Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER M.C.A. DEGREE EXAMINATION, DECEMBER 2018

Course Code: RLMCA105

Course Name: APPLIED PROBABILITY AND STATISTICS

Max. Marks: 60 Duration: 3 Hours

(Statistical tables are allowed)

PART A

Answer all questions, each carries 3 marks. Marks

1 Given the data set : 4 , 10 , 7 , 7 , 6 , 9 , 3 , 8 , 9 (3)

Find a) the sample standard deviation. b) If we replace the data value 6 in the data set above by 24, will the standard deviation increase, decrease or stay the same?

2 A consignment of 15 record players contains 4 defectives. The record players are selected at random, one by one, and examined. Those examined are not put back. What is the probability that the 9^{th} one examined is the defective? (3)

3 Define distribution function of a continuous random variable. Also state its important properties. (3)

4 A man draws 2 balls from a bag containing 3 white and 5 black balls. If he is to receive Rs.14 for every white ball and Rs.7 for every black drawn, what is his expectations? (3)

5 Students of a class were given an aptitude test. Their marks were found to be normally distributed with mean 60 and standard deviation 5. What percentage of students scored more than 60 marks? (3)

6 A medical doctor wants to reduce blood sugar level of all his patients by altering their diet. He finds that the mean sugar level of all patients is 180 with a standard deviation of 18. Nine of his patients start dieting and the mean of the sample is observed to 175. Now, he is considering to recommend all his patients to go on a diet. He calculates 99% confidence interval. What is the standard error of the mean? (3)

7 What would be the critical values of Z for 98% confidence interval for a two-tailed test? (3)

8 Define null hypothesis. (3)

PART B

Answer six questions, one full question from each module and carries 6 marks.

Module I

9 The following table shows the distribution of 100 families according to their expenditure per week. Number of families corresponding to expenditure groups (6)

Rs.(10-20) and Rs.(30-40) are missing from the table. The median and mode are given to be Rs.25 and Rs.24 respectively. Calculate the missing frequency and then the mean of the data

Expenditure:	0-10	10-20	20-30	30-40	40-50
Families:	14	?	27	?	15

OR

10 The following are determinations of a river's annual maximum flow in cubic meters per second: 405,355,419,267,370,391,612,383,434,462,288,317,540,295 and 508 (6)

Construct a stem and leaf display with two digit leaves.

Module II

11 The odds that person X speaks the truth are 2:3 and the odds that person Y speaks the truth are 5:3. In what percentage of cases are they likely to contradict each other on an identical point. (6)

OR

12 In a class of 100 students 75 are boys and 25 are girls. The chance that a boy gets a first class is 0.25 and the probability that a girl gets first class is 0.21. Find the probability that a student selected at random gets a first class. (6)

Module III

13 The distribution of typing mistakes committed by a typist is given below. Assuming Poisson model, find the expected frequencies. (6)

Mistakes per page	0	1	2	3	4	5
Number of pages	142	156	69	27	5	1

OR

14 With the usual notation find p for binomial random variable X if n = 6 and $9P(X = 4) = P(X = 2)$ (6)

Module IV

15 The mileage X (in thousands of miles) which car owners get with a certain kind of tyre is a random variable having a probability density function (6)

$$f(x) = \begin{cases} \frac{e^{\frac{-x}{20}}x}{20}, & x > 0 \\ 0, & x \leq 0 \end{cases}$$

Find the probabilities that one of the tyres will last (a) atmost 10,000 miles (b) anywhere from 16000 to 24000 miles (c) atleast 30,000 miles.

OR

16 A random variable X is normally distributed with $\mu = 2$ and $\sigma = 4$. What is the distribution of random variable Y=3X+2? Find P(Y>20). (6)

Module V

17 Suppose the refractive indices of 20 pieces of glass have a variance 1.2×10^{-4}. Construct a 95% confidence interval for σ the standard deviation of population sampled. (6)

OR

18 A machine which produces mica insulating washers for use in electric device to turn out washers having a thickness of 10mm. A sample of 10 washers has an average thickness 9.52 mm with a standard deviation of 0.6mm. Find the value of Student's t statistic. (6)

Module VI

19 In a big city 325 men out of 600 men were found to be smokers. Does this information support the conclusion that the majority of men in this city are smokers? (6)

OR

20 The mean consumption of food grains among 400 sampled middle class consumers is 380 grams per day per person with a standard deviation of 120 grams. A similar sample survey of 600 working class consumers gave a mean of 410 grams with a standard deviation of 80 grams. Is the consumption of food grains in both classes the same? Use 1% level of significance. (6)

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