CG-11-2020
WINTER EXAM 2020
Subject Name : RB-10_MATHEMATICS - Metric Spaces – XII (CBCS)_V

Date : 17/03/2021 Duration : 60 min.

Instruction / सुचना / :-

* Follow the detail instructions given on OMR Sheet
* ओ एम आर वरील सर्व सूचनांचे पालन करावे.

Q.1

If R^n is the set of all ordered n-Tuples with the function 'd' defined by $d(x, y) = \sqrt{\sum^1 (x_i - y_i)^2}$, $\forall x, y \in R^n$ then d is called as
A) Usual metric
B) Discrete metric
C) Euclidean metric
D) None of these

.

A]A C]C
B]B D]D

Q.2

The diameter of any non-empty subset A, of a metric space (x,d), is defined as d(A) =
A) Sup {d(a,b) : a, b∈A}
B) inf {d(a,b) : a, b∈X}
C) Sup {d(a,x) : $x \in X$}
D) inf {d(a,x) : $x \in X$}

.

A]A C]C
B]B D]D

Q.3

Let (x,d) be any metric space and a∈X. Then an open sphere of radius r>o, centered at a is defined as
A) {xEX : d(x, a) ≤ r}
B) {xEX : d(x, a) < r}
C) {xEX : d(x, a) ≥ r}
D) {xEX : d(x, a) < r}

.

A]A C]C
B]B D]D

Q.4 Which of the following statement is not correct ?
A]In siscrete metric space, eveyr singletion set is onepn C]Both (& (
B]In a usual metric space, the singleton set is noit open D]Neither (A) nor (B)

Q.5 In any metric space, the set F is closed if
A]it contains all its limit points C]Both (& (
B]Its complement is open D]Neither (A) nor (B)

Q.6 If R is the set of real numbers with usual metric 'd' and A =]o, 1 [, then the set of all limit point of A is
A]] a, b [C]] a, b]
B][a, b [D][a, b]

Q.7 Every closed sphere is
A]an open set C]a semi - open set
B]a closed set D]a semi close set

Q.8 If A is any subset of a metric space (x, , then
A]A is a close set C]both (& (
B]A = A if and only if A is closed D]Neither (A) nor (B)

A subse A of a metric space (x, d) is said to be dense is X if
A) A = ϕ
B) A = A
C) A = X
D) None of the above

Q.9

A]A C]C
B]B D]D

Q.10 The set of integers has
A]a unique limit point C]infinite number of limit points
B]finite number of limit points D]no limit point

Q.11 The arbitrary union of closed sets
A]is a closed set C]an open set
B]need not be a closed set D]None of the above

Q.12

Let (x, d) be any metric space and let $d^1(x, y) = \frac{d(x, y)}{1 + d(x, y)}$, ∀x, yEx

then,
A) d^1 is also a metric on X
B) d and d^1 are equivalent
C) Both (A) and (B)
D) None of the above

.

A]A C]C
B]B D]D

Q.13
If Y is a subspace of a metric space (x, d), then the open sphere $S_r^y(y)$ in (Y, dy) is given by

A) $S_r(y) \cap y$
B) $S_r(y) \cap x$
C) $S_r(y) \cap \{y\}$
D) None of the above

.

A]A C]C
B]B D]D

Q.14
In a metric space (x, d), which of the following statment is correct ?
A) An empty set φ and the whole set x are both open and closed sets.
B) Every open sphere is an open set
C) Every closed sphere is a closed set
D) All of the above

A]A C]C
B]B D]D

Q.15 A point aEX is an adherent point of a subset A of X if every open sphere centered at 'a'
A]contains a point of A C]is an empty set
B]not contains a point of A D]None of the above

Q.16
A sequence {xn}, of points of a metric space (x,d) is called cauchy seqrence if for each E > O,
∃ a positive integer no such that ∀n, m ≥ no
A) d(xn, xm) < E
B) d(xn, xm) ≤ E
C) d(xn xm) ≥ E
D) None of the above

.

A]A C]C
B]B D]D

Q.17 A subspace y, of a complete metric space x, is complete if and only if y is
A]Open set C]Closed set
B]Complete set D]None of the above

Q.18 "Every complete metric space is of second category" is known as
A]Cantor's Intersection Theorem C]Banach fixed point Theorem
B]Baire's category Theorem D]None of the above

Q.19
Let (x,d) be a complete metric space and let {Fn} be a decreasing sequence of non-empty closed subset of x such that $(d(f_n) \to O$ as $n \to \infty$ then $F = \bigcap_{n=1}^{\infty} f_n$ contains

A) exactly one point
B) finite number of points
C) infinite number of points
D) None of the above

.

A]A C]C
B]B D]D

Q.20 Which of the following statement is correct ?
A]Every convergent sequence is a cauchy sequnence. C]Both (and (
B]Every cauchy sequence is a convergent sequence D]Neither (A) nor (B)

Q.21
The function $f : (x\ d_1) \to (y, d_2)$ is said to be continuous if it is continuous at
A) only one point of x
B) each point of x
C) finite number of point of x
D) None of the above

.

A]A C]C
B]B D]D

The function $f : (x, d_1) \to (y, d_2)$ is continuous if and only if
A) f^{-1} (G) is open in X whenever G is open in Y.
B) f^{-1} (F) is closed x whenever F is closed in Y.
C) Both (A) and (B)
D) Neither (A) nor (B)

Q.22
A]A C]C
B]B D]D

The constant function $f : (x\ d_1) \to (y\ d_2)$ is
A) continuous on x
B) continuous on y
C) not continuous on x
D) not continuous on y

Q.23
A]A C]C
B]B D]D

Every unformly continuous function $f : (x\ d_1) \to (y\ d_2)$ is
A) continuous on x
B) not continuous on x
C) not continuous on y
D) none of the above

Q.24
A]A C]C
B]B D]D

A function $f : (x\ d) \to (y, d^1)$ is called on isometry if $\forall x, y \in x$
A) $d(x\ y) = (x, y)$
B) $d^1(x\ y) = (x, y)$
C) $d(x, y) = d^1(f(x), f(y))$
D) None of the above

Q.25
A]A C]C
B]B D]D

Q.26
A function $f : (x, d) \to (x, d)$ is said to be a contraction mapping if $\exists$ a positive real number $\propto < 1$ such that $\forall x, y \in x$
A) $d(x\ y) < \propto . d(x, y)$
B) $d(f(x), f(y)) < \propto . d(x,y)$
C) $d(f(x), f(y) < \propto . d(f(x), y)$
D) None of the above

A]A C]C
B]B D]D

Q.27
Any contraction mapping f of a non-empty complete metric space (x, d) into itself has
A) a unique fixed point
B) two fixed points
C) finite number of fixed point
D) None of the above

A]A C]C
B]B D]D

Q.28
If $f(x) = x^2$, $o \leq x \leq 1/3$, is a contraction mapping on [o, 1/3] with
A) the usual metric
B) Discrete metric
C) Euchidean metric
D) None of the above

A]A C]C
B]B D]D

Q.29 A subset A of a metric space (x, is compact if every open coves of A admits
A]a subcover C]an infinite subcover
B]a finite subcover D]None of the above

Q.30 Every compact subset F of a metric space (x, is
A]an empty set C]a closed set
B]an open set D]None of the above

Q.31 Every compact subset A of a metric space is
A]closed set C]both (and (
B]bounded D]Neither (A) nor (B)

Q.32 continuous image of compact set is
A]compact C]not continuous
B]continuous D]None of the above

Q.33 A metric space (x, is said to have Bolzano-Weierstrass Property if every infinite subset of x has

A]a fixed point
B]a limit point
C]a isolated point
D]None of the above

Q.34 A metric space is sequentialey compact, if every convergent sequence has
A]an infinite subsequence
B]a convergent subsequence
C]a subsequence
D]none of the above

Q.35
Two sets A and B in a metric space (x, d) are said to be separated is
A) $A \cap \overline{B} = \phi$
B) $\overline{A} \cap B = \phi$
C) Both (A) and (B)
D) None of the above

A]A
B]B
C]C
D]D

Q.36 Two disjoint set A and B are
A]separated
B]not separated
C]either (or (
D]Neither (A) nor (B)

Q.37
Which of the following statements are equivalent
A) y is connected
B) y cannot be expressed as disjoint union of two non-empty closed sets in y.
C) ϕ and y are the only sets which are both open and closed in y.
D) All of the above

A]A
B]B
C]C
D]D

Q.38 The union of two connected sets is connected if it has
A]empty intersection
B]non-empty intersection
C]a single point
D]none of these

Q.39 Continuous image of connected set is
A]connected
B]not connected
C]separated
D]None of the above

Q.40
In the Euclidean space R^2, $D = \{(x, y) : x \neq o, y = \sin 1/x\}$ is
A) connected
B) not connected
C) compact
D) None of the above

A]A
B]B
C]C
D]D