

[Time: 03.00 Hrs]

[Marks:75]

Please check whether you have got the right question paper.

N.B:

1. Q.1 is compulsory and carries 20 Marks.
2. Q. 8 is compulsory and carries 15 Marks.
3. Attempt any four questions from Q.2, Q.3, Q.4, Q.5, Q6 and Q7. Each of these questions carry 10 Marks.
4. Figures to the right indicate full marks.

Q.1	<p>(A) Select the correct option for the following statements/questions: (10)</p> <p>i) The value of correlation coefficient is _____ of the two regression coefficients. a) Arithmetic Mean b) Geometric Mean c) Harmonic Mean d) Standard deviation</p> <p>ii) Out of the following values, which one is not possible in probability? a) $P(x) = 1$ b) $\sum x P(x) = 3$ c) $P(x) = 0.3$ d) $P(x) = -0.3$</p> <p>iii) The shape of the normal curve depends on its _____. a) Mean deviation b) Standard deviation c) Quartile deviation d) Correlation</p> <p>iv) If $r = 1$, then there is _____ correlation between the two variables. a) No b) Perfect negative c) Perfect positive d) Elastic</p> <p>v) If the two regression lines are represented by $2x - 3y + 11 = 0$ and $x - 2y + 9 = 0$, the mean value of x and y are _____. a) (7, 5) b) (6, 5) c) (6, 7) d) (5, 7)</p> <p>vi) The median of a given frequency distribution is found graphically with the help of _____. a) Histogram b) Simple bar diagram c) Frequency polygon d) Ogive</p>	
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	<p>vii) What is the weighted mean of first 10 natural numbers whose weights are equal to the corresponding number?</p> <p>a) 7 b) 5.5 c) 5 d) 4.5</p> <p>viii) What is the mean of a Chi Square distribution with 6 degrees of freedom?</p> <p>a) 2 b) 6 c) 12 d) 8</p> <p>ix) Which of the following distributions is used to compare two variances?</p> <p>a) T – Distribution b) F – Distribution c) Normal Distribution d) Poisson Distribution</p> <p>x) Find the number of all possible samples from a population containing 8 items from which 2 items are selected at random without replacement.</p> <p>a) 42 b) 28 c) 56 d) 16</p> <p>(B) State whether the statement is True or False:</p> <p>i) For Normal distribution mean and mode are equal.</p> <p>ii) When data is arranged, middle value in set of observations is classified as mode.</p> <p>iii) If x and y are dependent than coefficient of correlation between x and y is $r \neq 0$.</p> <p>iv) The numerical value of a range can never be negative.</p> <p>v) If the computed value of F is greater than F- table value at specified level of significance then reject H_0.</p> <p>vi) Coefficient of correlation is geometric mean of both coefficient of regression.</p> <p>vii) Mathematical expectation of probability distribution is variance of probability distribution.</p> <p>viii) For Poisson distribution mean is np.</p> <p>ix) Population is a subset of sample.</p> <p>x) If the Critical region is evenly distributed then the test is referred as one tail test.</p>	(10)
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Q.2	<p>Attempt any Two of the following:</p> <p>(A) The average monthly salary of employees of a firm is Rs. 5,200. The average salaries of gents and ladies from the firm are Rs. 6,000 and Rs. 4,800. Find ratio of gents and ladies in the firm.</p> <p>(B) Represent the following data by a subdivided bar diagram. The data represents figure of production of paper in thousand tones for the year 2005, 2006, 2007.</p> <table><tr><td>Types</td><td>2005</td><td>2006</td><td>2007</td></tr><tr><td>Printing and Writing</td><td>35</td><td>40</td><td>50</td></tr><tr><td>Wrapping</td><td>18</td><td>19</td><td>15</td></tr><tr><td>Boards</td><td>16</td><td>15</td><td>15</td></tr><tr><td>Special varieties</td><td>7</td><td>5</td><td>5</td></tr><tr><td>Total</td><td>76</td><td>79</td><td>85</td></tr></table> <p>(C) Calculate the mode for the following data:</p> <table><tr><td>Daily wages (in Rs.)</td><td>100-149</td><td>150-199</td><td>200-249</td><td>250-299</td><td>300-349</td></tr><tr><td>No. of employees</td><td>13</td><td>24</td><td>35</td><td>16</td><td>12</td></tr></table>	Types	2005	2006	2007	Printing and Writing	35	40	50	Wrapping	18	19	15	Boards	16	15	15	Special varieties	7	5	5	Total	76	79	85	Daily wages (in Rs.)	100-149	150-199	200-249	250-299	300-349	No. of employees	13	24	35	16	12	(10)
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Q.3	<p>Attempt any Two of the following:</p> <p>(A) The number of patients seen in the emergency ward of a hospital for a sample of 5 days was 153, 147, 151, 156 and 153. Determine the mean absolute deviation and its coefficient.</p> <p>(B) Following are the scores made by two batsmen in one over.</p> <table><tr><td>Balls</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>Batsman A</td><td>1</td><td>6</td><td>4</td><td>6</td><td>3</td><td>1</td></tr><tr><td>Batsman B</td><td>3</td><td>4</td><td>4</td><td>3</td><td>4</td><td>3</td></tr></table> <p>And $\sigma_1 = 2.062$ for batsman A and $\sigma_2 = 0.5$ for batsman B. Which of the two batsmen is a better scorer on an average? Which of them is more consistent?</p> <p>(C) For the following grouped data find the Karl Pearson's Coefficient of Skewness. Also interpret the type of distribution.</p>	Balls	1	2	3	4	5	6	Batsman A	1	6	4	6	3	1	Batsman B	3	4	4	3	4	3	(10)															
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		C.I	0-4	4-8	8-12	12-16	16-20													
		F	1	3	10	4	2													
Q.4	<p>Attempt any Two of the following:</p> <p>(A) A pair of fair dice is rolled. What is the probability that the sum of upper most face is 6, given that both of the numbers are odd?</p> <p>(B) For given joint probability distribution function:</p> $P_{XY}(X, Y) = \begin{matrix} 1/4 & \text{for } x = 0, & y = 1 \\ 1/2 & \text{for } x = 1, & y = 0 \\ 1/4 & \text{for } x = 2, & y = 0 \end{matrix}$ <p>Calculate the conditional expectation x when $y = 0$.</p> <p>(C) A newspaper boy has estimated the following probability of selling a magazine:</p> <table><tr><td>No. of copies sold</td><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td></tr><tr><td>Probability</td><td>0.05</td><td>0.15</td><td>0.4</td><td>0.3</td><td>0.1</td></tr></table> <p>Cost of copy is Rs. 30 and sale price is Rs. 40. He cannot return unsold copies. How many copies should he order to maximise probability? Also calculate EVPI.</p>							No. of copies sold	21	22	23	24	25	Probability	0.05	0.15	0.4	0.3	0.1	(10)
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Q.5	<p>Attempt any Two of the following:</p> <p>(A) Rahul's chance of hitting a target is 4/5. If he fires 5 shots, what is the probability that he hits the target a) Exactly twice b) at least once.</p> <p>(B) The probability that a car passing through a certain junction will have an accident is 0.00007. on a day ,10000 cars pass the junction. Find the probability that at most 1 car has an accident ($e^{-0.7}=0.497$)</p> <p>(C) For some laptops, the time between charging the laptop battery is normally distributed with a mean of 60 hours and a standard deviation of 15 hours. Khush Sheth owns one of these laptops and wants to know the probability that the time period will be between 60 and 80 hours.(Given that for a standard normal variate z, the area under the curve between $z=0$ and $z=1$ is 0.3413 and between $z=0$ and $z=1.33$ is 0.9082).</p>							(10)												
Q.6	<p>Attempt any Two of the following:</p>							(10)												

- (A) A teacher claims that the mean score of students in his class is greater than 82 with a standard deviation of 20. If a sample of 81 students was selected with a mean score of 90 then check if there is enough evidence to support this claim at a 0.05 significance level.
- (B) Ten customers are taken at random from an automatic filling machine. The mean net weight of the 10 cartons is 11.8 oz and standard deviation is 0.15 oz. Does the sample mean differ significantly from the intended weight if 12 oz? You are given that for $k = 9$, $t_{0.05} = 2.26$.
- (C) Fit a Poisson distribution to the following data and test for its goodness of fit at level of significance 0.05. Given that $e^{-0.904} = 0.4049$, χ^2 table value for 3 d.f at $\alpha = 0.05 = 7.815$.

X	0	1	2	3	4
F	419	352	154	56	19

Q.7 Attempt any Two of the following: **(10)**

- (A) Calculate Spearman's rank correlation coefficient for the following data:

x	15	12	16	15	17	14	18
y	17	14	20	25	20	24	22

- (B) Form a data of 10 observations on x and y the following results are calculated.

$$\sum x = 250, \sum y = 30, \sum (x - \bar{x})^2 = 640, \sum (y - \bar{y})^2 = 360, \sum (x - \bar{x})(y - \bar{y}) = 384$$

Find both line of regression equations.

- (C) The battery life of smart phone manufacturer A have a mean lifetime of 1050 days with a standard deviation of 150 days, while those of manufacturer B have a mean lifetime of 800 days with a standard deviation of 120 days. If random samples of 100 batteries of each brand are tested, what is the probability that the brand A batteries will have a mean lifetime that is at least (a) 200 days and (b) 280 days more than the brand B batteries?

Q.8 Attempt any Three of the following: **(15)**

- (A) The average income of 100 men in a city is Rs. 15,000 with standard deviation Rs. 8,500 and the average income of 100 women is Rs. 12,000 and standard deviation Rs. 9000. Can it be said at 5% level of confidence that there is a significant difference between the average income of men and women?

- (B) Calculate the Karl Pearson's coefficient of correlation for the following data and comment:

X	7	4	8	6	5
Y	6	5	9	8	2

(C) A man is to draw a single card from a well shuffled pack of 52 cards. He wins Rs. 10 if he draws a picture card, Rs. 2 if he draws a card of denomination 2, 3, 4 or 5. Else he has to pay Rs. 3 for his failure. Find the mathematical expectation of his gain.

(D) The following table shows the income distribution of 630 families.

Income in Rs.	Below 75	75-150	150-225	225-300	300-375	375-450	450 & above
No. of families	69	167	225	46	88	25	10

Find the minimum income of the richest 30% families.