**Department of Mathematics**

M.Sc. (I Year/ I Sem) Question Bank

**Paper – III** (103), Subject: **Topology**

**Unit – I**

1. Let X be a Topological Space then if A is closed ⇔ [ ]

A)

B)

C)

D)

E) None of these

2. Let X be a Topological Space then any finite union of closed sets in X is [ ]

A) Open

B) Closed

C) May not be closed

D) Need not be open

E) None of these

3. Let X = {1,2,3}, Topology T = { then find {} [ ]

A) { 2, 3 }

B) { 1 ,3 }

C)

D) X

E) None of these

4. X = {a, b, c}, Topology T = { and let A = {b, c} then

Isolated point of A is [ ]

A) b

B) c

C) a

D) {c, a}

E) None of these

5. X = {1, 2, 3, 4} & T = { & A = {2, 3} then

Find the limit points of A. [ ]

A) 1 B) 2

C) 3 D) 1, 2, 3

E) None of these

6. How many topologies on X = {1} [ ]

A) One

B) Two

C) Three

D) No topologies

E) None of these

7. Which of the following is a topology on X = {a, b, c} [ ]

A) {

B) {

C) {

D) {

E) None of these

8. Which of the following is not a topology on X = {1, 2} [ ]

A) {}

B) {}

C) {}

D) {{1}, {2}, X}

E) None of these

9. X={1, 2, 3, 4} & T = { and A = {2, 3} [ ]

Then find isolated point of A

A) 2

B) 3

C) 2 & 3

D) 2, 3 & 4

E) None of these

10. X = {1, 2, 3}, T = and A = {1, 2} then find Int (A) [ ]

A)

B) X

C) {1}

D) {1} and X

E) None of these

11. X = {a, b, c, d} T = { and A = {b, c, d} then find Int (A) [ ]

A) {c} B)

C) {d} D) {c, d}

E) None of these

12. X = {a, b, c} T= { then find the boundary of set A [ ]

A) {a} B) {b}

C) {c} D) {b} and {c}

E) None of these

13. Let X = {1, 2, 3} & T = then which one of the following

Is not an open base for X [ ]

A) {

B) {

C) {

D) {{1}, {2}, X}

E) None of these

14. Let X be a topological space. Then any arbitrary intersection of closed sets

in X is \_\_\_\_ [ ]

A) Open

B) Closed

C) Open and Closed

D) Need not be closed

E) None of these

15. Let X = R with Co- finite topology

Then R is [ ]

A) is second countable space

B) Separable space

C) Not second countable space

D) Separable and not second countable space

E) None of these

16. The Discrete topology and In discrete topology of X are same then X is \_\_ [ ]

A) Finite Set

B) Singleton Set

C) Empty Set

D) Two terms set

E) None of these

17. The set of all limit points of A is called [ ]

A) Open Set

B) Closed Set

C) Derived Set

D) Closure of a Set

E) None of these

18. Let X be a Topological space and then A is closed if and only if [ ]

A) D (A) A B) D (A) A

C) D (A) = A D) A D (A)

E) None of these

19. Let X be a topological space & A X then A is said to be dense in X if [ ]

A)

B)

C)

D) (or)

E) None of these

20. Let X be a topological space then A is said to be separable if it has a countable [ ]

A) Sub set

B) Super set

C) Dense sub set

D) Open set

E) Closed set

21. Every Second countable space is [ ]

A) Separable

B) Not Separable

C) Metric Space

D) Linear Space

E) None of these

22. Every separable metric space is [ ]

A) Countable

B) Un Countable

C) Second Countable space

D) Dense

E) None of these

23. Let X be a Topological space and A X. the interior of A is the union of all [ ]

A) Closed subsets of A

B) Open subsets of A

C) Subsets of A

D) Super subsets of A

E) None of these

24. Let X be a Topological space & A X then A is open iff A = \_\_\_\_ [ ]

A)

B) D(A)

C) Int (A)

D) Int(A) D(A)

E) None of these

25. Every open sphere is an [ ]

A) Closed Set

B) Empty Set

C) Finite Set

D) Open Set

E) None of these

26. Let X be a second countable space then any open base for X has a countable

subclass which is also [ ]

A) Sub base

B) Countable

C) Open base

D) Uncountable

E) None of these

27. Every finite topological space is [ ]

A) Separable

B) Countable

C) Un Countable

D) Not Separable

E) None of these

28. Every Separable space [ ]

A) Countable

B) Un Countable

C) Second countable space

D) Need not be second countable

E) None of these

29. Let X be a Topological space and A X then = [ ]

A) A

B) X

C) A D(A)

D) D(A)

E) None of these

30. Every Indiscrete Topological space is [ ]

A) Countable

B) Un Countable

C) Separable

D) Not Separable

E) None of these

31. Let X be a Topological space then any finite union of closed sets in X is [ ]

A) Open

B) Closed

C) Open and Closed

D) Empty Set

E) None of these

32. Which of the following is a Topology on X = {1, 2} [ ]

A) {

B) {

C) {

D) {

E) All of the above

33. Let X be a topological Space A X and then A is \_\_ iff A = Int (A) [ ]

A) Closed set

B) Empty set

C) Open set

D) Finite set

E) None of these

34. A point x in A is not an Interior point of A, If every nbd of x is \_\_\_\_ [ ]

A) Contained in A

B) Does not contained in A

C) Contained in A or Does not contained in A

D) Contained in X

E) None of these

35. Let X be a Topological space and A X then the boundary of set A is [ ]

A) A

B) A

C) A

D)

E)

36. X = {a, b, c}, T={ A = {b} then the boundary of set A is [ ]

A) {a, b}

B) {b, c}

C) {c, d}

D) {a, c}

E) None of these

37. X={a, b, c, d}, T= { A={a,b} then the boundary of

set A is [ ]

A) {c, d}

B) {a, b}

C) {b, c}

D) {a, c}

E) {b, d}

38. f is an open mapping if f carries open sets over to\_\_\_ [ ]

A) Closed sets

B) Empty set

C) Finite sets

D) Open sets

E) None of these

39. Let f: X→Y be a mapping where ‘X’ is discrete topological space and Y be  
 a arbitrary topological space then f is always [ ]

A) Open mapping

B) Continuous mapping

C) Open mapping & Continuous mapping

D) On to mapping

E) None of these

40. Let f: X→Y be a mapping where X is an arbitrary T.S. and Y is discrete

topological space then f is always [ ]

A) One – One mapping

B) On to mapping

C) Open mapping

D) Continuous mapping

E) None of these

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**UNIT – II**

1. Let X be Topological space, { of open subsets of X is said to be an open

Cover of X if X = \_\_\_\_\_ [ ]

A) X =

B) X

C) X =

D) X

E) None of these

2. Let X be a T.S. an open cover of X where sets are all in the same given open

Base is called \_\_\_\_ open cover [ ]

A) Basic B) Sub basic

C) Sub D) Finite

E) None of these

3. Let X be a metric space, if given a subset ‘A’ of X is called on

If A is finite and X = \_\_\_\_\_ [ ]

A)

B)

C)

D)

E) None of these

4. A metric space X is said to have Bolzano weierstrass property if every  
 infinite subset of ‘X’ has a \_\_\_\_ [ ]

A) Isolated point

B) Limit point

C) Not Limit point

D) Not Isolated point

E) None of these

5. A subclass of an open cover which is itself on open cover is called a \_\_\_\_ [ ]

A) Finite Sub Cover

B) Sub Cover

C) Open Cover

D) Finite Open Cover

E) None of these

6. A compact space is a T.S. in which every open cover has a \_\_\_\_ [ ]

A) Finite Sub Cover

B) Sub Cover

C) Open Cover

D) Finite Open Cover

E) None of these

7. Any closed subspace of compact space is \_\_\_\_ [ ]

A) Compact

B) Not Compact

C) Closed

D) Bounded

E) None of these

8. A class { has finite intersection property if every finite subclass of has [ ]

A) Empty intersection

B) Non-Empty intersection

C) Empty set

D) Finite set

E) None of these

9. Topological space is compact if every basic open cover has a [ ]

A) Sub cover

B) Open cover

C) Finite sub cover

D) Finite open cover

E) None of these

10. A metric space X is said to be sequentially compact if every sequence in

X has a convergent \_\_\_\_ [ ]

A) Sequence

B) Sub sequence

C) Cauchy sequence

D) Bounded

E) None of these

11. Every sequentially compact metric space is \_\_\_\_\_ [ ] A) Compact

B) Bounded

C) Totally bounded

D) Compact and totally bounded

E) None of these

12. In a sequentially compact metric space, every open cover has a \_\_\_ [ ]

A) Sub cover

B) Finite sub cover

C) Lebesgue number

D) Finite sub cover and Lebesgue number

E) None of these

13. A metric space is compact if and only if it is \_\_\_\_ [ ]

A) Complete

B) Bounded

C) Totally Bounded

D) Complete and Totally bounded

E) None of these

14. f : X→ Y then f is continuous at if for every nbd H of xo

such that yH ⇒ \_\_\_\_ [ ]

A)

B)

C)

D)

E) None of these

15. Let X be a metric space, then which of the following are equivalent to one

another [ ]

A) X is compact

B) X is Sequentially Compact

C) X has Bolzono weierstrass property

D) X is compact and bounded

E) All of these

16. Any continuous image of compact space is [ ]

A) Closed

B) Bounded

C) Closed & Bounded

D) Compact

E) None of these

17. Topological space is compact if every open cover has \_\_\_\_ [ ]

A) Sub cover

B) Finite sub cover

C) Infinite sub cover

D) No sub cover

E) None of these

18. A metric space X is said to be have Bolzono weierstrass property if every

infinite subset of ‘X’ has [ ]

A) Limit point

B) Not Limit point

C) Isolated point

D) Not Isolated point

E) None of these

19. A metric space X is said to be sequentially compact if every sequence in X has a  
 \_\_\_\_\_\_\_ sub sequence [ ]

A) Divergent

B) Oscillating

C) Convergent

D) Finitely Oscillating

E) None of these

20. If the number of open sets in sub cover is finite then we say it is an [ ]

A) Basic open cover

B) Sub basic open cover

C) Infinite sub cover

D) Finite sub cover

E) None of these

21. A compact space is a T.S. in which every \_\_\_\_\_\_ has a finite sub cover [ ]

A) Basic open cover

B) Sub cover

C) Open cover

D) Sub basic open cover

E) None of these

22. A metric space X is said to be totally bounded if X has [ ] A) A sequentially Compact

B) An -net for each

C) A Bolzano weierstrass property

D) A sequentially compact and Bolzano weierstrass property

E) None of these

23. In a sequentially compact metric space every open cover has a \_\_ [ ]

A) Lebesgue Number

B) Totally bounded

C) -net for each

D) Sequentially compact

E) None of these

24. Any continuous mapping of compact metric space into a metric space is [ ]

A) Continuous

B) Open

C) Bounded

D) Uniformly continuous

E) None of these

25. Any \_\_\_\_\_\_\_ subspace of a compact space is compact [ ] A) Open

B) Bounded

C) Open and Bounded

D) Closed

E) None of these

26. Every compact metric space has the [ ]

A) Sequentially compact

B) Totally bounded

C) Sequentially compact and totally bounded

D) Bolzano weierstrass property

E) None of these

27. Any continuous image of compact space is [ ]

A) Compact

B) Not Compact

C) Continuous

D) Compact and Continuous

E) None of these

28. Let ‘X’ be a metric space if given a subset A of X is called on

if A is finite and X = [ ] A)

B)

C)

D) and

E) None of these

29. A class {Fi} has finite intersection property if every finite subclass of

{Fi} has [ ]

A)

B)

C)

D)

E) None of these

30. A T.S.is compact iff every class of closed sets with empty intersection has

a finite subclass with\_\_\_\_ [ ]

A) Non-Empty intersection

B) Empty intersection

C) Non-Empty intersection and Empty intersection

D) Finite intersection

E) None of these

31. Let X be a T.S. an open cover of X whose sets are all in same given

open base is called a [ ]

A) Open cover

B) Non basic open cover

C) Sub basic open cover

D) Basic open cover

E) None of these

32. A T.S. is compact iff every class of closed set with the finite

intersection property has [ ]

A) Non-Empty intersection

B) Empty intersection

C) Non-empty intersection and empty intersection

D) Finite intersection

E) None of these

33. A metric space is sequentially compact iff it has the [ ]

A) Bolzano weierstrass property

B) Totally bounded

C) Bolzano weierstrass property and totally bounded

D) Finite intersection property

E) None of these

34. A metric space is compact iff it is [ ]

A) Complete

B) Totally bounded

C) Complete and totally bounded

D) Bounded

E) None of these

35. Every convergent sequence is a [ ]

A) Not Cauchy sequence

B) Cauchy sequence

C) Sub sequence

D) Convergent sub sequence

E) None of these

36. Every Cauchy sequence is [ ]

A) Convergent

B) Divergent

C) Need not be Cauchy

D) Need not be Convergent

E) None of these

37. A complete metric space is a metric space in which every

Cauchy sequence is [ ]

A) Cauchy

B) Convergent

C) Need not be Cauchy

D) Need not be convergent

E) None of these

38. Let {xn} is Cauchy Sequence {xn} is convergent iff {xn} has a [ ]

A) Sub sequence

B) Convergent subsequence

C) Cauchy sequence

D) Cauchy subsequence

E) None of these

39. Sequence {xn} is said to be Cauchy sequence. if some stage n0 such that after this stage the distance between any two terms of the sequence {xn} is [ ]

A) B)

C) D)

E) None of these

40. Let X & Y are two metric spaces with metrics d1 & d2 then a mapping f:X→Y is

said to be uniformly continuous if for each

\_\_\_\_\_ where [ ]

A)

B)

C)

D)

E) None of these

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**UNIT – I ANSWERS KEY**

|  |  |  |
| --- | --- | --- |
| 1 | B |  |
| 2 | B | Closed |
| 3 | A | { 2, 3 } |
| 4 | A | b |
| 5 | C | 3 |
| 6 | A | One |
| 7 | B | { |
| 8 | D | {{1}, {2}, X} |
| 9 | A | 2 |
| 10 | C | {1} |
| 11 | D | {c, d} |
| 12 | D | {b} and {c} |
| 13 | C | { |
| 14 | B | Closed |
| 15 | D | Separable and not second countable space |
| 16 | B | Singleton Set |
| 17 | C | Derived Set |
| 18 | B | D (A) A |
| 19 | D | (or) |
| 20 | C | Dense Sub Set |
| 21 | A | Separable |
| 22 | C | Second Countable space |
| 23 | B | Open Subsets of A |
| 24 | C | Int (A) |
| 25 | D | Open Set |
| 26 | C | Open base |
| 27 | A | Separable |
| 28 | D | Need not be second countable |
| 29 | C | A D(A) |
| 30 | C | Separable |
| 31 | B | Closed |
| 32 | E | All of the above |
| 33 | C | Open Set |
| 34 | B | Does not contained in A |
| 35 | D |  |
| 36 | B | {b, c} |
| 37 | A | {c, d} |
| 38 | D | Open Set |
| 39 | B | Continuous mapping |
| 40 | C | Open mapping |

**UNIT – II ANSWERS KEY**

|  |  |  |
| --- | --- | --- |
| 1 | C | X = |
| 2 | A | Basic |
| 3 | C |  |
| 4 | B | Limit Point |
| 5 | B | Sub Cover |
| 6 | A | Finite Sub Cover |
| 7 | A | Compact |
| 8 | B | Non-Empty intersection |
| 9 | C | Finite Sub Cover |
| 10 | B | Sub Sequence |
| 11 | D | Compact and totally bounded |
| 12 | C | Lebesgue number |
| 13 | D | Complete and Totally bounded |
| 14 | A |  |
| 15 | E | All of these |
| 16 | D | Compact |
| 17 | B | Finite Sub Cover |
| 18 | A | Limit Point |
| 19 | C | Convergent |
| 20 | D | Finite Sub Cover |
| 21 | C | Open Cover |
| 22 | B | An -net for each |
| 23 | A | Lebesgue Number |
| 24 | D | Sequentially Compact |
| 25 | D | Closed |
| 26 | D | Bolzano Weierstrass Property |
| 27 | A | Compact |
| 28 | C |  |
| 29 | C |  |
| 30 | B | Empty Intersection |
| 31 | D | Basic Open Cover |
| 32 | A | Non-Empty intersection |
| 33 | A | Bolzano weiestrass property |
| 34 | C | Complete and totally bounded |
| 35 | B | Cauchy Sequence |
| 36 | D | Need not be Convergent |
| 37 | B | Convergent |
| 38 | B | Convergent Subsequence |
| 39 | A |  |
| 40 | C |  |
|  |  |  |