

**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. END SEMESTER EXAMINATION APRIL/NOV - 2021**

**SEMESTER - II**

**14PAMCT2A05 & PAM/CT/2A05 - Topology**

<b>Total Duration : 3 Hrs</b>	<b>Total Marks : 75</b>
MCQ : 30 Mins	MCQ : 15
Descriptive : 2 Hrs.30 Mins	Descriptive : 60

Section B

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

1. Let  $X$  be a topological space. Show that any intersections of closed sets in  $X$  is closed and any finite union of closed sets in  $X$  is closed.
2. Let  $X$  and  $Y$  be metric spaces and  $f$  is mapping of  $X$  into  $Y$  then prove that  $f$  is continuous at  $x_0$  if and only if  $x_n \rightarrow x_0$  implies that  $f(x_n) \rightarrow f(x_0)$
3. Show that any continuous image of connected space is connected.
4. Prove that every compact subspace of a Hausdorff space is closed.
5. Show that the product of any non - empty of compact space is compact.
6. Show that any continuous mapping of a compact metric space into a metric space is uniformly continuous.
7. Prove that a space  $X$  is locally connected if and only if for every open set  $U$  of  $X$ , each components of  $U$  is open in  $X$ .
8. Define metrizable space and prove that every metrizable space is normal.

Section C

Part A

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

9. Show that a subset of a topological space is closed if and only if it contains all its Limit points.
10. State and prove uniform limit theorem.
11. Prove that every compact Hausdorff space is normal.
12. Prove that every regular space with a countable basis is normal.

Part B

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

13. State and prove Urysohn lemma.