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PG (NEW) CBCS

M.Sc. Semester-II Examination, 2019

APPLIED MATHEMATICS WITH OCEANOLOGY AND COMPUTER PROGRAMMING

PAPER: MTM-206

(GENERAL TOPOLOGY)

Full Marks: 40 **Time: 2 Hours**

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1. Answer any two questions of the following: **2×2**

a) If y and y' are topologies on a set x and y' is strictly finer than y. What can you say about the corresponding subspace topologies on the subset y of x?

b) Define an older topology on an ordered set x.

c) If Y is a subspace of X and Z is subspace of Y, then show that Z is a subspace of X.

d) Is the space $\mathbb{R}_l$connected? Justify your answer.

2. Answer any two questions of the following: **4×2**

a) Let x be a topological space with topology y. if y is a subset of x. Then show that the collection $y_y = \{Y \cup \cap : \cup \in y\}$ is a topology on Y.

b) State the following theorems:

i) Urysohn Metrization theorem

ii) Tychonoff theorem

c) Show that every compact Hausdorff space is normal.

d) Show that $\mathbb{R}^{\omega}$ in the uniform topology satisfies the first countability axiom but it does not satisfy the second countability axiom.

3. Answer any one questions of the following: 8×1

a) i) Define Hausdorff space. Let x and y be two Hausdorff spaces, then show that x × y is a Hausdorff space. 2+2

ii) Let X be metrizable topological space. Show that the following are equivalent:

(u) Every continuous function $\emptyset = X \rightarrow \mathbb{R}$ is bounded.

(v) X is limit point compact. 2+2

b) i) Let β be a basis for the topology of a non-empty set x and e be a basis for the topology of y. Then show that the collection

$D = \{B \times C : B \in \beta \text{ and } C \in e\}$ is a basis for the topology of x × y.

4

ii) Let Y be an ordered set with order topology. Let $f, g : x \rightarrow y$ be two continuous functions. Then show that the set $\{x \in x ! f(x) \leq g(x)\}$ is closed in x. 4

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