COPYRIGHT RESERVED BCA (Sem-IV) – Math (405)

GE-4

2022

Time : $1\frac{1}{2}$ hours

Full Marks : 40

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

*Answer from **both** the sections as directed.*

Section–A

Answer any **four** questions of the following : $6\times4=24$

1. (a) State order and completeness property of R.

(b) Find the infinimum and supermum of the following sets :

(i) [5,9]

(ii) $\left\{1+\frac{1}{n} : n \in N\right\}$

2. State and prove Cauchy's general principle of convergence.

3. Define convergent sequence. Pove that a sequence cannot converge to more than one limit.

4. State and prove Root test.

5. Prove that every absolutely convergent series is convergent but the converse need not be true.

6. State and prove Leibnitz's test.

Section–B

Answer any **four** questions of the following :

4×4=16

7. Show that the sequence $\left\{\frac{1}{n}\right\}$ converges to the limit O.

8. Using Cauchy's general principle of convergence, shiow that the sequence $\{a_n\}$ where $a_n = 1+\frac{1}{2}+\frac{1}{3}+......+\frac{1}{n}$ is not convergent.

9. Test the convergency of the series :

$$\frac{1}{1.2.3}+\frac{1}{2.3.4}+\frac{1}{3.4.5}+.....\infty$$

10. Show that the series $1-\frac{1}{2}+\frac{1}{3}-\frac{1}{4}+......$ is conditionally convergent.

11. Give examples of countable and uncountable sets.

12. Give examples of convergent, divergent and oscillatatory sequence.

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$1^2, 4^2, 8^2, 6^2, 7^2, 2^2, 11^2$.

A.S.College ,Deoghar
First Internal Test
BCA Sem-4
Subject :- Mathematics

Full Marks-40 Time-1 Hour

Answer any five questions.

1. Show that every subset of a countable set is countable.
2. Show that the set of algebraic number is countable.
3. If $x, y \varepsilon R$ then prove that $|x+y| \leq |x|+|y|$.
4. Show that the limit of a sequence is unique if it exists.
5. Prove that every convergent square is bounded.
6. Show that $\lim_{n\to\infty} \sqrt[n]{n} = 1$.
7. Prove that the sequence $\sqrt{2}$, $\sqrt{(2\sqrt{2})}$, $\sqrt{2(\sqrt{2}\sqrt{2})}$ converges to 2.
8. If $\sum u_n$, $\sum v_n$ are two series of positive terms such that $\lim_{n\to\infty} u_n/v_n = l$ (finite and nonzero) Then the two series are either both convergent or divergent.
9. The series $1/1^p+1/2^p+1/3^p+$................$+1/n^p$ is convergent if $p>1$ and divergent if $p\leq 1$.
10. Test the convergency of the series whose general form is $(\sqrt{n^2+1} - n)$.

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