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Maximum Weight : 10

Section II

ME 010 103—MCQ—BASIC TOPOLOGY

[TO BE ATTACHED TO THE MAIN ANSWER-BOOK]

M.Sc. DEGREE (C.S.S.) PRIVATE EXAMINATION, MAY 2026

DO NOT WRITE YOUR REGISTER NUMBER OR NAME ANYWHERE IN SECTION II OF
THE QUESTION PAPER

Answer all questions.

All questions carry equal weight.

Put a tick mark [✓] in the column against the correct answer.

1. Let X be a co finite topological space and $X-A$ is finite set. Then A is :
(A) Empty set. ☐ (B) Clopen. ☐
(C) Closed. ☐ (D) Open. ☐
2. Consider the statement S_1 : $\mathbb{R}$ with usual topology is second countable
 S_2 : $\mathbb{R}$ with semi open interval topology is not second countable
(A) S_1 True, S_2 False. ☐ (B) S_1 False, S_2 True. ☐
(C) S_1, S_2 True. ☐ (D) S_1, S_2 False. ☐
3. Let X be a set with n , ($n \geq 3$) distinct elements. Then which of these statement is true :
(A) There are at most $2^{(2^n-2)}$ topologies. ☐
(B) There are at least $2^{(2^n-2)}$ topologies. ☐
(C) There are at most $2^n - 2$ topologies. ☐
(D) There are exactly 2^n topologies. ☐
4. In an indiscrete topological space X , which one is true :
(A) Full set X and null set are the only open sets. ☐
(B) Full set X is open but not null set. ☐
(C) A proper subset of X is open. ☐
(D) All subsets of X are open. ☐

Turn over





26151744

5. Consider $\mathbb{R}$ with usual metric d' . Then which one is an open ball in the metric space $(\mathbb{R}, d)$:

- (A) Every closed intervals. ☐ (B) Every open intervals. ☐
(C) Union of open intervals. ☐ (D) All the above. ☐

6. Let f be an open map. Then which of the following is necessarily true :

- (A) Inverse of f is an open map. ☐
(B) Inverse of f is a closed map. ☐
(C) Inverse of f is a continuous map. ☐
(D) Inverse of f is an injective map. ☐

7. Which of the following is false ?

- (A) f is continuous if and only if inverse image of open set is open. ☐
(B) Composition of continuous function is continuous. ☐
(C) Projection map is continuous. ☐
(D) None of these. ☐

8. Let A be a set such that A is disjoint from its boundary and B is such that B contains its boundary. Then :

- (A) A is open, B is open. ☐ (B) A is closed, B is closed. ☐
(C) A is open, B is closed. ☐ (D) A is closed, B is open. ☐

9. A topological property is said to be ——— if whenever a space has it, so does every quotient space of it.

- (A) Hereditary. ☐
(B) Preserved under continuous functions. ☐
(C) Divisible. ☐
(D) All of these. ☐





26151744

10. Which of the following is True ?

- (A) Every open surjective map is a quotient map. ☐
- (B) Every closed surjective map is a quotient map. ☐
- (C) Both (A) and (B). ☐
- (D) Only (A). ☐

11. A subset A of a space X is said to be Lindeloff if _____.

- (A) Every cover of A by open subsets of X has a countable subcover. ☐
- (B) Every cover of A by closed subsets of X has a countable subcover. ☐
- (C) Every cover of A by subsets of X has a countable subcover. ☐
- (D) None of these. ☐

12. A topological property is said to be weakly hereditary if _____.

- (A) Whenever a space has it so does every subspace of it. ☐
- (B) Whenever a space has it so does every open subspace of it. ☐
- (C) Whenever a space has it so does every closed subspace of it. ☐
- (D) Whenever a space has it so does every subset of it. ☐

13. A space is said to be first countable if it is first countable at _____ of the space.

- (A) Each subset. ☐ (B) Each closed subset. ☐
- (C) Each open subset. ☐ (D) Each point. ☐

14. Every closed and bounded interval is _____.

- (A) Dense. ☐ (B) Lindeloff. ☐
- (C) Separable. ☐ (D) Compact. ☐

Turn over





26151744

15. Which of the following is not an example of a path-connected space ?
- (A) Topologist's sine curve. ☐ (B) Real line. ☐
- (C) Unit sphere. ☐ (D) Euclidean spaces. ☐
16. Which of the following statements is correct for a path-connected space ?
- (A) Path-connectedness is not preserved under continuous functions. ☐
- (B) Every path-connected space is connected. ☐
- (C) Topological product of a finite number of non-empty path-connected spaces need not be path-connected. ☐
- (D) Every connected space is path-connected. ☐
17. Which of the following is not a hereditary property ?
- (A) Metrisability. ☐ (B) Regularity. ☐
- (C) Local connectedness. ☐ (D) T_2 . ☐
18. A space is said to be Tychonoff if it is :
- (A) Regular and T_1 . ☐
- (B) Normal and T_1 . ☐
- (C) Completely regular and T_1 . ☐
- (D) Completely normal and T_1 . ☐
19. Let T be the topology on the set of reals $\mathbb{R}$ whose members are $\emptyset$, $\mathbb{R}$ and sets of the form (a, ∞) for $a \in \mathbb{R}$. Then $(\mathbb{R}, T)$ is a :
- (A) T_0 space. ☐ (B) T_1 space. ☐
- (C) T_2 space. ☐ (D) T_3 space. ☐
20. Which of the following is an equivalent statement for a normal topological space (X, T) ?
- (A) For any open set C and any closed set G containing C , there exists an open set H such that $C \subset H$ and $\bar{H} \subset G$. ☐
- (B) For any closed set C and any open set G containing C , there exists an open set H such that $C \subset H$ and $\bar{H} \subset G$. ☐





26151744

- (C) The family of all closed neighbourhoods of any point of X forms a local ☐
base at that point.
- (D) For any $x \in X$ and any open set G containing x , there exists an open ☐
set H containing x and $\bar{H} \subset G$.
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No. of MCQ's attempted

Weight Scored

(To be entered by the examiner)

No. of MCQ's not attempted

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