DEPARTMENT OF MATHEMATICS

BUNDELKHAND COLLEGE JHANSI-284001

TOPOLOGY (MCQ) FOR M.SC. STUDENTS

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(1) Let T be a topology on a nonempty set X. Then any member of T is called?.

(a) Closed set

(b) Clopen set

(c) Open set ★

(d) None of these

(2) The only convergent sequence in discrete space is those which are

(a) Convergent to more than one point

(b) Alternating

(c) Eventually constant ★

(d) All of these

(3) 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 ★

(4) Let T_1, T_2 are topologies on a non empty set X with $T_1 \supset T_2$

(a) T_1 stronger than T_2 ★

(b) T_1 weaker than T_2

(c) T_1 and T_2 are uncomparable

(d) None of these

(5) The topology induced by Euclidean metric on R is

(a) Discrete topology

(b) Indiscrete topology

(c) Usual topology ★

(d) None of these

(6) Example of a topology which is not metrisable

(a) Discrete topology

(b) Usual topology

(c) Sierpinski?s topology ★

(d) All of these

(7) If a topology on a set X has countable base, then the space is called

(a) Second category

(b) First countable

(c) Second countable ★

(d) First category

(8) Consider the statements

(i): Second countability is hereditary

(ii): Metrizability is not hereditary

(a) Both (i) and (ii) are true

(b) (i) true , (ii) false

(c) (i) false, (ii) true

(d) both False

(9) If T_1 and T_2 are two topologies on a set, then which of the following is a topology.

(a) $T_1 \cup T_2$

(b) $T_1 \cap T_2$

(c) $T_1 \oplus T_2$

(d) All of these ★

(10) Which statement is correct

(a) In a second countable space, every open cover has a finite subcover

(b) In a second countable space, every open cover has a countable subcover ★

(c) Both A and B is correct

(d) Both A and B is false

(11) In a scattered line topology, Which sequence converge to an irrational number

(a) Sequence of irrationals

(b) Sequence of rationals ★

(c) Eventually constant sequence

(d) Alternating sequence

(12) The topological space in which all the subsets of the underlying set X are open is called

(a) Discrete ★

(b) Indiscrete

(c) Scattering

(d) None of these

(13) Let B is a base for a topological space X then

(a) Every open set can be written as union of some members of B ★

(b) Every open set can be written as intersection of some members of

B

(c) Every closed set can be written as union of some members of B

(d) None of these

(14) Consider the statements

(i): R with usual topology is second countable

(ii) : R with semi open interval topology is not second countable (a)

(i) True, (ii) false

(b) (i) false, (ii) true

(c) (i),(ii) True

(d) both false

(15) Let $X = \{a, b, c\}$. Which of these is a topology

(a) $\{\phi, \{a\}, \{b\}, X\}$

(b) $\{\phi, \{a\}, \{b\}, \{c\}, X\}$

(c) $\{\phi, \{a\}, \{c\}, X\}$

(d) $\{\phi, \{a\}, \{b\}, \{a, b\}, X\}$ ★

(16) Every subspace of a metrisable space is?.

(a) Second countable

(b) Metrisable ★

(c) Separable

(d) First countable

(17) Let S be a sub base for a topological space X. Which of the following

is true

(a) Finite union of members of S is a base element

(b) Arbitrary union of members of S is a base element

(c) Finite intersection of members of S is a base element

(d) None of these

(18) Let X be a set with $n \geq 3$ 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 $2^2 - 2$ topologies

(d) There are exactly 2^n topologies

(19) Let T_1 be the indiscrete topology and T_2 be the discrete topology on an arbitrary set X then

(a) T_1 is weaker than T_2 ★

(b) T_1 is stronger than T_2

(c) $T_1 = T_2$

(d) T_1 and T_2 are not comparable

(20) Which statement is correct

(a) Every metric space is a topological space ★

(b) Every topological space is metrisable

(c) Every topological space is second countable

(d) Every metric space is second countable

(21) 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

(22) R with usual topology is

(a) Metrisable and second countable ★

(b) Second countable but not metrisable

(c) Neither second countable nor metrisable

(d) Metrisable but not second countable

(23) Consider R with usual metric d. Then which one is an open ball in the metric space (R, d)

(a) Every closed intervals

(b) Every open intervals ★

(c) Union of open intervals

(d) All the above

(24) Let X be a space and A be a subset of X such that interior(X-A) = X-A. Then A is

(a) Open

(b) Closed ★

(c) Not open

(d) Both open and closed

(25) Which among the following is false statement.

(a) Complement of an open set is closed

(b) Finite union of closed sets is closed

(c) Arbitrary intersection of closed set is closed

(d) Arbitrary intersection of open set is open ★

(26) Which of the following is not a property of closure operator.

(a) Every closed sets are its fixed points

(b) Closure operator commutes with finite unions.

(c) Closure operator commutes with finite intersections. ★

(d) Closure operator is idempotent.

(27) If closure(A)=X, then

(a) A is closed in X

(b) A is separable

(c) A is dense in X ★

(d) X is dense in A

(28) If a set A is a neighborhood of each of its points, then A is

(a) Open ★

(b) Closed

(c) Clopen

(d) Second countable

(29) The largest open set contained in A is called

(a) Interior of A ★

(b) Derived set of A

(c) Closure of A

(d) None of these

(30) The set which is the intersection of closure(A) and closure(X-A) is

(a) Neighborhood of A

(b) Neighborhood of X-A

(c) Boundary of A ★

(d) Boundary of X

(31) Which of the following is true for a continuous function f from X to Y.

(a) Inverse image of open set in Y is open in X

(b) Inverse image of closed set in Y is closed in X

(c) Both A and B ★

(d) None of these

(32) 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.

(33) The weak topology determined by projection functions is called

(a) Quotient topology

(b) Discrete topology

(c) Product topology★

(d) Scattering topology

(34) The intersection of all closed sets containing A is called

(a) Interior of A

(b) Boundary of A

(c) Closure of A★

(d) Derived set of A

(35) Let X be a space and x belong to X and A subset of X. If every open set containing x contains a point in A other than x, then x is

(a) Limit of A

(b) Accumulation point of A ★

(c) Accumulation point of X-A

(d) None of these

(36) 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 ★

(37) Which of the following are not sufficient for a function to be homeomorphism

(a) f is continuous bijection and open

(b) f is continuous bijection

(c) Inverse of f is open and f is bijection

(d) All of these ★

(38) 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

(39) Let X be a discrete space and G non empty subset of X. Set of all accumulation points of G is

(a) X

(b) Empty set

(c) G

(d) X-G

(40) Which of the following is true

(a) Every open balls are open sets

(b) Every open sets are open balls

(c) Every open sets are complements of closed balls

(d) Closure of an open ball is always closed ball

(41) If $X = \{a, b\}$, then which of the following is not topology

(a) $T = \{\phi, X\}$

(b) $T = \{\phi, X, \{a\}\}$

(c) $T = \{\phi, X, \{b\}\}$

(d) $T = \{\phi, X, \{a\}, \{b\}\}$ ★

(42) In a metric space each derived set is

(a) Closed ★

(b) Open

(c) Not open

(d) Not closed

(43) Null set is :

(a) Open set

(b) Closed set

(c) Both ★

(d) None of these

(44) Which of the following is true :

(a) $\overline{A \cap B} = \overline{A} \cap \overline{B}$

(b) $\overline{A \cap B} \subset \overline{A} \cap \overline{B}$ ★

(c) $\overline{A \cap B} = \overline{A} \cup \overline{B}$

(d) $\overline{A \cap B} \supset \overline{A} \cap \overline{B}$

(45) Cloure of the set $A = \{2, \frac{3}{2}, \frac{4}{3}, \ldots\}$ w. r. to usual topology on R:

(a) $\overline{A} = A \cup \{1\}$ ★

(b) $\overline{A} = A \cup \{2\}$

(c) $\overline{A} = A \cup \{\phi\}$

(d) None

(46) Let (X, T) is a topological space and let A° denote the interior of A.

Which of the following is wrong :

(a) $(A^\circ)^\circ = A$

(b) A is a open subset of X

(c) $(A \cap B)^\circ = A^\circ \cap B^\circ$

(d) $(A \cup B)^\circ = A^\circ \cup B^\circ$ ★

(47) Two subsets of a set X are called disconnected if:

(a) $(A \cap \overline{B}) \cup (\overline{A} \cap B) = \phi$ ★

(b) $(A \cap \overline{B}) \cup (\overline{A} \cap B) \neq \phi$

(c) $(A \cup \overline{B}) \cup (\overline{A} \cup B) = \phi$

(d) All of these

(48) Every discrete space is:

(a) Connected

(b) Disconnected

(c) Totally disconnected ★

(d) None of these

(49) Every indiscrete space is:

(a) Connected ★

(b) Disconnected

(c) Totally disconnected

(d) None of these

(50) Which of the following is incorrect for topological space (X, T):

(a) A subset of a compact space X is compact ★

(b) Continuous image of a compact space is compact

(c) If $X = R$ and T is usual topology, then $A = [0, 1]$ is compact

(d) A closed and bounded subset of a compact space is compact

(51) Which of the following is not true:

(a) A closed subset of a compact space is compact

(b) Every indiscrete space is compact

(c) Every topological space (X, T) is compact if X is finite ★

(d) None of the above

(52) A compact subset of a Hausdroff space is :

(a) Closed

(b) Open

(c) Compact ★

(d) None of these

(53) Which of the following is a compact subset:

(a) R

(b) (a, b)

(c) $[a, b]$ ★

(d) $(a, b]$

(54) Which of following is wrong :

(a) $D(A \cap B) = D(A) + D(B)$

(b) $D(A \cap B) \subset D(A) + D(B)$ ★

(c) $D(A \cap B) \supset D(A) + D(B)$

(d) All of these

(55) Let (X, T) is a topological space, then :

(a) $ext(X) = \phi$ ★

(b) $ext(X) = X$

(c) $ext(X) \neq \phi$

(d) None of these

(56) The largest open set contained in A is called:

(a) Interior of A ★

(b) Derived set of A

(c) Closure of A

(d) None of these

(57) Let X be a space and x belong to X and A subset of X. If every open set containing x contains a point in A other than x, then x is:

(a) Limit of A

(b) Accumulation point of A ★

(c) Accumulation point of X-A

(d) None of these

(58) Two subsets A and B of a topological space X are said to be separated if:

(a) $A \cap B = \phi$ and $A \cup B = X$

(b) $\bar{A} \cap \bar{B} = \phi$ and $A \cup B = X$

(c) $A \cap \bar{B} = \phi$ and $\bar{A} \cap B = \phi$ ★

(d) None of these

(59) Maximally connected subset of a space is called.:

(a) Closure

(b) Interior

(c) Component ★

(d) None of these

(60) Which of the following is an example of a locally connected space?:

(a) Space of irrationals with usual relative topologies

(b) Discreate space ★

(c) Space of rationals with usual relative topologies

(d) Idiscreate space

(61) T_2 space is also called a

(a) Completely normal space

(b) Hausdorff space ★

(c) Regular space

(d) Normal space

(62) If $X = \{a, b, c\}$ and $T = \{\phi, \{a\}, \{b\}, \{a, b\}, X\}$, then base of T is

(a) $\{\phi, \{a\}, \{b\}, \{a, b\}\}$

(b) $\{\{a\}, \{b\}, \{a, b\}\}$

(c) $\{\{a\}, \{b\}\}$

(d) $\{\{a\}, \{b\}, X\}$ ★

(63) If $X = \{a, b, c\}$ and $T = \{\phi, \{a\}, \{b\}, \{a, b\}, X\}$, then local base of T at a is

(a) $\{\phi, \{a\}, \{b\}, \{a, b\}\}$

(b) $\{\{a\}, \{a, b\}\}$ ★

(c) $\{\{a\}, \{b\}\}$

(d) $\{\{a\}, \{b\}, X\}$

(64) If $X = \{a, b, c\}$ and $T = \{\phi, \{a\}, \{b\}, \{a, b\}, X\}$, then (X, T) is

(a) Connected ★

(b) disconnected

(c) Locally connected

(d) All of these true

(65) If $X = \{a, b, c, d\}$ and $T = \{\phi, \{a\}, \{b\}, \{a, b\}, \{c, d\}, X\}$, then

(a) a is the limit point of $\{c, d\}$

(b) b is the limit point of $\{c, d\}$

(c) c is not limit point of $\{c, d\}$

(d) All of these true ★

(66) Projection maps are

(a) Open and surjective

(b) Closed and surjective

(c) Both closed and open ★

(d) Closed and quotient

(67) Exterior of a set is

(a) Interior of its complement ★

(b) Interior of the closure of the set

(c) Boundary of its complement

(d) Closure of the complement

(68) If X is a compact space and A is a subset of X is closed in X then A, in its relative topology is

(a) Open

(b) Closed ★

(c) Compact

(d)Lindeloff

(69) If X is a Lindeloff space and A is a subset of X is closed in X then A, in its relative topology is

(a) Open

(b) Closed ★

(c)Lindeloff

(d) none of these

(70) A space with a countable local base at each of its points is ?

(a) First Countable ★

(b) Second Countable

(c) Compact

(d) Separable

(71) Components of a topological space are sets.

(a) Open ★

(b) Closed

(c) Clopen

(d) None of these

(72) A space which contains a countable dense subset is called

(a) Separable ★

(b) Connected

(c) Compact

(d) Lindeloff

(73) Every continuous image of a compact space is

(a) Compact ★

(b) Dense

(c) Separable

(d) Lindelofff

(74) Which of the following is true.

(a) Compactness and property of Lindeloff are hereditary properties ★

(b) Compactness and property of Lindeloff are NOT hereditary properties

(c) Compactness is a hereditary property and property of Lindeloff is NOT a hereditary properties

(d) Compactness is NOT a hereditary property and property of Lindeloff is a hereditary properties

(75) Which of the following is true.

(a) Compactness and property of Lindeloff are weakly hereditary properties ★

(b) Compactness and property of Lindeloff are NOT weakly hereditary properties

(c) Compactness is a weakly hereditary property and property of Lindeloff is NOT a weakly hereditary properties

(d) Compactness is NOT a weakly hereditary property and property of Lindeloff is a weakly hereditary properties

(76) A subset A of a space X is said to be compact if

(a) every cover of A by open subsets of X has a finite subcover ★

(b) every cover of A by closed subsets of X has a finite subcover

(c) every cover of A by subsets of X has a finite subcover

(d) None of these

(77) 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

(78) A space is said to be separable if it contains a subset.

(a) Countable

(b) Dense

(c) Countable Dense ★

(d) Closed

(79) 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

(80) A space is said to be first countable at a point if

(a) there exist a finite local base at the point

(b) there exist an countable local base at the point ★

(c) there exist a finite base

(d) there exist a countable base

(81) A space is said to be first countable if it is first countable at.

(a) each subset

(b) each closed subset

(c) each open subset

(d)each point ★

(82) If a space is connected then

(a) Only closed subset of X are empty set and X.

(b) Only clopen subset of X are empty set and X. ★

(c) Only open subset of X are empty set and X.

(d) None of these

(83) A space is said to be first countable at a point if

(a) there exist a finite local base at the point

(b) there exist an countable local base at the point ★

(c) there exist a finite base

(d) there exist a countable base

(84) Every closed and bounded interval is

(a) Dense

(b) Lindeloff

(c) Separable

(d) Compact ★

(85) Closure of a connected set is

(a) NOT connected

(b) sometimes connected

(c) always connected ★

(d) None of these

(86) First countability is .

(a) Hereditary property ★

(b) Weakly hereditary property

(c) Absolute property

(d) Relative property

(87) Compactness and property of being Lindeloff are

(a) Absolute property

(b) Relative property

(c) Both ★(d) None of these

(88) Denseness is a

(a) Absolute property

(b) Relative property ★

(c) Both

(d) None of these

(89) Which of the following statements is not true for a locally connected space?

(a) Every quotient space of a locally connected space is locally connected ★

(b) Local compactness is a hereditary property

(c) Comb space is an example of locally connected spaces

(d) Discrete spaces are locally connected

(90) A path in a topological space X is

(a) A continuous function from X to X

(b) A continuous function from [0,1] to X ★

(c) An injective function from [0,1] to X

(d) An injective function from X to X

(91) Which of the following is the weakest separation axiom?

(a) T_0 ★

(b) T_1

(c) T_2

(d) T_3

(92) Which of the following is the correct hierarchy of the separation axioms?

(a) $T_4 \Rightarrow T_3 \Rightarrow T_2 \Rightarrow T_1 \Rightarrow T_0$ ★

(b) $T_0 \Rightarrow T_1 \Rightarrow T_2 \Rightarrow T_3 \Rightarrow T_4$

(c) $T_4 \Rightarrow T_3 \Rightarrow T_1 \Rightarrow T_2 \Rightarrow T_0$

(d) $T_2 \Rightarrow T_3 \Rightarrow T_4 \Rightarrow T_1 \Rightarrow T_0$

(93) A topological space X is said to be completely regular if

(a) The space is normal and T_1 ★

(b) The space is regular and T_1

(c) The space is normal and T_2

(d) The space is regular and T_2

(94) Every T_3 space is

(a) Regular and T_2

(b) Regular and T_1 ★

(c) Normal and T_1

(d) Normal and T_1

(95) Every T_4 space is

(a) Regular and T_2

(b) Regular and T_1

(c) Normal and T_1 ★

(d) Normal and T_1

(96) Which of the following statements is true?

(a) Every T_2 space is T_1 ★

(b) Every T_2 space is T_3

(c) Every T_2 space is T_4

(d) Every T_1 space is T_2

(97) 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