Roll No. _____

SIIS-N-72 A-18

B.A./B.Sc. IInd Semester Degree Examination

MATHEMATICS

(Algebra - II)

Paper : 2.1

(New)

Time : 3 Hours Maximum Marks : 60

Instructions to Candidates:

*Answer **all** Sections.*

SECTION - A

I. Answer any **TEN** of the following. **(10×2=20)**

1. Define least upper bound (L.U.B). Greatest lower bound (G.L.B) and limit of a sequence.
2. Prove that every convergent sequence is bounded.
3. Show that $\left\{\frac{1}{3^n}\right\}$ converges to 0 .
4. Discuss the boundedness of the sequence $\{x_n\}$, where $x_n = 1+\frac{1}{5}+\frac{1}{5^2}+.....+\frac{1}{5^n}$.
5. Define Logarithmic series and Bionomial series.
6. Find the nature of the series $\frac{1}{2}x+\frac{2^3}{3^2}x^2+\frac{3^4}{4^3}x^3+\frac{4^5}{5^4}x^4+....(x>0)$.
7. Discuss the convergence of the series $\frac{1}{3}+\frac{1.2}{3.5}+\frac{1.2.3}{3.5.7}+.....$
8. Test for convergence the series $1+\frac{x}{2}+\frac{x^2}{3^2}+\frac{x^3}{4^3}+.....(x>0)$.
9. Test the convergence of the series $\sum_{n=1}^{\infty}\frac{n^3+a}{2^n+a}$.

10. If B is a boolean algebra then a subset s = {0,1} of B is boolean subalgebra of B.

11. Express $(x+y)(x+y')(x'+z)$ in DNF.

12. Find the CNF of $(x+y+z)(xy+x'z)'$.

SECTION - B

II. Answer any **TWO** of the following : **(2×5=10)**

13. A sequence is convergent if and only if it is a cauchy sequence.

14. Using cauchy's criterion of convergence, show that the sequence $\{x_n\}$ where

$x_n = 1+\frac{1}{2}+\frac{1}{3}+.....+\frac{1}{n}$ is not convergent.

15. Show that the sequence $\{x_n\}$ where $x_n = \frac{1}{1!}+\frac{1}{2!}+.....+\frac{1}{n!}$ is convergent.

SECTION - C

III. Answer any **FOUR** of the following : **(4×5=20)**

16. Show that the series $\sum\frac{1}{n^P}$ is convergent if P > 1 and divergent if $P \leq 1$.

17. State and prove Cauchy's Root test.

18. Examine the convergence of the series $x-\frac{x^2}{\sqrt{2}}+\frac{x^3}{\sqrt{3}}-\frac{x^4}{\sqrt{4}}+.....$

19. Test the convergence of the series $\frac{1}{2}x+\left(\frac{2}{3}\right)^2x^2+\left(\frac{3}{4}\right)^3x^3+.....(x>0)$.

20. Discuss the convergence of the series $\sum\frac{1.5.9.....(4n-3)}{3.7.11.....(4n-1)}$

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21. Examine the convergence absolute and conditionally convergence of the series.

$$1-\frac{1}{2}+\frac{1}{3}-\frac{1}{4}+.....$$

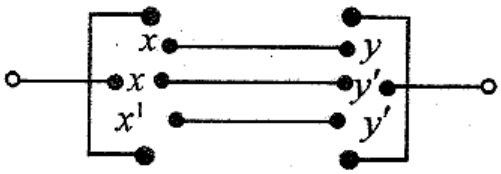
SECTION - D

IV. Answer any **TWO** of the following. **(2×5=10)**

22. Find the conjective normal form of $x^3 + yz$.

23. Construct the Boolean function corresponding to the Boolean expression $xy + z'(x + y) + x'y'$.

24. Simplify the network



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