

Roll No. \_\_\_\_\_

**LIBRARY**  
Karnatak Arts Science  
Commerce College  
B I D A R - 585 401

SIIS-N 69 A-17

**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**

Answer any **TEN** of the following :

**(10 × 2 = 20)**

1) Define sequence bounded sequence, and limit of the sequence.

2) Discuss the convergence of the sequence whose  $n^{\text{th}}$  term is  $1 + \sin \frac{n\pi}{2}$ .

3) Find the infimum and supremum of the set  $S = \{(-1)^n n : n \in \mathbb{N}\}$ .

4) Show that the sequence  $3 + \frac{1}{n^3}$  is a cauchy sequence.

5) Prove that if the series  $\sum u_n$  is convergent then  $\lim_{n \rightarrow \infty} u_n = 0$ .

6) Define the Geometric series and Harmonic series.

7) Test for the convergence of the series  $\sum \frac{1}{n \frac{2016}{2017}}$ .

8) Find the nature of the series  $\sum_{n=1}^{\infty} \left(1 + \frac{2}{n}\right)^{n^2}$ .

- 9) Construct the Boolean function corresponding to Boolean expression  
 i)  $x + y$                       ii)  $xy$
- 10) Write the dual of the statement  $(x + y) \cdot (y + z) = x \cdot z + y$ .
- 11) Define Disjunctive Normal Form with example.
- 12) In a Boolean algebra B. Show that  $xy' + xz + xy = x$ .

### Section - B

Answer any **two** of the following.

(2 × 5 = 10)

- 13) Prove that every monotonically increasing sequence. Which is bounded above converges to its least upper bound.
- 14) Show that the sequence  $\{x_n\}$ , where  $x_n = \frac{1}{3} + \frac{1}{3^2} + \dots + \frac{1}{3^n}$  is convergent and find its limit.
- 15) Show that the sequence  $\{x_n\}$  defined by  $x_1 = \sqrt{2}$  and  $x_{n+1} = \sqrt{2x_n}$  converges to 2.

### Section - C

Answer any **four** of the following.

(4 × 5 = 20)

- 16) State and prove D'Alembert's ratio test.
- 17) Test the Convergence of the series  $\sum_{n=1}^{\infty} \left( \frac{2^n - 2}{2^n + 1} \right) x^n (x > 0)$ , using Ratio test.
- 18) Discuss the convergence of the series  $\sum_{n=1}^{\infty} \left\{ \left( \frac{n+1}{n} \right) - \left( \frac{n+1}{n} \right)^{n+1} \right\}^{-n}$ .
- 19) Using Raabe's test, Examine the convergence of  $1 + \frac{1}{2} + \frac{1.3}{2.4} + \frac{1.3.5}{2.4.6} + \dots$
- 20) Prove that An absolutely convergent series is convergent.
- 21) Sum to infinity the Binomial series  $\frac{3.5}{3.6} + \frac{3.5.7}{3.6.9} + \frac{3.5.7.9}{3.6.9.12} + \dots$

Section - D

Answer any two of the following.

(2 × 5 = 10)

- 22) Transform the CNF  $(x + y + z)(x + y + z')(x + y' + z)(x' + y + z')(x' + y' + z)$  in to DNF.
- 23) Construct an input/output table for the following Boolean function 'f', and also draw their arrow diagram.
- i)  $f(x_1, x_2) = x_1 \cdot x_2^1$
- ii)  $f(x_1, x_2) = x_1^1 + x_2$
- 24) Simplify the network.

