STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI 600 086
(For candidates admitted from the academic year 2011–12& thereafter)

SUBJECT CODE : 11MT/MC/MS64

B. Sc. DEGREE EXAMINATION, APRIL 2016
BRANCH I – MATHEMATICS
SIXTH SEMESTER

COURSE : MAJOR CORE
PAPER : MATHEMATICAL STATISTICS
TIME : 3 HOURS **MAX. MARKS : 100**

SECTION-A

ANSWER ALL QUESTIONS: **10 X 2 = 20**

1. Define chisquare distribution.
2. Define F distribution.
3. Distinguish between parameter and statistic.
4. What is critical region?
5. State the central limit theorem.
6. Define an estimator.
7. Define a likelihood function.
8. What do you mean by Confidence interval and confidence limits?
9. What is level of significance?
10. Define null hypothesis and alternative hypothesis.

SECTION-B

ANSWER ANY FIVE QUESTIONS: **5 X 8 = 40**

11. Show that distribution of the quotient of two independent chi square variables is a beta distribution of second kind.
12. Show that $z = \frac{\chi^2 - n}{\sqrt{2n}}$ is a standard normal variate.
13. Find the mean and standard deviation of $\bar{x}$
14. Show that sample mean is a consistent estimator of population mean and sample variance is a consistent estimator of population variance.
15. Find the maximum likelihood estimate for λ of Poisson distribution on the basis of sample of size n. Find its variance.

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16. Obtain 100(1-α)% confidence interval for the variance of the normal population when μ is known.
17. An IQ test was given to 5 people before and after they were trained. Test whether there is any change in IQ after the training program at 1% level of significance.

IQ before	110	120	123	132	125
IQ after	120	118	125	136	121

SECTION-C

ANSWER ANY TWOQUESTIONS: 2 X20 = 40

18. Derive the distribution of t – distribution with n degrees of freedom. Show that the limiting form of t – distribution tends to normal distribution.

19. (a) State and prove Cramer-Rao inequality.
(b) State and prove Rao-Blackwell theorem.

20. (a)Test whether the two samples have the same variance at 5% level of significance.

X	66	67	75	76	82	84	88	90	92		
Y	64	66	74	78	82	85	87	92	93	95	97

(b) Examine whether the nature of area is related to voting preference in an election at 5% level of significance for which the data is tabulated below.

Nature of area	**Candidate**		
	A	**B**	**Total**
Rural	620	380	1000
Urban	550	450	1000
Total	1170	830	2000