LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

THIRD SEMESTER – **APRIL 2018**

ST 3503– STATISTICAL MATHEMATICS - II

Date: 05-05-2018 Dept. No. Max. : 100 Marks

Time: 01:00-04:00

Section – A

Answer ALL the questions. **(10 x 2 = 20)**

1. Define upper integral.

2. If X is a random variable and C be a constant, then prove that $M_{CX}(t) = M_X(ct)$ where 'M' denotes the MGF.

3. Find $L(e^{2t} + 3e^{-5t})$

4. Define Beta function.

5. Evaluate the $\int_0^1 \int_{-1}^1 2ydydx$

6. Change the order of integration $\int_0^1 \int_0^x f(xy)dydx$.

7. Define a Skew -Symmetric matrix.

8. Solve $(D^2 - 4D + 3)y = 0$

9. State Cayley Hamilton's theorem.

10. Define the characteristic equation of a matrix.

Section – B

Answer any FIVE questions. **(5 x 8 = 40)**

11. Show that the function $f(x) = \begin{cases} 1 \; if \; x \; is \; rational \\ 0 \; if \; x \; is \; irrational \end{cases}$ in $[0,1]$ is not Riemann integrable.

12. Find $L(5 - 3t - 2e^{-t})$

13. Evaluate $\int_0^1 \int_1^2 x(x+y)dydx$

14. Solve $xdx = y(x^2 + y^2 - 1)dy$

15. Verify whether the system of equations 3x - 4y = 2, 5x + 2y = 12, -x + 3y = 1 is consistent.

16. Find the eigen values of $A=\begin{pmatrix} a & h & g \\ 0 & b & 0 \\ 0 & 0 & c \end{pmatrix}$

17. Solve $\frac{1}{x}\frac{dy}{dx}+\frac{y}{x}\tan x=\cos x$

18. Find the M.G.F of Poisson distribution and hence find its mean and variance.

Section – C

Answer any TWO questions. **(2 x 20 = 40)**

19. If $f \in R[a,b]$ and $a<c<b$, then show that $f \in R[a,c]$, and $f \in [c,b]$ and that $\int_a^b f=\int_a^c f+\int_c^b f$

20. Evaluate $\int_0^\infty \int_x^\infty \frac{e^{-y}}{y}\,dydx$ by changing the order of integration

21. Solve $\left(D^2-D-2\right)y=e^{2x}+e^x$

22. Find all the characteristic roots and the associated characteristic vectors of the matrix

$$A=\begin{pmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{pmatrix}$$

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