SUBJECT CODE : 15MT/PE/SR34

M. A. DEGREE EXAMINATION, NOVEMBER 2016
THIRD SEMESTER

COURSE   : ELECTIVE
PAPER   : STATISTICS FOR RESEARCH
TIME   : 3 HOURS   MAX. MARKS : 100

SECTION – A   **(5 X 2 = 10)**
ANSWER ALL THE QUESTIONS

1. Define a sample and size of a sample.
2. If the mean of n observations $x_1, x_2 \ldots x_n$ is $\bar{x}$, then prove that $\sum_{i=1}^{n}(x_i - \bar{x}) = 0$.
3. State any two properties of a normal curve.
4. State Central limit theorem.
5. Explain two types of errors in Hypothesis testing.

SECTION – B   **(5 X 6 = 30)**
ANSWER ANY FIVE QUESTIONS

6. What are the two methods of sampling? Explain Probability sampling method.
7. Draw, on the same diagram, a histogram and a frequency polygon to represent the following data which shows the monthly cost of living index of a city in a period of 2 years.

Cost of living index	No. of months	Cost of living index	No. of months
440-460	2	520-540	3
460-480	4	540-560	2
480-500	3	560-580	1
500-520	5	580-600	4
Total			24

8. If the arithmetic mean of two numbers is 10 and their geometric mean is 8, find their harmonic mean and the numbers also.
9. Assume the mean height of children to be 68.22 cm with a variance of 10.8 cm. How many children in a school of 1000 would you expect to be over 72 cm tall?
10. 1,000 light bulbs with a mean life of 120 days are installed in a new factory. Their length of life is normally distributed with a standard deviation of 20 days.
    a) How many bulbs will expire in less than 90 days?
   b) If it is decided to replace all bulbs together, what interval should be allowed between replacement if not more than 10% should expire before replacement?
11. The quality control manager of a tyre company has sample of 100 tyres and has found the mean life time to be 30,214km. The population s.d. is 860. Construct a 95% confidence interval for the mean life time for this particular brand of tyres.
12. A random sample of 400 items gives the mean 4.45 and the variance as 4. Can the sample be regarded as drawn from the normal population with mean 4? (At 5% level of significance).

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SECTION – C   **(3 X 20 = 60)**
ANSWER ANY THREE QUESTIONS

13. Explain in detail the sampling and non-sampling errors and also standard error of a statistic.

14. a) Plot Less than Ogive and More than Ogive for the following data:

Cost of production	4-6	6-8	8-10	10-12	12-14	14-16
No. of farms	13	111	182	105	19	7

   b) Calculate the mean and median for the following data:

Height (in cm)	No. of boys	Height (in cm)	No. of boys
135-140	4	155-160	24
140-145	9	160-165	10
145-150	18	165-170	5
150-155	28	170-175	2

15. a) Find the mean deviation from (i) mean and (ii) median for the following data:

Marks	20	18	16	14	12	10	8	6
No. of students	2	4	9	18	27	25	14	1

   b) The means of two samples of sizes was 500 and 600 were respectively 186 and 175. The corresponding standard deviations were respectively 9 and 10. The variable studied was height in centimetres. Obtain the mean and variance of the combined sample.

16. a) A random sample of size 100 has mean 15, the population variance being 25. Find the interval estimate of the population mean with a confidence level of (i) 99% and (ii) 95%.

   b) A random sample of size 16 has 53 as mean. The sum of squares of deviations from mean is 150. Can this sample be regarded as taken from the population having 56 asmean?Also obtain 95% confidence limits for the mean. ($t_{15} = 2.131, t_{16} = 2.602$).

17. a) An I.Q. Test was administered to 5 persons before and after they are trained. The results are given below.

   Candidates   :   I   II   III   IV   V
   I.Q. Before training :   110   120   123   132   125
   I.Q. After training   :   120   118   125   136   121

   Test whether there is any change in I.Q. after the training programme. It is given that $t_{0.01} = 4.6$ for 4 d.f.

b) Calculate the expected frequencies for the following data presuming the two attributes, conditions of home and condition of child as independent.

		Condition of home	
		Clean	Dirty
Condition of child	Clean	70	50
	Fairly clean	80	20
	Dirty	35	45

Use chi-square test at 5% level of significance to state whether the two attributes are independent.

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