

[Time: 03.00 Hrs]		[Marks:75]
Please check whether you have got the right question paper.		
N.B:	<ol style="list-style-type: none"> 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	(A)	<p>Select the correct option for the following statements/questions:</p> <p>i) If the values of regression coefficient are 0.4 and 0.9, then the values of correlation coefficient is _____</p> <p>a) 0.6 b) -0.6 c) 0.36 d) 0.4</p> <p>ii) In a positive skewed distribution, order of mean, median and mode is as</p> <p>a) mean < median > mode. b) mean > median > mode. c) mean < median < mode. d) mean > median < mode.</p> <p>iii) Which of the following is absolute measure of dispersion?</p> <p>a) Mean b) Mode c) Stander deviation d) Median</p> <p>iv) In probability theories, events which can never occur together is known as</p> <p>a) mutually exclusive events b) Not exclusive events c) mutually exhaustive events d) Complementary event</p> <p>v) The covariance between two variables is</p> <p>a) Strictly positive b) Strictly negative c) always zero d) either positive or negative or zero</p> <p>vi) Normal Distribution is symmetric is about _____</p> <p>a) Variance b) Mean c) Standard deviation d) Covariance</p> <p>vii) The whole χ^2 distribution curve lies in the _____.</p> <p>a) First quadrant b) Second quadrant c) Third quadrant d) Fourth quadrant</p> <p>viii) The sampling error is defined as?</p> <p>a) difference between population and parameter b) difference between sample and parameter c) difference between population and sample</p>	(10)
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	<p>d) difference between parameter and sample</p> <p>ix) Which of the following is non-parametric test?</p> <p>a) Z-test b) t-test c) Chi-square test d) F-test</p> <p>x) When conducting an ANOVA, FDATA will always fall within what range?</p> <p>a) between 0 to ∞ b) between $-\infty$ to ∞ c) between -1 to 1 d) between $-\infty$ to 0</p> <p>(B) State whether the statement is True or False.</p> <p>i) For binomial distribution mean and variance are equal.</p> <p>ii) When data is arranged, middle value in set of observations is classified as mean.</p> <p>iii) If x and y are independent than coefficient of correlation between x and y is $r \neq 0$.</p> <p>iv) The numerical value of a standard deviation can never be positive.</p> <p>v) A curve which is flat than the normal curve is called Platykurtic.</p> <p>vi) For the estimation of x for the given value of y, we use regression line of y on x.</p> <p>vii) Discrete random variable takes only isolated values.</p> <p>viii) The mean of the sample proportions from each group represents the proportion of the entire population.</p> <p>ix) The T-test is not a reliable.</p> <p>x) If your experiment has a quantitative outcome and you have two categorical explanatory variables, a two-way ANOVA is appropriate.</p>	(10)
Q.2	<p>Attempt any Two of the following:</p> <p>(a) In a factory employing 3000 persons, 5 per cent earn less than Rs. 150 per day, 580 earn from Rs. 151 to Rs. 200 per day, 30 per cent earn from Rs. 201 to Rs. 250 per day, 500 earn from Rs. 251 to Rs. 300 per day, 20 per cent earn from Rs. 301 to Rs. 350 per day, and the rest earn Rs. 351 or more per day. What is the median wage?</p>	(10)

(b) Draw a pie diagram to represent the following data giving profits of different partners in a firm.

Partners	Profit in Rs.
A	2200
B	2000
C	1800
D	1600
E	1400
Total	9000

(c) Mr. Shah invested his Rs. 50,000 in stocks of three companies over which the yield was as follows:

Company	P	Q	R
Investment	25,000	15,000	10,000
Yield(%)	9	7	5

Find the average yield over the total investment.

Q.3 Attempt any Two of the following: **(10)**

(a) Calculate the range and coefficient of range for the following data:

Sales in (Crs.)	15-30	30-45	45-60	60-75	75-90
No. of Days	3	8	17	12	5

(b) For a group of 150 male workers, the mean and standard deviation of their daily wages are Rs. 75 and Rs.12 respectively. For a group of 100 female workers these are Rs. 65 and Rs.9 respectively. Find the standard deviation for the combined group of 250 workers.

(c) Calculate Bowley's Measure of Skewness for the following dataset representing the ages of a group of people in a sample: 20, 24, 28, 32, 35, 40, 42, 45, 50.

Q.4 Attempt any Two of the following: **(10)**

(a) A box contains 5 white and 7 black balls. A person draws 3 balls at random. He gets Rs. 50 for every white ball and losses Rs. 10 every black ball. Find the expectation of him.

(b) The letters of the word "CHICKEN" are written on 7 cards. Kelly chooses a card and replaces it and chooses another one. Using the probability tree diagram find the probability that only one of the chosen cards will have the letter C on it.

(c) Pay-offs of three acts X, Y and Z and states of nature S_1 , S_2 , S_3 are given below :

Pay-off in ('000' Rs.)

State of nature	Course of Action		
	X	Y	Z
S_1	-80	-50	10
S_2	120	150	100
S_3	300	280	350

The probabilities of the states of nature are 0.3, 0.2 and 0.5. Calculate the EMV and EOL for the data given and select the best act. Also find the expected value of perfect information (EVPI).

Q.5 **Attempt any Two of the following:** **(10)**

(a) 20 wrist watches in a box of 100 are defective. If 10 watches are selected at random, find the probability that (i) 10 are defective (ii) at least one watch is defective.

(b) In a company previous record show that on an average 3 workers are absent without leave per shift. Find the probability that in a shift

i) Exactly 2 workers are absent

ii) At most 3 workers will be absent. Given that $[e^{-3} = 0.0499]$

(c) Average yield of a certain crop was found to be 20.5 Kgs. Per plot with standard deviation of 3.2 Kgs. Assuming normal distribution of yield, find how many plots out of 2000 will have yield of 23.7 Kgs or more. (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 $z=1.5$ is 0.4332).

Q.6 **Attempt any Two of the following:** **(10)**

(a) A group of 5 patients treated with medicine 'A' weight 42, 39, 48, 60, 41 kgs. Second group of 7 patients from the same hospital treated with medicine 'B' weight 38, 42, 56, 64,

	<p>68, 69, 62 kgs. Do you agree with the claim that medicine ‘B’ increases the weight significantly? (The value of t at 5% level of significance for 10 degree of freedom is 2.2281).</p> <p>(b) In experiments on pea breeding the following frequencies of seeds were obtained:</p> <table><tr><td>Round and yellow</td><td>Wrinkled and yellow</td><td>Round and green</td><td>Wrinkled and green</td><td>Total</td></tr><tr><td>315</td><td>101</td><td>108</td><td>32</td><td>556</td></tr></table> <p>Theory predicate that the frequencies should be in proportions 9:3:3:1. Examine the correspondence between theory and experiment.</p> <p>Given that χ^2 table value for 3 d.f at $\alpha = 0.05 = 7.815$.</p> <p>(c) An old machine produced 10 defective bolts in a batch of 300. After the servicing was done the same machine was found to produce 6 defective bolts in a batch of 200. Help the manufacturer to conclude whether the machine has improved after the servicing?</p>	Round and yellow	Wrinkled and yellow	Round and green	Wrinkled and green	Total	315	101	108	32	556																				
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315	101	108	32	556																											
Q.7	<p>Attempt any Two of the following:</p> <p>(a) Find the rank correlation coefficient for the following data giving marks of FYMMS students in the subjects of Mathematics and Statistics:</p> <table><tr><td>Marks in ECO</td><td>65</td><td>45</td><td>78</td><td>35</td><td>52</td><td>73</td><td>67</td><td>49</td><td>40</td></tr><tr><td>Marks in BS</td><td>60</td><td>40</td><td>70</td><td>28</td><td>72</td><td>59</td><td>69</td><td>56</td><td>55</td></tr></table> <p>(b) Using the following tabulated information, find (i) the most probable value of x when y = 10 and (ii) the most probable value of y when x = 12.</p> <table><tr><td>r = 0.65</td><td>X</td><td>Y</td></tr><tr><td>Mean</td><td>15</td><td>22</td></tr><tr><td>S.D.</td><td>7.5</td><td>9</td></tr></table> <p>(c) Suppose it is known that 47% of Indian own smart phone. If a random sample of 50 Indians were surveyed, what is the probability that the proportion of the sample who owned smart phone is between 50% and 54%?</p>	Marks in ECO	65	45	78	35	52	73	67	49	40	Marks in BS	60	40	70	28	72	59	69	56	55	r = 0.65	X	Y	Mean	15	22	S.D.	7.5	9	(10)
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Q.8	<p>Attempt any Three of the following:</p> <p>(a) The mean life of the tyres manufactured by a company follows normal distribution with standard deviation 3200 kms. A sample of 250 tyres is taken and it is found that the average</p>	[10] (15)																													

life of the tyres is 50000 kms with a standard deviation of 3500 kms. Establish the 99% confidence interval within which the mean life of tyres of the company is expected to lie.

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

X	10	8	11	7	9	12
Y	8	5	10	6	7	11

(c) A random variable X has probability mass function as follow:

$X = x_i$	-1	0	1	2	3
$P(x_i)$	K	0.2	0.3	$2k$	$2k$

Find the value of k , and expected value and variance.

(d) A time and motion study of a certain operation shows the following distribution of 100 workers. Calculate mode of the distribution.

Time (in Minutes)	10-15	15-20	20-25	25-30	30-35	35-40	40-45
No. of workers	8	14	18	25	15	14	6