SUBJECT CODE : 15MT/AC/ST45

B. Sc. DEGREE EXAMINATION, APRIL 2019
BRANCH I – MATHEMATICS
FOURTH SEMESTER

COURSE   **:** ALLIED CORE
PAPER   **:** MATHEMATICAL STATISTICS – II
TIME   **:** 3 HOURS   **MAX. MARKS : 100**

SECTION – A
ANSWER ALL THE QUESTIONS: **(10×2=20)**

1. Define parameters and statistics.
2. Define standard error.
3. Define chi-Square distribution.
4. Define Snedecor's F distribution.
5. What is point of estimate?
6. What is meant by Likelihood function of the sample?
7. An industrial engineer intends to use the mean of a random sample of size n = 150 to estimate the average mechanical aptitude of assembly line workers in a large industry. If, on the basis of the experience, the engineer can assume that σ is 6.2 for each day, what can be asserted with probability 0.99 about the maximum size of the error?
8. A random sample of size 80 is taken from a population with $S^2 = 30.85$. Given that the sample mean is 18.85, construct a 99% confidence interval for the population mean μ.
9. What is meant by chi-square test of goodness of fit?
10. Define student's t Distribution.

SECTION – B
ANSWER ANY FIVE QUESTIONS: **(5×8=40)**

11. Show that the mean and standard error of sample mean $\bar{y}$ from simple samples of size n are $E(\bar{y}) = \mu$ and $S.E.(\bar{y}) = \frac{\sigma}{\sqrt{n}}$ where μ and σ denote the mean and standard deviation of the population.
12. Find the moment generating function of chi-square distribution.
13. On the basis of a random variable, find the maximum likelihood estimator of the parameter of a Poisson distribution.
14. A sample of heights of 300 British men has a mean of 170 centimeters and a standard deviation of 6.4 centimeters, while a sample of heights of 400 Americans has mean of 172 centimeters and a standard deviation of 6.3 centimeters. Construct a 95 percent confidence interval for the difference of means.
15. The mean height of two samples of 1000 and 2000 members are respectively 67.5 and 68 inches. Can they be regarded as drawn from the same population with standard deviation 2.5 inches?
16. Derive the confidence interval for ratio of variances for big and small samples.

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17. Time taken by workers in performing a job are given below

Method I	20	16	26	27	23	22	
Method II	27	32	42	35	32	34	38

Test whether there is any significant difference between the variances of time distribution.

SECTION – C

ANSWER ANY TWO QUESTIONS: (2×20=40)

18. (a) Explain Stratified sampling.
    (b) Obtain the relation between $t, \chi^2 \ and \ F$ distributions.

19. (a) State and prove Rao-Blackwell theorem.
    (b) A signal having value μ is transmitted from location A. The value received at location B is normally distributed with unknown mean μ and unknown variance σ^2. A particular value is transmitted 9 times. Find the 95 percent confidence interval for the transmitted data μ, when the successive values received are 5, 8.5, 12, 15, 7, 9, 7.5, 6.5 and 10.5.

20. (a) In a certain sample of 2000 families, 1400 families are vegetarian. Out of 1800 Hindu families, 1236 families are vegetarian. Use Chi-square test and state whether there is any significant difference between vegetarians among Hindu and Non-Hindu families.
    (b) The nicotine content in milligrams of two samples of tabacco were found to be as follows:

Sample A	24	27	26	21	25	
Sample B	27	30	28	31	22	36

Can it be said that two samples come from normal populations having the same mean?

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