LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc.DEGREE EXAMINATION –**MATHEMATICS**

SECOND SEMESTER – **APRIL 2018**

MT 2500/ MT 2501– ALGEBRA, ANAL.GEO & CALCULUS - II

Date: 24-04-2018   Dept. No.   Max. : 100 Marks
Time: 01:00-04:00

PART –A

ANSWER ALL THE QUESTIONS: **(10 X 2 = 20)**

1. Evaluate $\int \log x\, dx$.

2. Evaluate $\int xe^x\, dx$.

3. Define Particular integral.

4. Solve $D^2 - 5D + 6 = 0$.

5. Define convergent sequence with an example.

6. State Cauchy's root test.

7. Show that $\left(1 + \frac{1}{2!} + \frac{1}{4!} + \cdots\right)^2 = 1 + \left(1 + \frac{1}{3!} + \frac{1}{5!} \cdots\right)^2$

8. Sum the series $\frac{2}{6} + \frac{2.5}{6.12} + \frac{2.5.8}{6.12.18} + \cdots$

9. Show that the points (5,3,-2), (3,2,1) and (-1,0,7) are collinear.

10. Find the direction cosines of the line joining the points (3,-5,4) and (1,-8,-2)

PART - B

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

11. Prove that $\int_0^{\frac{\pi}{4}} \log(1 + \tan\theta\,)d\theta = \frac{\pi}{8} \log 2$.

12. Evaluate $\int \frac{x+\sin x}{1+\cos x}\, dx$.

13. Solve $(D^2 + 4)y = x \sin x$.

14. Test the convergence of the series $\sum_{n=0}^{\infty} \frac{n^3+1}{2^n+1}$.

15. Sum the series $1 + \frac{1+3}{2!} + \frac{1+3+3^2}{3!} + \frac{1+3+3^2+3^3}{4!} + \cdots to\ \infty$

16. Show that if $x > 0,\ \log x = \frac{x-1}{x+1} + \frac{1}{2} \cdot \frac{x^2-1}{(x+1)^2} + \frac{1}{3} \cdot \frac{x^3-1}{(x+1)^3} + \cdots$

17. Find the equation of the plane passing through the points (3, 1, 2), (3, 4, 4) and perpendicular to the plane $5x + y + 4z = 0$.

18. Find the perpendicular distance from (3,9,-1) to the line $\frac{x+8}{-8} = \frac{y-31}{1} = \frac{z-13}{5}$.

1

PART – C

ANSWER ANY TWO QUESTIONS: **(2 X 20 = 40)**

19.a) Evaluate $I = \int_0^{\frac{\pi}{2}} \log \sin x \, dx$

 b) Find the area and the perimeter of the cardioid $r = a(1 + \cos\theta)$.

20. a) Solve : $x^2 \frac{d^2y}{dx^2} - 3x\frac{dy}{dx} + 5y = x^2\sin(\log x)$.

 b) Solve : $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = e^x \cos x$.

21. a) Find the sum to infinity of the series $1 + \frac{3}{4} + \frac{3.5}{4.8} + \frac{3.5.7}{4.8.12} + \cdots$

 b) Sum of the series $\frac{5}{1!} + \frac{7}{3!} + \frac{9}{5!} + \cdots$

22. a) Test the convergence of the series $\frac{1}{1.2.3} + \frac{3}{2.3.4} + \frac{5}{3.4.5} + \frac{7}{4.5.6} + \cdots$

 b) Find the image of the point (1, -2 , 3) in the plane $2x - 3y + 2z + 3 = 0$.

****