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## TERM – I Exam 2021 – 2022
## Class- XI
## MATHEMATICS (Code - 041)

**Time Allowed: 90 minutes**                                    **Maximum Marks: 40**

### General Instructions:

1. **This question paper contains three sections – A, B and C. Each part is compulsory.**
2. **Section – A has 22 MCQs, attempt any 16 out of 22.**
3. **Section – B has 23 MCQs, attempt any 16 out of 23.**
4. **Section – C has 10 MCQs, attempt any 8 out of 10.**
5. **There is no negative marking.**
6. **All questions carry equal marks.**

## Section – A

1. If A, B, C be three sets such that A ∪ B = A ∪ C and A ∩ B = A ∩ C, then,

   (A)  B = C                          (B) A = C

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

2. Which one is different from the others:

   **(i)** Empty set      **(ii)** Void Set      **(iii)** Zero Set      **(iv)** Null set

   (A) (i)                             (B) (ii)

   (C) (iii)                           (D) (iv)

3. if A={0,1} then A X A is given by

   ( A ) { 0,1}                        ( B ) {(1,0),(0,1)}

   ( C ) {(0,0),(0,1),(1,0),(1,1)}     ( D ) {(0,0),(1,1)}

4. If f(x)= 3( 2x- 4), then f(-1) is given by

   ( A ) -6                            ( B ) 6

   ( C ) 18                            ( D ) -18

5. The value of $\theta$ for which $\frac{3+\,2i\,\sin\theta}{3-2i\sin\theta}$ is purely real

   a)  $\theta = \frac{n\pi}{2}$

   b)  $\theta = -\frac{\pi}{2}$

   c)  $\theta = \frac{\pi}{2}$

   d)  $\theta = n\pi$

6. $(1 + i)^{6} + (1 - i)^{3}$ is equal to

   a)  $-2 +\,10i$

   b)  $-5 - 10i$

   c)  $-2 - 5i$

   d)  $-2 - 10i$

7. The real value of 'a' for which $3i^3 – 2ai^2 + (1 – a)i + 5$ is real is ---------
   a) 1
   b) −2
   c) 3
   d) 5

8. The solution of $x^2 – x + 2 = 0$
   a) $\frac{-1 \pm \sqrt{7}\, i}{4}$
   b) $\frac{1 \pm \sqrt{7}\, i}{4}$
   c) $\frac{1 \pm \sqrt{7}\, i}{2}$
   d) $\frac{-1 \pm \sqrt{7}\, i}{2}$

9. The equation of the line which cuts off equal intercept from the axes and passes through the points (1,-2) is
   (a) x + y + 1=0          (b) 2x - y +1 =0          (c) x – y -1 =0          (d) x + 2y +1=0

10. What is the value of k for which the line $(k-3)x – (4-k^2)y + k^2 - 7k + 6=0$ is parallel to the x- axes
   (a) 3          (b) 4          (c) 5          (d) 6

11. What is the value of k if the straight line $2x + 3y + 4 + k(6x – y +12) =0$ is perpendicular to the line $7x + 5y - 4 =0$.
   (a) 29/37          (b) -29/37          (c) 27/37          (d) -27/37

12. Two lines are perpendicular if the product of their slopes is
   (a) 0          (b) 1          (c) -1          (d) None of these

## CASE STUDY QUESTIONS: -
A parking lot in an IT Company is triangular shaped with two of its vertices at B(-2,0) and C (1,12). The third vertex A is at midpoint of the line joining the points (1,1) and (3,11).

13. Find the co-ordinate of third vertex A of a triangular shaped parking lot.
   (a)  (1,6)          (b)  (2,6)          (c)  (1,5)          (d)  (2,5)

14. Find the equation of the line that passes through the points B (-2,0) and C (1,12).
   (a)  y = 4x +8          (b)  y = 3x-7          (c)  y = 4x -8          (d)  y =3x -7

15. Find the equation of the line parallel to BC and passing through the vertex A.
   (a)  4x + y +2=0          (b)  4x – y -2 =0          (c)  7x –y – 2=0          (d) 7x +y +2=0

16. Find the equation of the line perpendicular to BC and passing through the vertex A.
   (a) x -2y +26=0          (b) 4x +y -26=0          (c)  x +4y -26=0          (d) 4x –y +26=0

17. The value of $\lim\limits_{x \to 0} \dfrac{\sin^2 2x}{\sin^2 4x}$
   (a) 2
   (b) $\dfrac{1}{2}$
   (b) -2
   (d) $\dfrac{1}{4}$

18. If f(x)=mx+c and f(0)= $f'(0)$ =1 then f(x) is equal to

    (a) x+1
                           (b) x-1
    (c) -x+1
                           (d) -x-1

19. $\lim_{x \to 0} \dfrac{(x+2)^{\frac{1}{3}} - 2^{\frac{1}{3}}}{x}$ is equal to

    (a) $\dfrac{1}{2}(3)^{\frac{-2}{3}}$
                           (b) $\dfrac{1}{3}(2)^{\frac{-2}{3}}$

    (c) $\dfrac{-2}{3}(2)^{\frac{1}{3}}$
                           (d) $\dfrac{3}{2}(2)^{\frac{-2}{3}}$

20. If a finite set S contains n elements, then the number of all non empty proper subsets of S is

    (A) $2^n$
             (B) $2(2^n - 1)$
         (C) $2^n - 2$
       (D) $2^n - 1$

21. Let $T_r$ be the r $^{th}$ term of an A.P., for r = 1, 2, 3, ... If for some positive integers m, n, we have $T_m$=1/n and $T_n$ = 1/m, then $T_{mn}$ equals

    (a) 1/m n
      (b) 1/m + 1/n
      (c) 1
      (d) 0

22. The first term of a GP is 1. The sum of the third term and fifth term is 90. The common ratio of GP is

    (a) 1
      (b) 2
      (c) 3
      (d) 4

## Section- B

23. If $A = \{x: x \, is \, multiple \, of \, 4\}$ and $B = \{x: x \, is \, multiple \, of \, 6\}$ then then $(A \cap B)$ consists of all multiples of:

    (A) 24
               (B) 4
            (C) 6
       (D) 12

24. If A x B = { ( p, q), ( p, r), ( m, q) (m, r) } Then A and B are

    (A) { p, q, m} and { q, r }
                      ( B ) { p, q, r} and { m, n }
    (C ) { p, m} and { q, r }
                      ( D ) { p, q,} and { m, r }

25. The domain of the function $f(x) = \sqrt{9 - x^2}$ is

    ( A ) { -3, 3}
                      ( B ) {-3, 0, 3}
    ( C ) [-3, 3]
                      ( D ) R – [-3,3]

26. The value of k, if for complex numbers $z_1 \, and \, z_2$ we have

$$|1 - \overline{z_1} \, z_2|^2 - |z_1 - z_2|^2 = k(1 - |z_1|^2)(1 - |z_2|^2)$$

    a) k = 0
    b) k = 2
    c) k = 1
    d) k = -1

27. If $|z^2 - 1| = |z|^2 + 1$, then z lies
   a) on imaginary axis
   b) on real axis
   c) on both axes
   d) none of these

28. If $z_1 = 2 - i$, $z_2 = -2 + i$ then $Re\left(\dfrac{z_1 z_2}{z_1}\right)$ is
   a) 1/5
   b) 2/5
   c) -2/5
   d) 2/5

29. If $\left(\dfrac{1+i}{1-i}\right)^m = 1$ then least positive value of m is
   a) 1
   b) 2
   c) 3
   d) 4

30. If f is a real valued function defined by $f(x) = x^2 + 4x + 3$, then the f'(3) equal to
   (a)11                                          (b)9
   (c)10                                          (d)12

31. Let $\begin{cases} x^2 - 1, 0 < x < 2 \\ 2x + 3, 2 \le x < 3 \end{cases}$ then $\lim\limits_{x \to 2^-} f(x)$ and $\lim\limits_{x \to 2^+} f(x)$ are
   (a)3,7                                         (b)-3,-7
   (c)3,-7                                        (d)-3,7

32. The distance of f(t) in metres moved by a particle travelling in a straight line in t seconds is given by $f(t) = t^2 + 3t + 4$, then the speed of the particle at the end of 2 seconds is equal to
   (a)5 m/sec                                     (b)0.5m/sec
   (c)0.7m/sec                                    (d)7m/sec

33. The mean and variance of 7 observations are 8 and 16 respectively. If 5 of the observations are 2, 4, 10, 12 and 14. The other two observations are.
   (a)    6,8      (b) 3,5       (c) 7,9       (d) 5,7

34. Calculate the mean deviation about the mean of the following data:

   | CLASS | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 |
   |-------|-------|-------|-------|-------|-------|-------|-------|
   | Fi    | 2     | 3     | 8     | 14    | 8     | 3     | 2     |

   (a) 5      (b) 3       (c) 10      (d) 12

35. Find the mean deviation about the mean for following data:
       38, 70, 48, 40, 42,55, 63, 46, 54, 44.
   (a) 5       (b) 7.8       (c) 2.97       (d) 8.4

36. The mean of 6, 8, 5, 7, 'a' and 4 is 7. Find the mean deviation about median of these observations.
   (a) 2     (b) 5     (c) 3     (d) 7

37. **Assertion** (A) is followed by a statement of **Reason** (R).
    Pick the correct option as:
    (a) If both A and R are true and R is the correct explanation of A
    (b) If both A and R are true but R is not the correct explanation of A.
    (c) If A is true but R is false
    (d) If A is false but R is true
    (e) If both A and R are false

    **Assertion**: If each of the observation of given data is increased by 'a', where 'a' is a negative or positive numbers, then the variance changed according to 'a'.
    **Reason**: Adding or subtracting a positive number to each observation of given data affects the variance.

38. If a, b, c are in AP then
    (a) $b = a + c$     (b) $2b = a + c$     (c) $b^2 = a + c$     (d) $2b^2 = a + c$

39. The first term in the sequence an = 2n+5 is

    (a) 7     (b) 11     (C) -7     (d) 9

40. If the first term of an A.P is 3 and 7th term is 39, the common difference is..

    (a) 6          (b) 7          (c) 5          (d)-6

41. The numbers -2/7,x,-7/2 are in G.P. Then the value of x is

    (a) ± 2          (b) ±3          (c) ±1          (d) ±5

42. The 12th term of a G.P. whose 8th term is 192 and common ratio is 2.

    (a) 3070          (b) 3062          (c)3072          (d) 3060

43. The sum of AP 2, 5, 8, .....up to 50 terms is
    (a) 3557          (b) 3757          (c) 3775          (d) 3575

44. If the sum of the first 2n terms of the A.P. 2, 5, 8, is equal to the sum of the first n terms of the A.P. 57, 59, 61, .............., then n is equals to:
    (a) 10          (b) 12          (c) 11          (d) 13

45. The GM between 6 and 24 is

    (a) 10          (b) 8          c) 11          (d) 12

## Section- C

The function f : R→R defined by f(x)= [ x ], x € R assumes the value of the greatest integer, less than or equal to x, Such a function is called greatest integer function.  From the definition of [x], we can say that

[x] = -1 for -1 ≤ x < 0

[x] =  0 for 0 ≤ x < 1

[x] = 1 for 1 ≤ x < 2, and so on

Based on above information give the answers of following questions (Q.N. 31 to 35)

46.  What is the image of [4.25]

      (A) 4.25       ( B ) 5       ( C ) 4       ( D ) 4.5

47.  What is the domain of the function f

      (A) ( 0 , ∞)       ( B ) set of integers I       ( C ) R       ( D ) [ 0, ∞ )

48.  What is the range of function f

      ( A ) R ( set of all real numbers)       ( B ) I ( set of all integers )

      ( C ) N ( set of all natural numbers)       ( D ) ( 0, ∞ )

49.  What is the image of [ -13.5 ]

      ( A ) 13       ( B ) 14       ( C ) -13

      ( D ) -14

50.  Find the value of [ 5.2 ] – [ -0.5 ]

      ( A ) 6       ( B ) 5       ( C ) 7       ( D ) 4

**CASE STUDY:**

Rajashri is standing at the junction A of straight line represented by $2x - 3y + 4 = 0$ and $3x + 4y - 5 = 0$

$2x - 3y + 4 = 0$

A
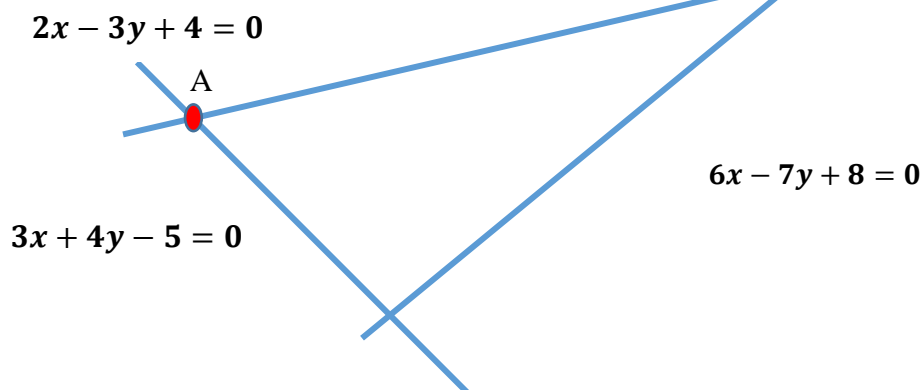
$6x - 7y + 8 = 0$

$3x + 4y - 5 = 0$

51. Slope of the line $2x - 3y + 4 = 0$ is

$(A)\ 2$ $\quad\quad$ $(B)\ \ 3$ $\quad\quad$ $(C)\dfrac{2}{3}$ $\quad\quad$ $(D)\ -\dfrac{2}{3}$

52. What is the intercept made by the line $\ 3x + 4y - 5 - 0$

$(A)\ 3$ $\quad\quad$ $(B)\dfrac{5}{4}$ $\quad\quad$ $(C)\dfrac{5}{3}$ $\quad\quad$ $(D)\dfrac{3}{4}$

53. Coordinate of point A is

$(A)\left(\dfrac{1}{17}, -\dfrac{22}{17}\right)$ $\quad$ $(B)\left(-\dfrac{1}{17}, \dfrac{22}{17}\right)$ $\quad$ $(C)\left(\dfrac{1}{17}, \dfrac{22}{17}\right)$ $\quad$ $(D)\left(-\dfrac{1}{17}, -\dfrac{22}{17}\right)$

54. Rajashri want to reach the path $\ 6x - 7y + 8 = 0$. Then from the point A she must walk along a line which is

$(A)\ Perpendicular\ to\ the\ line\ 6x - 7y + 8 = 0$
$(B)\ \ parallel\ to\ the\ line\ \ 6x - 7y + 8 = 0$
$(C)\ \ not\ necessarily\ perpendicular\ to\ the\ line\ 6x - 7y + 8 = 0$
$(D)\ not\ necessarily\ parallel\ to\ the\ line\ 6x - 7y + 8 = 0$

55. Then from point A she must walk along a line which is

$(A)\ 102x + 119y = 125$ $\quad\quad$ $(B)\ \ 119x + 102y = 125$
$(C)\ 109x + 112y = 125$ $\quad\quad$ $(D)\ \ 119x + 102y = 215$

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