

SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)

(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.

M.Sc.Applicable Mathematics - END SEMESTER EXAMINATIONS - APRIL 2025
SEMESTER - II

20PAMCT2005 - Topology

Total Duration : 2 Hrs. 30 Mins.

Total Marks : 60

Section B

Answer any **SIX** questions ($6 \times 5 = 30$ Marks)

1. Show that the subspace of a complete metric space is complete if and only if it is closed.
2. Define derived set $D(A)$ of a subset A of a topological space X and prove that
 - (i) $A = \bar{A} \cup D(A)$
 - (ii) A is closed if and only if $A \supseteq D(A)$.
3. Show that a closed subspace of a compact space is compact.
4. Define Product topology and show that it is the weakest such topology.
5. State and Prove Tychonoff's theorem.
6. Prove that every sequentially compact metric space is totally bounded.
7. Show that every compact Hausdorff space is normal.
8. Prove that the product of any non-empty class of connected spaces is connected.

Section C

I - Answer any **TWO** questions ($2 \times 10 = 20$ Marks)

9. Demonstrate an approach of topological spaces by taking closure operation as the basic undefined concept.
10. State and prove Ascoli's theorem.
11. State and prove Urysohn's theorem.
12. Show that a compact Hausdorff space X is totally disconnected if and only if it has an open base whose sets are closed.

II - Compulsory question ($1 \times 10 = 10$ Marks)

13. State and prove Heine-Borel theorem.
