QP Code: RM22MSC017 | Reg. No | | | | | | | | | | | AR 21

GIET UNIVERSITY, GUNUPUR – 765022

M. Sc. (First Semester) Examinations, March – 2023

22MTPC102 - Topology

(Mathematics)

Time: 3 hrs | Maximum: 70 Marks

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

PART – A **(2 x 10 = 20 Marks)**

Q.1. Answer all questions

		CO#	Blooms Level
a.	List two distinct non-trivial topological space for the set $X = \{1,2,3\}$.	CO1	K2
b.	Show $f: R \to R_l$ is not continuous.	CO1	K2
c.	Show $Y = [-1,0) \cup (0,1] \subset R$ is connected or not connected.	CO2	K2
d.	Define Homeomorphism.	CO3	K1
e.	Describe discrete and indiscrete topological spaces.	CO4	K1
f.	Give an example of collection of open subsets in the real line R whose intersection is not open.	CO1	K2
g.	R is connected, prove the statement.	CO2	K2
h.	Define product topological space.	CO3	K1
i.	State Heine-Borel theorem.	CO4	K1
j.	Constant function is continuous, justify your answer.	CO3	K2

PART – B **(10 x 5 = 50 Marks)**

Answer ***ANY FIVE*** questions

		Marks	CO#	Blooms Level
2. a.	Let X be a countable set, and T is the family consisting of empty set and all complement of countable sets. Show that T is topology on X.	5	CO1	K2
b.	Let (X, T) be a topological space, B is a basis of T. Then T equal the collection of all union of elements of B.	5	CO1	K2
3.a.	If Function $f: X \to Y$ and $g: Y \to Z$ are two continuous function, then show that composition of these two functions is also continuous.	5	CO2	K1
b.	State and prove Intermediate Value Theorem.	5	CO2	K1
4. a.	Every finite set in a Housdroff space is a closed set.	5	CO3	K1
b.	A finite subset of a T_1 space has no cluster point.	5	CO3	K1
5.a.	Complete Regular Space is regular.	5	CO4	K2
b.	Completely normal space is normal.	5	CO4	K2
6. a.	State and prove Pasting Lemma.	5	CO1	K1
b.	The image of compact space under continuous mapping is compact.	5	CO2	K2
7.a.	Let $Y \subseteq X$ is a connected subspace and X has a separation (A,B), then either $Y \subseteq A$ or $Y \subseteq B$.	5	CO3	K2
b.	Let $Y \subseteq X$ be a subspace, Y is compact iff every covering of Y with sets open in X has a finite sub cover.	5	CO4	K2
8. a.	If B is basis for the topology X and C is a basis for the topology of Y, then the collection $D = \{A \times E \mid A \in B \text{ and } E \in B\}$ is a basis for the topology of $X \times Y$.	5	CO1	K2
b.	$X = (-1,1)$ with subspace topology from R, f is a function from X to R, and $f(x) = \frac{x}{1-x^2}$. Then show that f is homeomorphism.	5	CO2	K1

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