Time: 3 Hours   Max.Marks:100

Section - A

Answer ALL the Questions: 10 X 3 =30

1. Define outer measure.

2. State any one of 'Little words' three principles.

3. State monotone convergence theorem.

4. Give an example for linear independence of two functions.

5. Define the wronskian of function.

6. Solve $y'' + y' - 2y = 0$

7. Define the initial value problem for n^{th} order equations.

8. State the existence theorem of initial value problem.

9. Define the lagendrgs polynomial

10. Write the solution for $y'^v - 2a^2 y'' + a^4 y = 0$

Section - B

Answer any FIVE Questions: 5 X 6 = 30

11. Prove that the outer measure of an interval is its length

12. Prove that if $m^*(E) = 0$ than E is measurable

13. State and prove Fatou's Lemma

14. Prove that the function f is an indefinite integral if and only if it is absolutely continuous?

15. State and prove Dominated convergence theorem

16. If ϕ_1 and ϕ_2 are two solutions of L(y) = 0 on as interval I containing a power x_0 then prove that ϕ_1 and ϕ_2 are linearly independent if and only if their wronskian is zero

17. Explain the methods of variation of constants by suitable example

18. Solve the non-Gomogerous equation

$$y'' - \frac{2}{x^2} y = x \ (0 < x < \infty)$$

Section – C

Answer any TWO Questions: 2 X 20 = 40

19. Construct an example of a non-measurable set on a straight line

20. Prove that $\int_{-1}^{1} p_m(x) p_n(x) = \begin{cases} \dfrac{2}{2n+1} & if \ m = n \\ 0 & if \ m \neq n \end{cases}$

21. Solve $y''' + y'' + y' + y = 1$ such that $y(0) = 0, \ y'(0) = 1, \ y''(0) = 0$.