2023/12

MASTER OF COMPUTER APPLICATION
FIRST SEMESTER
FUNDAMENTAL CONCEPTS OF MATHEMATICS
MSM-710 (BRIDGE COURSE)
[USE OMR SHEET FOR OBJECTIVE PART]

SET
A

Duration: 3 hrs.

Full Marks: 70

(**Objective**)

Time: 30 mins.

Marks: 20

Choose the correct answer from the following:

1 ×20=20

1. The length of a rectangle is three times the breadth. If the minimum perimeter of the rectangle is 160 cm, then:
   a. breadth > 20 cm
   b. length < 20 cm
   c. breadth x ≥ 20 cm
   d. length ≤ 20 cm

2. If $-3x + 17 < -13$, then:
   a. $x \in (10, \infty)$
   b. $x \in [10, \infty)$
   c. $x \in (-\infty, 10]$
   d. $x \in [-10, 10)$

3. If $4x + 3 < 6x + 7$, then x belongs to the interval:
   a. $(2, \infty)$
   b. $(-2, \infty)$
   c. $(-\infty, 2)$
   d. $(-4, \infty)$

4. Solving $-8 \leq 5x - 3 < 7$
   a. $-1/2 \leq x \leq 2$
   b. $1 \leq x < 2$
   c. $-1 \leq x < 2$
   d. $-1 < x \leq 2$

5. The inequality representing the following graph is
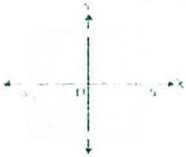
   a. $|x| < 5$
   b. $|x| \leq 5$
   c. $|x| > 5$
   d. $|x| \geq 5$

6. The value of $1 + i^2 + i^4$
   a. 0
   b. -1
   c. 1
   d. None of these

7. If $a + ib = c + id$, then
   a. $a^2 + c^2 = 0$
   b. $b^2 + c^2 = 0$
   c. $b^2 + d^2 = 0$
   d. $a^2 + b^2 = c^2 + d^2$

8. Value of i is.....................
   a. -1
   b. 1
   c. $(-1)^{\frac{1}{2}}$
   d. $(-1)^{\frac{1}{4}}$

9. In $z = 4 + i$, what is the real part?
   a. 1
   b. 4
   c. 5
   d. 0

10. In $z = 4 + i$, what is the imaginary part?
    a. 1
    b. 4
    c. 5
    d. 0

11. $(x + 3) + i(y - 2) = 5 + 2i$, find the values of x and y.
    a. x=8 and y=4
    b. x=2 and y=4
    c. x=2 and y=0
    d. x=8 and y=0

12. $(Sin\ 30° + cos\ 60°) - (sin\ 60° + cos\ 30°)$ is equal to:
    a. 0
    b. $1 + 2\sqrt{3}$
    c. $1 - \sqrt{3}$
    d. $1 + \sqrt{3}$

13. The value of $\tan 60°/\cot 30°$ is equal to:
    a. 0
    b. 1
    c. 2
    d. 3

14. $1 - cos^2 A$ is equal to:
    a. $\sin^2 A$
    b. $\tan^2 A$
    c. $1 - \sin^2 A$
    d. $\sec^2 A$

15. The value of $sin\ 60°\ cos\ 30° + sin\ 30°\ cos\ 60°$ is:
    a. 0
    b. 1
    c. 2
    d. 4

16. If x is a set and the set contains an integer which is neither positive nor negative then the set x is...............
    a. Set is Empty
    b. Set is Non-empty
    c. Set is Finite
    d. Set is both Non-empty and Finite

17. If x is a set and the set contains the real number between 1 and 2, then the set is............
    a. Empty set
    b. Finite set
    c. Infinite set
    d. None of the mentioned

18. Which of the following is a subset of set $\{1, 2, 3, 4\}$?
    a. $\{1, 2\}$
    b. $\{1, 2, 3\}$
    c. $\{1\}$
    d. All of the mentioned

19. How to define a set?
    a. A collection of well-defined objects or element
    b. A collection of unordered objects or element
    c. Any random elements
    d. A collection of special characters

20. How is a set denoted?
    a. (....)
    b. {...}
    c. [...]
    d. * ... *

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Time : 2 hr. 30 mins.   Marks : 50

[Answer question no.1 & any four (4) from the rest]

1. a) Solve $5x - 3 < 3x + 1$ 5+5=10

    b) Solve $\frac{5-2x}{3} < \frac{x}{6} - 5$

2. a) The marks obtained by a student of class XI in first and second   5+5=10
    terminal examination are 62 and 48 respectively. Find the minimum
    marks he should get in the annual examination to have an average of at
    least 60 marks.

    b) Find all pairs of consecutive odd natural numbers, both of which are
    larger than 10, such that their sum is less than 40.

3. a) Express in $a + ib$ form of the followings: 2+2=4

    i) $i^9 + i^{19}$

    ii) i^{-39}

    b) Find the value of   3+3=6
    i) $(-i)(2i)\left(-\frac{1}{8}i\right)^3$

    ii) $\left(-2 - \frac{1}{3}i\right)^3$

4. Find the conjugate, modulus an multiplicative inverse of the following: 3+3+4=10
                            $2 - 3i$

5. a) Find the value of $\sin 15^0$ and $\cos 15^0$ 5

    b) Prove that $\frac{\sin(x+y)}{\sin(x-y)} = \frac{\tan x + \tan y}{\tan x - \tan y}$ 5

6. a) Prove that $\frac{\sin(x+y)}{\sin(x-y)} = \frac{\tan x + \tan y}{\tan x - \tan y}$ 5

    b) Show that $\tan 3x + \tan 2x + \tan x = \tan 3x - \tan 2x - \tan x$ 5

7. a) In a school there are 20 teachers who teach mathematics or physics.   5
    Of these, 12 teach mathematics and 4 teach both physics and
    mathematics. How many teach physics.

    b) If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$,   5
    $A = \{1, 2, 3, 4, 5\}$
    $B = \{2, 4, 6, 8, \}$,
    then find the value of $A^1 \cup B^1$, $(A - B)^C$

8. **a)** In a survey of 400 students in a school, 100 were listed as taking   5+5=10
apple juice, 150 as taking orange juice and 75 were listed as taking
both apple as well as orange juice. Find how many students were
taking neither apple juice nor orange juice.

b) State and prove the D' Morgan's law.

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