LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

**B.Sc.** DEGREE EXAMINATION – **STATISTICS**

THIRD SEMESTER – NOVEMBER 2012

# ST 3503/3501/3500 - STATISTICAL MATHEMATICS - II

 Date : 02/11/2012 Dept. No. Max. : 100 Marks

 Time : 9:00 - 12:00

**PART-A**

 **Answer ALL the questions: [10x2 =20]**

1. Define upper sum and lower sums.

2. Give an example of a function that is not Riemann integrable.

3. Define improper integrals.

4. State the comparison test for the improper integrals

5. Define variance-covariance matrix.

6. When do we say that a system of equations is homogenous?

7. State the order and degree of the differential equation:



8. Obtain the Laplace transform of t > 0.

9. Define characteristic equation and characteristic roots.

10. Write down the importance of Caley-Hamilton Theorem.

**PART – B**

**Answer any FIVE questions:** **[5x8 =40]**

11. Evaluate  from first principles.

12. Show that every continuous function defined on a closed interval of the real line is

 Riemann integrable.

13. Find the mean and variance of Beta distribution of I kind.

14. Discuss the convergence of gamma integral.

15. Find the covariance between X and Y whose joint p.d.f. is .

16. Evaluate over the upper half of the circle with centre (0, 0) and radius 1.

17. a) Solve the differential equation

.

 (b) Obtain the inverse Laplace transform of

.

18. Find the characteristic roots and corresponding vectors of the matrix
 .

**PART - C**

 **Answer any TWO questions: [2x20 =40]**

19. (a) State and Prove the first fundamental theorem on integral calculus.

 (b) Derive the MGF of normal distribution. Hence find its mean and variance.

20. (a) Establish the relation between the Beta and Gamma integrals. Hence find the

 value of β (3, 4).

 (b) Solve the differential equation:

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21. (a) Solve the following initial value problem using Laplace transform,

 where y(0) = -2 and y'(0) = 5 :

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 (b) Let X and Y be two independent one parameter Gamma random variables with

 parameters α1 and α2 respectively. Use ‘transformation of variables’ method to

 obtain the distribution of .

22. (a) Show that if λ is a characteristic root of A, then λn is a characteristic root of An.

 (b) Solve the system of equations using matrix inverse method.





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