

2019

MSc

2nd Semester Examination

**APPLIED MATHEMATICS WITH OCEANOLOGY AND
COMPUTER PROGRAMMING**

PAPER – MTM-206

Full Marks: 25

Time: 1 Hour

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their

own words as far as practicable.

Illustrate the answers wherever necessary.

1. Answer any **TWO** questions: 2x2
- Define order topology for a non empty set with an example.
 - If $A \subset X$ such that a retraction of X onto A is a continuous map $r: X \rightarrow A$ satisfying $r(a) = a$ or each $a \in A$. Then show that T is a quotient map.
 - If Y is a subspace of a topological space X and Z is a subspace of Y , then show that Z is a subspace of X .
 - Show that a subspace of a Hausdorff space is Hausdorff.
2. Answer any **TWO** questions: 2x4
- Show by an example that product of two Lindelöf space need not be Lindelöf.
 - Show that \mathbb{R}^{ω} with respect to the uniform topology satisfies the first countability axiom but it does not satisfy the second countability axiom.
 - If X is a compact Hausdorff space under both the topologies τ and τ' then show that either τ and τ' are equal or they are not comparable.
 - Consider the set \mathbb{N} of all natural numbers equipped with co-finite topology. Verify if this topological space is T_1 or T_2 .

3. Answer any **ONE** question:

1x8

A. (i) Show that compactness property of a topological space implies limit point compactness, but not conversely. 3

(ii) Consider the product, uniform and box topologies on \mathbb{R}^ω . Under what topology or topologies the function $f: \mathbb{Q} \rightarrow \mathbb{R}^\omega$ defined by $f(t) = (t, 2t, 3t, \dots)$ is continuous? 5

B. (i) Write down the statement of the followings
(I) Urysohn Lemma. (II) Tietze Extension theorem 2

(ii) Let X be metrizable topological space. Show that the followings are equivalent.

- a) Every continuous function $\phi: X \rightarrow \mathbb{R}$ is bounded, 6
- b) X is limit point compact.

[Internal Assessment: 5 Marks]