GALGOTIAS UNIVERSITY

| ADMISSION NUMBER | | | | | | | | | | | | |
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# School of Basic Sciences

**Bachelor of Science Honours in Mathematics**
**Mid Term Examination - Mar 2024**

**Duration : 90 Minutes**
**Max Marks : 50**

## Sem VI - C1UC601T - Metric Spaces and Complex Analysis

*General Instructions*
*Answer to the specific question asked*
*Draw neat, labelled diagrams wherever necessary*
*Approved data hand books are allowed subject to verification by the Invigilator*

**1)** Explain that every convergent sequence is cauchy sequence. K2 (2)

**2)** Find the limit point of a set A = {1, 1/2, 1/3, 1/4, 1/5, 1/6, ... 1/n, ...}, $n \in N$ in a usual metric space (R, d) and justify your answer. K1 (3)

**3)** Estimate the relationship between compactness and sequential compactness in a metric space. K2 (4)

**4)** Show that arbitrary union of any collection of open sets in a metric space is open while arbitrary intersection need not. K2 (6)

**5)** Show that the identity map from any metric space to itself is continuous. K3 (6)

**6)** Verify that a compact metric space is bounded while a bounded metric space need not compact K3 (9)

**7)** Categorize the following metric spaces into compact and non compact metric spaces and justify your answers: (i) (R, d) (ii) ([0, 1], d) where d is usual metric. K4 (8)

**8)** Examine whether union and intersection of two compact subsets of a metric space is compact or not. K4 (12)

**OR**

Examine whether orbitrary union and intersection of closed sets in a metric space is closed or not. K4 (12)