

Roll No. _____

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SIIS-N 69 A-16
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 questions.

Section - A

I. Answer any Ten of the following :

(10×2=20)

1. Define superimum and infimum of a sequence.
2. Find the limit of the sequence whose n^{th} term is $\frac{2n^2 + 5 \sin \pi/n}{n^2}$
3. Examine the behaviour of $\left\{ \frac{3+7+11+\dots+(4n-1)}{2n^2+3n} \right\}$
4. Using Cauchy's creterion for convergence, show that the sequence $\{(-1)^n n\}$ is not convergent.
5. Determine the nature of the series $\sum_{n=1}^{\infty} \left(\frac{n+1}{n} \right)^{n^2} \frac{1}{5^n}$
6. Using Geometric series show that $\sum \left(\frac{100}{99} \right)^n$ is divergent.
7. Define Logarithemic and Binomial series.
8. Examine the Convergence of the series $\frac{1}{1.3} + \frac{2}{3.5} + \frac{3}{5.7} + \dots$

9. Express $(X + Y)(X' + Y')$ in to DNF.
10. Find the value of Boolean function $f(x_1, x_2, x_3) = (x_1 \cdot x_2) + x_3$
If (a) $x_1 = x_2 = 0, x_3 = 1$ (b) $x_1 = x_2 = 1, x_3 = 0$
11. Show that Boolean algebra can not have three elements.
12. Let $B = \{1, 2, 4, 6, 12\} \forall a, b \in B, a + b = lcm\{x, y\}$ and $a \cdot b = gcd\{x, y\}$ show that B is not Boolean algebra.

Section - B

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

1. Prove that every monotonically increasing sequence which is bounded above converges to its least upper bound.
2. Show that the sequence $\{x_n\}$ defined by

$$x_n = \frac{1}{n+1} + \frac{1}{n+2} + \dots + \frac{1}{n+n} \text{ converges}$$

3. Find the limit of the sequence 0.7, 0.77, 0.777,.....

Section - C

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

1. State and Discuss the convergence of P - series.
2. Test the convergence of the series

$$\frac{1.2}{3.4.5} + \frac{2.3}{4.5.6} + \frac{3.4}{5.6.7} + \dots$$

3. Determine the nature of the series $\frac{2}{3.4}x + \frac{3}{4.5}x^2 + \frac{4}{5.6}x^3 + \dots$
4. Test the following series convergence, Absolute convergence and conditional convergence

$$\frac{1}{6} - \frac{1}{11} + \frac{1}{16} - \frac{1}{21} + \dots$$

5. State and prove Leibnit'z Rule for alternating series.

Section - D

IV. Answer any **Two** of the following :

(2×5=10)

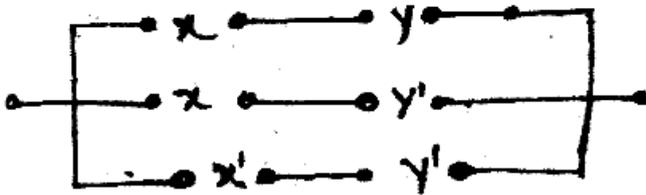
1. Simplify the following expression using Boolean algebra

$$x + x'yz' + (y + z)'$$

2. Express the following in to DNF

$$(x + y)(x + z)(x'y)'$$

3. Simplify the circuit



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