D.K.M.COLLEGE FOR WOMEN (AUTONOMOUS), VELLORE-1
SEMESTER EXAMINATIONS
NOVEMBER - 2017   **15CPMA3C**
TOPOLOGY

Time : 3 Hrs   **Max.Marks : 75**

SECTION-A   (5x 6 =30)

Answer ALL the questions.

1. (a) *Prove that the lower limit topology τ' on R is strictly finer than the standard topology τ.*

    (Or)

    (b) *If A is a subspace of X and B is a subspace of Y, then prove that product topology on $A \times B$ is the same as the topology $A \times B$ inherits as a subspace of $X \times Y$.*

2. (a) *State and prove the pasting lemma.*

    (Or)

    (b) *State and prove sequence lemma.*

3. (a) *Prove that the image of a connected space under a continuous map is connected.*

    (Or)

    (b) *State and prove intermediate value theorem.*

4. (a) *Prove that every compact subset of Hausdorff space is closed.*

    (Or)

    (b) *State and prove maximum and minimum value theorem.*

5. (a) *Suppose that X has a countable basis. Then prove that every open covering of X contains a countable sub collection covering X.*

    (Or)

    (b)*Prove that every metrizable space is normal.*

SECTION-B   (3x15 =45)
Answer any THREE of the following questions.

6. (i) *Let Y be a subspace of X; let A be a subset of Y; let $\bar{A}$ denote the closure of A in X. Then prove that the closure A in Y equals $A \cap Y$.*

    (ii) *Let A be a subset of the topological space X; let A' be the set of all limits points of A. Then prove that $\bar{A} = A \cup A'$.*

7. *Prove that the topologies on R^n induced by the Euclidean metric d and the square metric ρ are the same as the product topology on R^n.*

8. *Prove that the Cartesian product of connected spaces is connected.*

9. *Prove that the product of finitely many compact spaces is compact.*

10. *State and prove Urysohn lemma.*

✻ ✻ ✻ ✻ ✻ ✻