LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – STATISTICS

THIRDSEMESTER – APRIL 2017

ST 3503 / ST 3500 - STATISTICAL MATHEMATICS - II

Date: 05-05-2017   Dept. No.   Max. : 100 Marks
09:00-12:00

PART-A

Answer ALL the questions: **[10 x 2 =20]**

1. Define upper sum of a function on [a,b].

2. Find the MGF of $f(x,\theta)= \theta e^{-\theta x}; x \ge 0$.

3. What do you mean by improper integral?

4. Show that $\int_{1}^{\infty} \frac{1}{x^2} dx$ is convergent.

5. Define variance-covariance matrix.

6. If X has p.d.f $f(x)=6x^2, 0 \le x \le 1$, find mean of X.

7. Solve the equation $(D^2 - 4D + 13)y$.

8. Define Laplace transform of f(t).

9. When the system of equation is said to be consistent?

10. Determine the Eigen values of the matrix $A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$

PART –B

Answer any Five questions   **[5 x 8 = 40]**

11. If f and g are Riemann integrable over [a,b], then prove that the sum f+g is also Riemann integrable over [a,b].

12. Evaluate $\iint dx\,dy$ over the region bounded by x =0, x=2, y=0,y=2.

13. Define Gamma integral and obtain its recurrence formulae.

14. Sove the equation $(D^2 + 2D + 1)Y = e^{-x}$.

15. Discuss for all values of λ, the system of equations $x + y + 4z = 6, x + 2y - 2z = 6, \lambda x + y + z = 6$ as regards existence and nature of solutions.

16. Find $L[e^{-3t} \sin^2 t]$

17. Change the order of integration and evaluate $\int_{0}^{3} \int_{1}^{\sqrt{4-y}} (x + y)\, dx\, dy$.

18. Let $f(x)=x^2, 0 \le x \le 1$ and let $\sigma_n = \{0, \frac{1}{n}, \frac{2}{n}, ... \frac{n-1}{n}, 1\}$. Find $\underset{n \to \infty}{lt}\, U[f, \sigma_n]$ and $\underset{n \to \infty}{lt}\, L[f, \sigma_n]$.

PART-C

Answer any TWO questions (2 x 20 = 40]

19. (a) State and prove first fundamental theorem of calculus.

(b) Let f be a bounded function on the closed bounded interval [a,b]. Prove that **f** is Rieman integral iff is continuous.

[10+10]

20. (a) Discuss the convergence of the following improper integral $\int_{0}^{1} \frac{1}{\sqrt{1-x^2}} dx$

(b)Show that $\int_{0}^{2} x(8-x^3)^{\frac{1}{3}} dx = \frac{8}{3} \beta(\frac{2}{3}, \frac{4}{3})$ **[10+10]**

21. (a)Solve $\frac{d^2 y}{dx^2} + 4y = 5e^{-x}$, using laplace transform given that y(0)=2,y'(0)=3.

(b) Let $f(x,y) = \begin{cases} 8xy & 0 < x < y < 1 \\ 0 & elsewhere \end{cases}$

Find (a) E[Y/X=x]   b) E[XY/X=x]   c) Var[Y/X=x**).**   **[10+10]**

22. (a) State and prove Cayley Hamilton theorem.

(b) Find the characteristic root of the matrix $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ and hence find A^{-1}.

[10+10]

****

2