M.Sc. DEGREE EXAMINATION,NOVEMBER 2019
I Year II Semester
Topology

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

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

Answer any **TEN** questions

1. Give an example of a complete metric space which is not complete.
2. Define a norm on the linear space R^n.
3. Define an open base for a topological space.
4. Define a topological space.
5. Define locally compact space.
6. Define an lebesgue number for an open cover of X.
7. Show that every totally bounded space is bounded.
8. State the Bolzano-weierstrass property.
9. Define a T_1 topological space.
10. Give an example of a Hausdorff space.
11. Define a normal space.
12. State Urysonh's Lemma.

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

Answer any **FIVE** questions

13. Let X and Y be metric spaces.Show that a map f :X→Y is continuous if and only if f^{-1} (G) is open in X whenever G is open in Y.
14. Let X be a topological space and A a subset of X ,show that $\overline{A} =$ A$\bigcup$D(A). Deduce that A is closed if and only if A ⊇D(A).
15. Prove that any continuous image of a compact space is compact.
16. Prove that the product of any non-empty class of Hausdorff spaces is Hausdorff space.
17. Prove that the components of a totally disconnected space are its points.
18. Show that every compact Hausdorff is normal.
19. Let X be a topological space and A be a subset of X. Prove that $\overline{A} = \{$x : each neighbourhood of x intersects A$\}$.

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

Answer any **THREE** questions

20. Prove that the set R^n of all n- tuples X =(x_1, x_2, ...x_n) of real numbers is a real Banach space.
21. Prove that every separable metric space is second countable.
22. State and prove Tychnoff‘s theorem.
23. State and prove Tietze extension theorem.
24. Prove that a subspace of the real line R is connected if and only if it is an interval.

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