms of the distribution.

63. 4 dice are thrown 162 times. The occurrence of '2 or 3' is considered a success. In how many throws, do you expect (1) exactly 2 success (2) at least one success.

64. Consider families with 4 children each. What percentage of families would you expect to have (1) 2 boys and 2 girls (2) at least one boy

65. A basket contains 20 bad oranges and 80 good oranges. Three are drawn at random from this basket. Find the probability that of three (1)Exactly two (2) at least one and (3)utmost 2 are good oranges

66. 3% electric bulbs manufactured by a company are defective, find the probability that in a sample of 100 bulbs, exactly 5 bulbs are defective.

67. Explain the properties of poisson distribution

68. It is known from past experience that in a certain plant there are on the average 4 industrial accidents per month. Find the probability that in a given year there will be less than 3 accidents. Assume poisson distribution.

69. In a town 10 accidents took place in a span of 100 days. Assuming that the number of accidents follows poisson, find the probability that there will be at least 3 accidents in a day.

70. A manufacturer of blades knows that 5% of his product is defective. If he sells blades in boxes of 100, and guarantees that no more than 10 blades will be

defective, what is the probability that a box will fail to meet the guarantee quality?

71. A car hire firm has 2 cars which hires out day by day. The number of demands for a car on each day is distributed as a poisson variate with a mean 1.5. Calculate the proportion of days on which (1) neither car is used (2) some demand is refused.

72. out of 500 items selected for inspection 0.2% are found to be defective. Find how many lots will contain exactly no defective if there are 1000 lots (Use poisson distribution)

73. In a certain factory turning out optical lenses, there is a small chance of 1/500 for any one lens to be defective. The lenses are supplied in packets of 10. Use poisson distribution to calculate the approximate number of packets containing (1) no defective, (2)one defective, lenses in a consignment of 20,000 packets.

74. A company manufactures certain kinds of bolts. It is found that 2% of the bolts produced every year are defective. Find the probability that out of 200 bolts produced in a year none is defective.

75. A telephone exchange receives on an average 4 calls per minute. Find the probability on the basis of poisson distribution of (1) 2 or less calls per minute, (2) upto 4 calls per minute and (3) more than 4 calls per minute

76. A book contains 100 misprints distributed randomly throughout its 100 pages. What is the probability that a page observed at random contains at least 2 misprints? (Assume poisson distribution)

77. If in the key punching of 80 column cards, the average mistakes per card is 0.3, what percent of cards will have (1) no mistake (2) one mistake (3) three mistakes.

78. In a town 10 accidents took place in a span of 50 days. Assuming that the number of accidents follows poisson, find the probability that there are 2 accidents in a day.

79. The Variable X follows a normal distribution with mean 45 and S.D=10. Find the probability that (1)$X \geq 60$ (2) $40 \leq X \leq 56$

80. The scores of students in a test follow normal distribution with mean =80 and S.D =15. A sample of 1000 students has been drawn from the population. Find (1) probability that a randomly chosen student has score between 85 and 95 (2) appropriate number of students scoring less than 60

81. The height of the school children of one institution is normally distributed with mean of 54 inches and S.D of 12 inches. What percentage of students have height between 46 and 56 inches

82. The distribution of marks obtained by a group of students is normal with mean 50 marks and S.D 15 marks. Estimate the percentage of students with marks below 35.

83. If the heights of 1000 soldiers in a regiment are distributed normally with a mean of 172 cms and a S.D of 5 cms, how many soldiers have heights greater than 180cms?

84. The heights of employees in an organization follow a symmetric pattern with most values clustered near the mean.Explain how the properties of the normal distribution help in understanding this distribution.

85. Explain the application of the normal distribution in business management decisions.

86. Describe how correlation analysis can be used to study the relationship between hours of study and academic performance of students.

87. A business analyst studies three different situations and obtains the following correlation coefficients:

- **Situation A:** Correlation coefficient = **+1** between machine hours and output.
- **Situation B:** Correlation coefficient = **–1** between discount rate and selling price.
- **Situation C:** Correlation coefficient = **0** between employee shoe size and monthly salary.

Explain what each type of correlation indicates in the above situations.

88. Coefficient of correlation between two variables is calculated to be –0.98.
a) Find the value of probable error and hence interpret the result (n = 10).
b) Find the limits within which population correlation coefficient may lie.

89. If $r=0.89$, P.E. = 0.023, find the value of n.

90. Given: $n=5$ Calculate Karl Pearson's coefficient of correlation.
$\sum dx=0, \quad \sum dy=0$
$\sum dx^2=776, \ \sum dy^2=550$
$\sum dx\, dy=280$

91. A computer while calculating the correlation coefficient between two variables from 17 pairs of observations obtained the following results:

$\Sigma X=544;\ \ \Sigma X^2=19040; \Sigma Y=244;$

$\Sigma Y^2=3773;\qquad \Sigma XY=8413$

Find the correlation coefficient

92. The coefficient of rank correlation between the ranks of 7 students obtained by two judges was found to be 0.75. If the difference in ranks (D) was wrongly taken as 5 instead of 7, calculate the correct coefficient.

93. The prices of tea and coffee during the last 7 months in a town are given below. You are required to find the rank correlation coefficient between the prices of tea and coffee using Spearman's Rank Correlation Coefficient**.**

Tea	90	86	98	78	56	75	55
Coffee	150	180	156	148	124	132	110

94. In the study of regression equations, the following values were obtained.
Regression coefficient of Y on X = 0.25
r = 0.42
Standard deviation of Y = 4
Find the Standard Deviation of X.

95. Given: $bxy=0.85, byx=0.89, \sigma x=3$
Calculate:
a) Correlation coefficient
b) Standard deviation of Y

96. Variance is less than mean in binomial distribution illustrate with example.

97. Illustrate four required conditions for a scenario to be modelled using the Binomial distribution.

Answer Key :

98. Illustrate the procedure of fitting binomial distribution with suitable example.

99. Illustrate the procedure of fitting poisson distribution with suitable example.

100. Illustrate the key assumptions about the data that must be true for the Normal distribution to be a valid model?

101. Explain any one theoretical distribution with suitable example

Section-C-Mark-10

1. Describe the various methods used for measuring correlation. Illustrate the conditions under which each method is suitable.

2. Describe the different types of correlation—positive, negative, and zero correlation. Illustrate each type with a diagram and example.

3. Explain how a scatter diagram helps to distinguish the positive, negative, and zero correlation. Illustrate your answer with labelled diagrams.

4. Explain the relationship between the magnitude of the correlation coefficient (r) and the probable error (P.E). How can this relationship be used to interpret the

strength of correlation between training hours and employee productivity as 0.56 based on 20 pairs of data. Calculate the probable error and interpret the result.

5. Explain the concept of theoretical distribution. Discuss in detail the main features and applications of the Binomial, Poisson, and Normal distributions.

6. A hospital maintains records of the number of emergency cases arriving per hour. Explain how the concept of fitting a probability distribution helps in analyzing such data and justify the use of a Poisson distribution.

7. Eight coins were tossed together, 256 times. Find the expected frequencies of heads. Find mean and standard deviation

8. Five coins are tossed 3200 times. Find the frequencies of the distribution of heads and tails. Calculate the mean and standard deviation.

9. In a competitive examination, 5000 students have appeared for a paper in statistics. Their average mark was 62 and S.D was 12. If there are only 100 vacancies, find the minimum marks that one should score in order to get selected.

10. Given a normal distribution with mean =40 and S.D =10. Find the value of X that has (1) 15% of the area to its left (2) 20% of the area to its right.

11. In a normal distribution 17% of the items are below 30 and 17% of the items above 60. Find the mean and standard deviation.

12. In a normal distribution 15% of the items are under 45 and 15% of the items are over 65. Find the mean and standard deviation.

13. Assume that a variate X is normally distributed with mean 80 and S.D 20. Find the area under the normal distribution between 80 and 100. What is the area under normal distribution between 50 and 120.

14. In an intelligence test administered to 1000 students, the average score was 42 and standard deviation is 24. Find minimum score of the top 100 students.

15. The income of a group of 10,000 persons were found to be normally distributed with mean □520 and standard deviation □60. Find the lowest income of the richest 500.

16. The life time of electric bulbs of a certain company has a Mean of 400 hours and a S.D. of 50 hours. Assuming the distribution to be normal, find:(1). The proportion of the bulbs which have a life of more than 350 hours,(2)The life

time above which the best 25% of the bulbs will have life time, and the proportion of bulbs which have a life time between 300 and 500 hours.

17. A sales tax officer has reported the average sales of the 500 firms that he has to deal with during a year amounted to Rs. 72,000 with a standard deviation of Rs. 20,000. Assuming that the sales on these firms are normally distributed. Find (i) The number of firms whose sales are over Rs. 80,000 (ii) The percentage of firms whose sales are likely to range between Rs. 60,000 and Rs. 80,000.

18. In a normal distribution 31% of the items are under 45 and 8% of the items over 64. Find the mean and standard deviation of the distribution.

19. Calculate Karl Pearson's coefficient of correlation from the following data using 44 and 26 respectively as the origin of X and Y.

X	**43**	**44**	**46**	**40**	**44**	**42**	**45**	**42**	**38**	**40**
Y	29	31	19	18	19	27	27	29	41	30

20. Find the co-efficient of correlation between age and playing habit of the following students.

Age (years)	**14.5-15.5**	**15.5-16.5**	**16.5-17.5**	**17.5-18.5**	**18.5-19.5**	**19.5-20.5**
No. of students	250	200	150	120	100	80
Regular players	200	150	90	48	30	12

21. Find the co-efficient of correlation between the density of population and the death rate.

Cities	**A**	**B**	**C**	**D**	**E**	**F**
Areas in sq. miles	150	180	100	60	120	80
Population in '000	30	90	40	42	72	24
No. of death	300	1440	560	840	1224	312

22. Find out spearman's coefficient of correlation between the two kinds of assessment of graduate students' performance in a college.

Name of students	A	B	C	D	E	F	G	H	I
Internal Exam	51	68	73	46	50	65	47	38	60
External Exam	49	72	74	44	58	66	50	30	35

23. From the following data, compute the rank correlation.

X	82	68	75	61	68	73	85	68
Y	81	71	71	68	62	69	80	70

24. Ten competitors in a beauty contest are ranked by three judges in the following order:

Use the rank correlation coefficient to determine which pairs of judges has the nearest approach to common tastes in beauty.

1st Judge	1	6	5	10	3	2	4	9	7	8
2nd Judge	3	5	8	4	7	10	2	1	6	9
3rd Judge	6	4	9	8	1	2	3	10	5	7

25. The ranking of 10 individuals at the start and at the finish of a course of a training are as follows.

City	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
Rank before	1	6	3	9	5	2	7	10	8	4
Rank after	6	8	3	2	7	10	5	9	4	1

26. Find out the spearman's rank correlation coefficient

A	60	34	40	50	45	41	22	43	42	66	64	46
B	75	32	34	40	45	33	12	30	36	72	41	57

27. Find out the spearman's rank correlation coefficient

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

28. Find the two regression equation of X on Y and Y on X from the following data:

X	:	10	12	16	11	15	14	20	22
Y	:	15	18	23	14	20	17	25	28

29. From the following results, estimate the yield of crops when the rainfall is 22 cms and the rainfall when the yield is 600 Kgs.

	Yield in Kgs(Y)	Rainfall in cms(X)
Arithmetic Mean	508.4	26.7
Standard Deviation	36.8	4.6

Correlation coefficient between X and Y is 0.52

30. The following data gives the age and blood pressure (BP) of 10 sports persons.

Name	:	A	B	C	D	E	F	G	H	I	J
Age (X)	:	42	36	55	58	35	65	60	50	48	51
BP (Y)	:	98	93	110	85	105	108	82	102	118	99

1. Find regression equation of Y on X and X on Y (Use the method of deviation from arithmetic mean)
2. Find the correlation coefficient (r) using the regression coefficients.
3. Estimate the blood pressure of a sports person whose age is 45.

31. From the following information find regression equations and estimate the production when the capacity utilization is 70%. Correlation Coefficient (r)=0.72

	Arithmetic Mean	Standard Deviation
Production (in lakh units)	42	12.5
Capacity Utilization (%)	88	8.5

32. You are given the following data

	X	Y
Arithmetic Mean	36	85
Standard Deviation	11	8

Correlation coefficient between X and Y=0.66

1. Find the two regression equations
2. Estimate the value of x when y=75

33. The screws produced by certain machine were checked by examining samples. The following table shows the distribution of 128 samples according to the number of defective items they contained.

No. of defectives (x)	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
No. of samples (f)	7	6	19	35	30	23	7	1

Fit a binomial distribution to find the mean and variance of the distribution.

34. From the following data, fit a binomial distribution and find expected frequencies.

X	0	1	2	3	4
F	8	32	34	24	5

35. A systematic sample of 100 pages was taken from the *Concise Exophoria Dictionary*, and the observed frequency distribution of **foreign words per page** was found to be as follows:

No. of mistakes	0	1	2	3	4	5	6
No. of pages	48	27	12	7	4	1	1

36. The distribution of typing mistakes committed by a typist is given below. Assuming a Poisson model, find the expected frequencies.

Mistake per page	0	1	2	3	4	5
No. of pages	142	156	69	27	5	1

37. Following mistakes per page were observed in a book. Fit a Poisson distribution to the following data.

No. of mistakes	0	1	2	3	4
No. of pages	211	90	19	5	0

38. Following mistakes per page were observed in a book. Fit a Poisson distribution to the following data.

No. of mistakes	0	1	2	3	4
No. of pages	123	59	14	3	1

39. The Poisson distribution is used to model the number of events in a fixed interval. What three core assumptions must be met for the Poisson model to apply?

40. Draw the normal distribution curve and Explain the probability (area under the curve) for a normally distributed random variable, using the standard Normal (Z) distribution.