QP Code: RM20MSC089 Reg. No | | | | | | | | | | | AR 20

GIET UNIVERSITY, GUNUPUR – 765022

M. Sc (First Semester) Examinations, May – 2021

20MTPC 102 – TOPOLOGY

(MATHEMATICS)

Time: 2 hrs Maximum: 50 Marks

(The figures in the right hand margin indicate marks.)

PART – A **(2 x 10 = 20 Marks)**

Q.1. Answer ***ALL*** questions

a. Define topological space.
b. Show that in a topological space if $\mathcal{C}F$ is an open set, then F is a closed set.
c. Define connected set.
d. State Heine-Borel Theorem.
e. Define T_0 space.
f. Define countable open base at a point in a topological space.
g. Define limit of a sequence of points in a topological space.
h. Define completely regular space.
i. Define projection map.
j. State Urysohn's metrization theorem.

PART – B **(6 x 5 = 30 Marks)**

<u>Answer ***ANY FIVE*** questions</u> Marks

2. If $x \notin F$, where F is a closed subset of a topological space $(X, \mathfrak{I})$, then show that there exists an open set G such that $x \in G \subseteq \mathcal{C}F$. (6)

3. Show that if f is a homeomorphism of a topological space X onto another topological space X^* then f maps every isolated subset of X onto an isolated subset of X^*. (6)

4. In a T_1 space X, show that a point x is a limit point of a set E if and only if every open set containing the point x contains an infinite number of distinct points of E. (6)

5. If X and Y are two topological spaces, then show that $X \times Y$ is dense-in-itself if and only if atleast one of the spaces X and Y is dense-in-itself. (6)

6. Show that every closed subset of a compact space is compact. (6)

7. If $\langle x_n \rangle$ is a sequence of distinct points of a subset E of a topological space X, which converges to a point x in X, then show that x is a limit point of E. (6)

8. Let A, B, E be three subsets of a topological space $(X, \mathfrak{I})$. Show that (6)

   (i) $\mathrm{d}(\phi) = \phi$
   (ii) if $x \in d(E)$ then $x \in d(E \setminus \{x\})$.

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