M.Sc. DEGREE EXAMINATION,NOVEMBER 2018
I Year II Semester
Core Major - Paper V
TOPOLOGY

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. Define a complete metirc space and give an example.
2. Define a metrizable space.
3. Define product topology on X.
4. Define a compact space.
5. Define a totally bounded set and give an example.
6. Define the term "equicontinuous" for functions on a compact metric space.
7. Define a completely regular space.
8. Define a normal space.
9. Define a totally disconnected space and give an example.
10. Define components of a topological space and illustrate with an example.
11. Define an open base for a metric space and give an example.
12. Define a sequentially compact metric space.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Prove that a closed subspace of a complete metric space is complete.
14. If X is a second countable space ,then show that any open base for X has a countable subclass which is also an open base.
15. Show that every sequentially compact metric space is totally bounded.
16. Prove that a one-to-one continuous mapping of a compact space onto a hausdorff space is a homeomorphism.
17. Prove that any continuous image of a connected space is connected.
18. Show that the product of any non-empty class of Hausdorff space is a Hausdorff space.
19. If f and g are continuous real functions on a metric space X, then prove that f + g is also continuous.

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. If X and Y are metric spaces and f a mapping of X into Y, prove that f is continuous at $x_0$if and only if $x_n \to x_0$ implies $f(x_n) \to f(x_0)$.
21. State and prove Heine Borel theorem.
22. State and prove Tychonoff 's theorem.
23. State and prove Urysohn's lemma.
24. If X is a compact Hausdorff space, then show that X is totally disconnected if and only if it has an open base whose sets are also closed.

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