

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI-600 086
(For candidates admitted during the academic year 2019–20 and thereafter)
SUBJECT CODE: 19MT/PC/TO24
M. Sc. DEGREE EXAMINATION - MAY 2021
BRANCH I - MATHEMATICS
SECOND SEMESTER

COURSE : MAJOR CORE
PAPER : TOPOLOGY
TIME : 90 MINUTES

MAX. MARKS: 50

SECTION – A
Answer all the questions

(2 × 2=4)

1. Define basis of a topology.
2. What is a Hausdorff space?

SECTION – B
Answer any TWO questions

(2×6=12)

3. Let X be a topological space and A be subset of X . Suppose that for all $x \in A$, there is an open set U containing x such that $U \subset A$. Show that A is open in X .
4. State and prove Pasting Lemma.
5. Show that the image of a compact space under a continuous map is compact.

SECTION – C
Answer any TWO questions

(2×17=34)

6. a) Let X be a space satisfying the T_1 axiom; let A be a subset of X . Then prove that the point x is a limit point of A if and only if every neighborhood of x contains infinitely many points of A .
b) Let $f: A \rightarrow \prod X_\alpha$ be defined by the equation $f(a) = (f_\alpha(a))_{\alpha \in J}$; Let Z denote the subspace $f(A)$ of the product space $\prod X_\alpha$. Show that the image under f of each element of \mathcal{T} is an open set of Z . (7+10)
 7. a) Prove that a finite cartesian product of connected spaces is connected.
b) State and prove the Lebesgue number lemma. (8+9)
 8. State and prove Urysohn's Lemma.
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