

APPLIED MATHEMATICS WITH OCEANOLOGY AND
COMPUTER PROGRAMMING (P.G.)

M.Sc. Second Semester End Examination-2024
(Regular & Supplementary Paper)

PAPER- MTM-206
[General Topology]

Full Marks: 25

Time: 01 Hrs

The figures in the right hand margin indicate 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 of the following: 2x2=4
- a) Is the collection $\tau = \{U \mid X - U \text{ is finite or empty or all of } X\}$ a topology on X ?
- b) Prove that the lower limit topology on \mathbb{R} is strictly finer than the standard topology on \mathbb{R} .
- c) Define Quotient topology with an example.
- d) Is the space \mathbb{R}_l connected? Justify your answer.
2. Answer any two questions of the following: 8x2= 16
- a) i) Show that $[0,1]^\omega$ is not locally compact in the uniform topology.

(2)

- ii) Show that \mathbb{R}^J in the box topology is completely regular. 4+4
- b) i) Let X and Y are Hausdorff space. Then show that $X \times Y$ is also Hausdorff space.
- ii) $A \subseteq E \subseteq \bar{A}$ are subsets of a topological space X . Then prove that if A is connected, E is also connected. 5+3
- c) i) Let X be a topological space. Then show that the following statements are holds.
- A1) \emptyset and X are closed.
- A2) Arbitrary intersection of closed sets are closed.
- A3) Finite union of closed sets are closed. 5
- iii) Show that if X has the discrete topology, then X is totally disconnected. 3

[Internal Assessment – 5]
