Avinashilingam Institute for Home Science and Higher Education for Women
Deemed to be University Estd. u/s 3 of UGC Act 1956, Category A by MHRD (now MoE)
Re-accredited with A++ Grade by NAAC. CGPA 3.65/4, Category I by UGC
Coimbatore - 641 043, Tamil Nadu, India

Continuous Internal Assessment Test I – August 2025

Semester V

Class: III UG **Time: 2 Hrs.**
Major: Special Education & Mathematics **Max. Marks: 60**

23BSMC14 – Real Analysis I

Course Outcomes:

CO1: Recognize the basic properties of Real Number System.
CO2: Identify closed and open sets in Euclidean Space
CO3: Prove standard theorems in Real Analysis.
CO4: Understand the concept of compactness and metric spaces.
CO5: Acquire abstract and logical thinking that pervaded modern analysis.

PART-A **6 x 1 = 6**

Circle the correct answer

1. Let S be the collection of all sequences whose terms are the integers 0 & 1, then S is CO1 K2

   a. uncountable b. countable c. countably infinite d. countably finite

2. Let s = {1/n} and let k be defined by k(n) = 2^n. Then s ok is CO1 K1

   a. {1/n} b. {1/2n} c. {$1/2^n$} d. {n\2}

3. If S` is closed in R^n, then CO2 K1

   a. (S`)`$\subseteq$ S` b. (S`)` $\supseteq$ S` c. (S`)`= S` d. (S`)`$\neq$ S`

4. The set of rational numbers has ------ as an accumulation point. CO2 K3

   a. every real number b. every positive integer c. Z d. 0

5. The cardinal number of an empty set is _____ CO3 K2

   a. 0 b. 1 c. ∞ d. Not defined

6. If S $\subseteq R^n$, the collection of isolated points of S is _____ CO3 K1

   a. countable b. uncountable c. open set d. closed set

PART- B **3 x 6 = 18**

Answer all the questions

7.a) Let Z^+ denote the set of all positive integers. Then prove that the Cartesian product $Z^+ \times Z^+$ is countable. CO1 K3

(or)

7. b) Prove that every subset of a countable set is countable. CO1 K3

8.a) Define an (i) Adherent Point (ii) Accumulation Point (iii) Interior Point CO2 K2

(or)

8. b) Prove that a set S is open if and only if S = int S. CO2 K3

9.a) Prove that a set S in R^n is closed if and only if it contains all its adherent points CO3 K3

(or)

9. b) State and prove the Cauchy – Schwarz inequality in R^n. CO1 K1

PART- C **3 x 12 = 36**

Answer all the questions

10.a) Prove that the set of all real numbers is uncountable. CO1 K1

(or)

10. b) Prove that the union of any collection of open sets is open. CO1 K2

11.a) Prove that every non- empty open sets S in R` is the union of a countable collection of disjoint component intervals of S. CO2 K3

(or)

11. b) Prove that if a set S is in R^n is closed if and only if it contains all its accumulation points. CO2 K1

12.a) State and prove Cantor intersection theorem CO3 K3

(or)

12. b) Prove that the interior of a set in R^n is open in R^n CO3 K3

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