RYAN INTERNATIONAL SCHOOL, FARIDABAD

CLASS XII –MATHEMATICS (ADDITIONAL)

TERM 1

Time: 90 minutes **Max. Marks: 40**

INSTRUCTIONS:

1. The question paper is divided into three sections A, B and C.

2. Section A consists of 20 multiple choice questions, Do any 16 out of 20.

3. Section B consists of 20 multiple choice questions, Do any 16 out of 20.

4. Section C consists of 10 questions based on case studies, do any 8 out of 10.

5. Each question carries 1 mark.

SECTION A

Do any 16 questions out of 20.

1. Let f: R → R be defined as f(x) = x^2 Choose the correct answer:
   (A) f is one one onto.
   (B) F is many one onto.
   (C) F is one one but not onto.
   (D) F is neither one one nor onto.
2. Let T be the set of all triangles and let a relation R on T be defined as aRb if a is similar to b , ∀ a,b ∈ T , Then R is
   (A) Reflexive but not transitive
   (B) Transitive but not symmetric
   (C) Equivalence relation
   (D) None of these
3. If a relation R on the set {4,5,6} be defined by R= {(4,5)} , then R is
   (A) Reflexive
   (B) Transitive
   (C) Symmetric
   (D) None of these
4. The value of $\sin^{-1}(\cos \frac{3\pi}{5})$ is
   (A) $\frac{\pi}{10}$
   (B) $\frac{3\pi}{5}$

(C) $-\frac{3\pi}{5}$

(D) $-\frac{\pi}{10}$

5. The value of $\sin\left[\frac{\pi}{3} + \sin^{-1}\left(\frac{1}{2}\right)\right]$ is

   (A) 1

   (B) 0

   (C) 2

   (D) 4

6. The value of $\tan^{-1}(\sqrt{3}) - \sec^{-1}(-2)$ is

   (A) π

   (B) $-\frac{\pi}{3}$

   (C) $\frac{\pi}{3}$

   (D) $\frac{2\pi}{3}$

7. Which of the given values of x and y make the following pair of matrices equal $\begin{bmatrix} 3x+7 & 5 \\ y+1 & 2-3x \end{bmatrix}, \begin{bmatrix} 0 & y-2 \\ 8 & 4 \end{bmatrix}$

   (A) x = -1/3, y=7

   (B) Not possible to find

   (C) x =-2/3, y=7

   (D) x =-1/3, y= -2/3

8. If the matrix A is both symmetric and skew symmetric, then

   (A) A is a diagonal matrix

   (B) A is a zero matrix

   (C) A is a square matrix

   (D) None of these

9. If A= $\begin{bmatrix} 2 & -3 & 4 \end{bmatrix}$, B = $\begin{bmatrix} 3 \\ 2 \\ 2 \end{bmatrix}$,X =$\begin{bmatrix} 1 & 2 & 3 \end{bmatrix}$ and Y = $\begin{bmatrix} 2 \\ 3 \\ 4 \end{bmatrix}$, then AB+ XY equals to

   (A) $[28]$

   (B) $[24]$

   (C) 28

   (D) 24

10. If A is a square matrix of order 3X3 such that |Adj.A| =289 , then the value of | A| is

    (A) 3

    (B) 1/3

    (C) 15

    (D) 17

11. If f(x) = $\begin{cases} mx+1 \; ; if \; x \leq \frac{\pi}{2} \\ \sin x + n \; ; if \; x > \frac{\pi}{2} \end{cases}$, is continuous at x = $\frac{\pi}{2}$ then

(A) m=1, n=0

(B) m= $\frac{n\pi}{2}$ +1

(C) n = $\frac{m\pi}{2}$

(D) m = n = $\frac{\pi}{2}$

12. The derivative of log ($\tan^{-1} e^{-x}$) is

(A) $-\frac{1}{tane^{-x}} . \frac{1}{1+e^{-2x}} e^{-x}$

(B) $e^x \tan e^x$

(C) $- e^x \tan e^x$

(D) None of these

13. If $x= t^2$ and $y = t^3$, then $\frac{d^2y}{dx^2}$ is equal to

(A) 3/2

(B) 3/4t

(C) 3/2t

(D) 3/4

14. What is the slope of the normal to the curve $x= t^2 +3t -8$, $y =2t^2 -2t-5$ at t =2?

(A) – 7/6

(B) 6/7

(C) 1

(D) 5/6

15. For x∈ R , the function $f(x) = x^3 -6x^2 +12 x-18$ is

(A) An increasing function

(B) Decreasing function

(C) Both (A) and (B) are true

(D) None of above

16. Which of the following function is decreasing on (0, $\frac{\pi}{2}$)

(A) Sin 2x

(B) Tan x

(C) Cos x

(D) Cos 3x

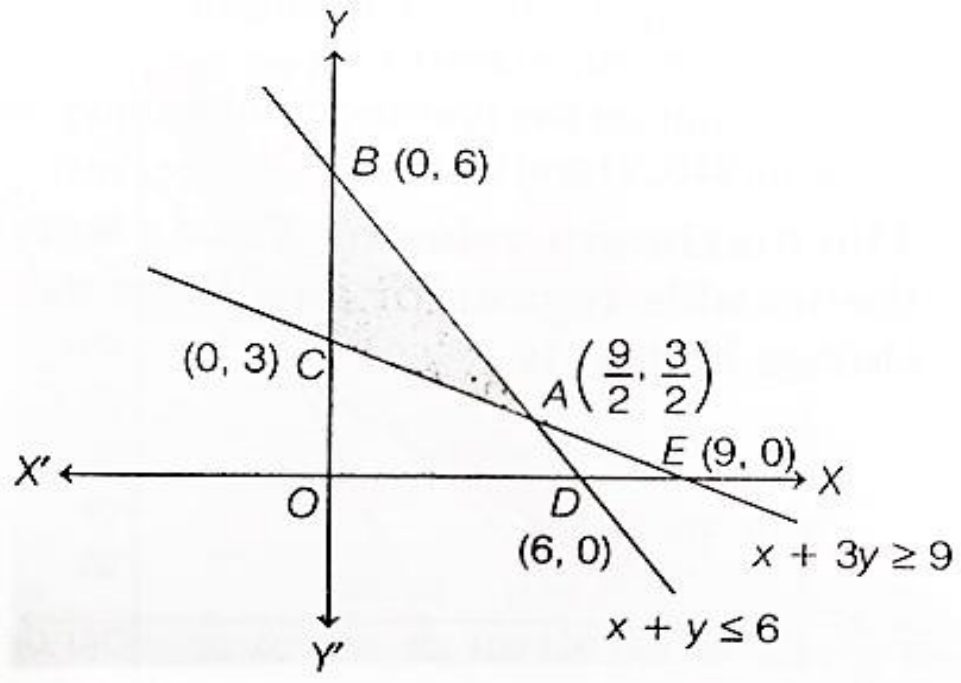
17. Corner points of the feasible region for a LPP are (0,2), (3,0), (6,0),(6,8) and (0,5). Let F= 4x+ 6y be the objective function. The minimum value of F occurs at

(A) Only (0,2)
(B) Only (3,0)
(C) The mid point of the line segment joining the points (0,2) and (3,0)
(D) Any point on the line segment joining the points (0,2) and (3,0)

18. The feasible solution of a LPP belongs to
(a) First and second quadrants
(b) First and third quadrants.
(c) Second quadrant
(d) Only first quadrant.

19. The corner points of the feasible region determined by the following system of linear inequalities $2x+y \leq 10$, $x+3y \leq 15$, $x, y \geq 0$ are (0,0), (5,0), (3,4) and (0,5). Let Z= px+ qy, where p ,q>0 , condition on p and q so that the maximum of Z occurs at both (3,4) and (0,5) is
(A) p = q
(B) p= 2q
(C) p= 3q
(D) q= 3p

20. The linear inequality in the graph is shown below; The feasible region is



(A) OCAD
(B) ADE
(C) ABC
(D) None of these

SECTION (B)

Do any 16 questions out of 20.

21. Let A={a,b,c] and the relation R be defined on A as R ={ (a,a), (b,c), (a,b)} . Then find minimum number of ordered pairs to be added in R to make R reflexive and transitive.
    (A)3
    (B)4
    (C)2
    (D)1

22. If A= {x: $x \in Z, 0 \leq x \leq 12$} and R is the relation in A given by R ={(a,b) :|a-b| is a multiple of 4}. Then the set of all elements related to 1 is
    (A) {1,4,6}
    (B) {1,5,9}
    (C) {2,4,6}
    (D) {1,3,9}

23. Consider the non empty set consisting of children in a family and a relation R defined as aRb , if a is brother of b. Then R is
    (A)Symmetric but not transitive
    (B)Transitive but not symmetric
    (C)Neither symmetric nor transitive
    (D)Both symmetric and transitive

24. The value of $\tan^{-1}[2 \sin (2 \cos^{-1}\frac{\sqrt{3}}{2})]$ is
    (A) $\frac{\pi}{3}$
    (B) $\frac{2\pi}{3}$
    (C) $-\frac{\pi}{3}$
    (D) $\frac{\pi}{6}$

25. The value of $\tan^{-1} (\frac{1}{\sqrt{3}}) + \cot^{-1} (\frac{1}{\sqrt{3}}) + \tan^{-1}(\sin \frac{\pi}{2})$ is
    (A) $\frac{\pi}{6}$
    (B) $\frac{\pi}{12}$
    (C) $\frac{3\pi}{4}$
    (D) $\frac{\pi}{3}$

26. If matrix A = $\begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$ and $A^2 = k A$, then the value of k is
    (A) 1

(B) 2
(C) 3
(D) 5

27. For the matrix A = $\begin{bmatrix} 1 & 5 \\ 6 & 7 \end{bmatrix}$, A +A′ is a
(A)Skew- symmetric matrix
(B) Symmetric matrix
(C)Diagonal matrix
(D) Scalar matrix

28. The value of the determinant $\begin{vmatrix} 1 & 2 & 5 \\ -1 & 3 & 0 \\ 4 & 1 & 0 \end{vmatrix}$ is
(A) -52
(B) 52
(C) 44
(D) -65

29. If $\begin{vmatrix} 2 & 2 \\ 4 & 5 \end{vmatrix} = \begin{vmatrix} x & 2 \\ 2x & 5 \end{vmatrix}$, then the value of x is
(A) 3
(B) -3
(C) 2
(D) -2

30. If there are two values of 'a', for which $\begin{vmatrix} 1 & -2 & 5 \\ 2 & a & -1 \\ 0 & 4 & 2a \end{vmatrix}$ =86; then the sum of these numbers is
(A) 2
(B) 4
(C) -4
(D) 1

31. The area of the triangle whose vertices are (3,8), (-4,2) and (5,1) , is
(A) 60 sq units
(B) 61 sq units
(C) 61/2 sq units
(D) 30 sq units

32. The minor and cofactors of all the elements of first row of determinant $\begin{vmatrix} 2 & -1 \\ 3 & 5 \end{vmatrix}$ are resp.
(A) 5,3,-1,2; 5,-3,1,2
(B) 5,-3,1,2; 5,3,-1,2
(C) 5,-1,3,2; 5,-3,1,2
(D) 5,3,-1,2; 5,1,-3,2

33. The value of x for which the matrix A= $\begin{bmatrix} 6 & x \\ 12 & 8 \end{bmatrix}$ is singular

(A) 2
(B) 1
(C) -1
(D) 4

34. The relationship between a and b , so that the function f defined by f(x)= $\begin{cases} ax+1; if\ x \leq 3 \\ bx+3; if\ x > 3 \end{cases}$ is cont. at x = 3

(A) a = b + 2/3
(B) a -b= 3/2
(C) a + b = 2/3
(D) a + b = 2

35.The derivative of $\sin^2 x$ w.r.t. $e^{\cos x}$ is

(A) $\frac{2\cos x}{e^{\cos x}}$
(B) $-\frac{2\cos x}{e^{\cos x}}$
(C) $\frac{2}{e^{\cos x}}$
(D) None of these

36. Let f(x) be a real valued function defined by

$$f(x) = \begin{cases} 5x-4\ ; & if\ 0 < x < 1 \\ 4x^2 - 3x; & if\ 1 \leq x < 2 \\ 3x+4; & if\ x \geq 2 \end{cases}$$

then f is differentiable at

(A) X=1
(B) X= 2
(C) X= 3
(D) X= 4

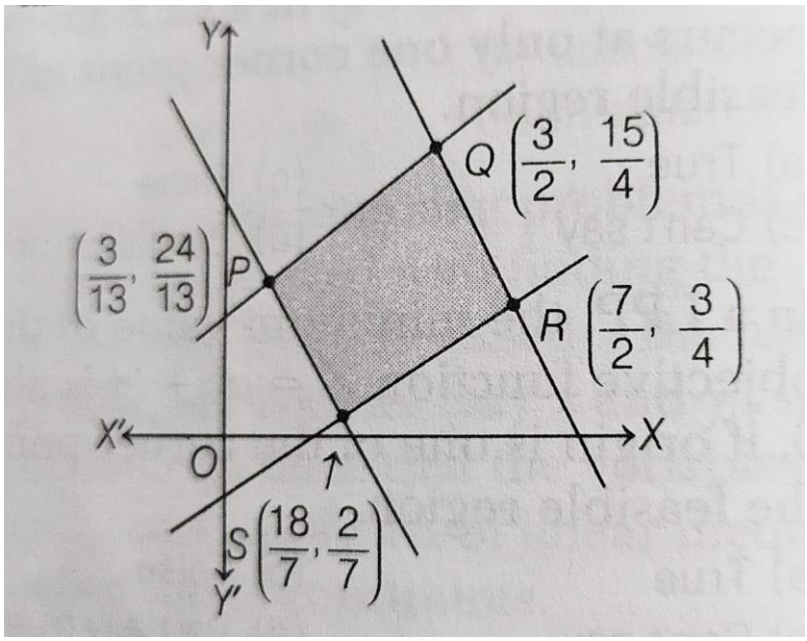
37. The interval on which the function f(x) = $2x^3 + 9x^2+12x-1$ is st. decreasing

(A) (-2,-1)
(B)[-2,-1]
(C) (-∞,-2)
(D) (-1,∞)

38.The equation of the Normal to the curve y = x^3+1 at (1,0)

(A) x+3y=1
(B) x – 3y =1
(C) 2x +y =1
(D) x-3y =6

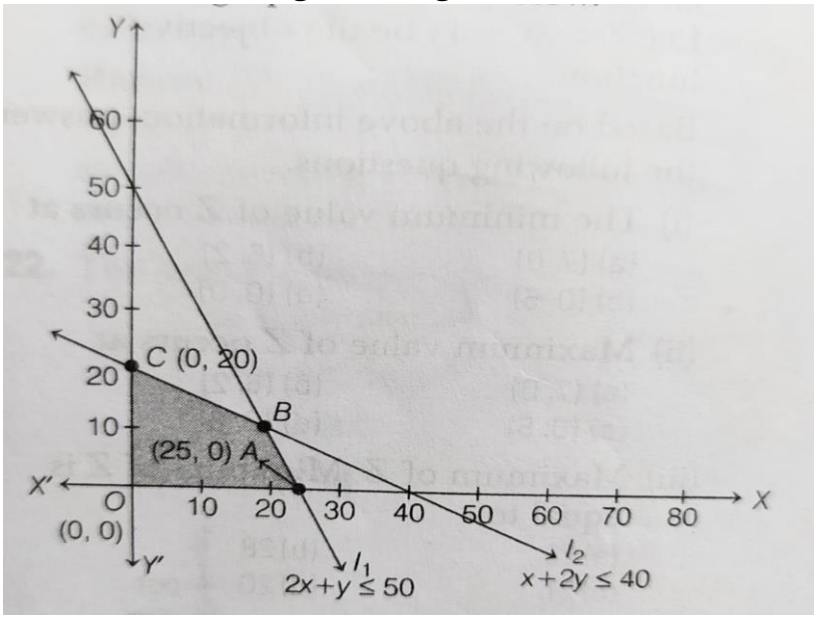
39. In the given figure, the feasible region for the LPP is shown



Find the max. and min. values of Z= x+2y

(A) 8, 3.2
(B) 9, 3.14
(C)9,4
(D) None of these

40.The corner points of the feasible region of a given LPP are

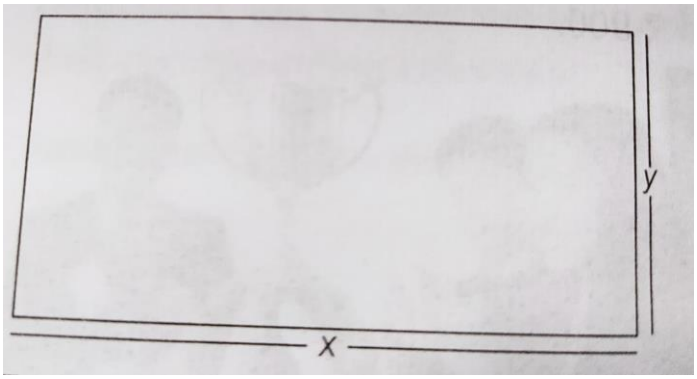


(A) (0,20), (25,0), (40/3,50/3)
(B) (0,0), (25,0), (0,20) ,(20,10)
(C) (0,0), (40/3,50/3), (0,20), (25,0)
(D) (25,0), (0,20), (20,10)

SECTION C (CASE STUDY BASED QUESTIONS)

Do any 8 questions out of 10.

DIRECTIONS: Sumeet has a rectangular plot of land which he wants to donate for a school in his village. He told about its dimensions that if its length is decreased by 50 m and breadth is increased by 50 m, then its area will remain same, but if length is decreased by 10m and breadth is decreased by 20 m, then the area will decrease by 5300 sq m.



Based on above information, Answer the following questions. (41 to 45)

41. The equations in terms of x and y are:
    (A) x – y =50, 2x-y=550
    (B) x-y =50, 2x+y =550
    (C) x+ y=50,2x+ y=550
    (D) x+ y = 50, 2x-y = 550
42. Which of the following matrix equation is represented by the given information:
    (A) $\begin{bmatrix}1 & -1\\2 & 1\end{bmatrix}\begin{bmatrix}x\\y\end{bmatrix}=\begin{bmatrix}50\\550\end{bmatrix}$
    (B) $\begin{bmatrix}1 & 1\\2 & 1\end{bmatrix}\begin{bmatrix}x\\y\end{bmatrix}=\begin{bmatrix}50\\550\end{bmatrix}$
    (C) $\begin{bmatrix}1 & 1\\2 & -1\end{bmatrix}\begin{bmatrix}x\\y\end{bmatrix}=\begin{bmatrix}50\\550\end{bmatrix}$
    (D) $\begin{bmatrix}1 & 1\\2 & 1\end{bmatrix}\begin{bmatrix}x\\y\end{bmatrix}=\begin{bmatrix}-50\\-550\end{bmatrix}$
43. The value of x (length of rectangular field) is
    (A) 150 m
    (B) 400 m
    (C) 200 m
    (D) 320 m
44. The value of y (breadth of rectangular field) is
    (A) 150 m

(B) 200 m
(C) 430 m
(D) 350 m

45. How much is the area of rectangular field?
(A) 60000 sq m
(B) 30000 sq m
(C) 22500 sq m
(D) 3000 sq m

DIRECTIONS: A company is going to build a new residential complex. The land they have purchased can hold at most 3500 apartments.

Also if they make x apartments, then the monthly maintenance cost for the whole complex would be as follows: fixed cost = Rs 4000000

Variable cost =Rs (160 x- 0.04 x^2)

Based on above information, answer following questions (46 to 50):

46. The maintenance cost as a function of x will be
(A) 160 x- 0.04 x^2
(B) 4000000
(C) 4000000 +160 x- 0.04 x^2
(D) None of the above

47. If C(x) denotes the maintenance cost function, then maximum value of C(x) occurs at x=
(A) 2000
(B) 0

(C) 4500
(D) 8000

48. The max value of C(x) would be
(A) 4160000
(B) 5400000
(C) 3400000
(D) 4000000

49. The number of apartments, that the complex should have in order to minimise the maintenance cost, is
(A) 3500
(B) 8000
(C) 1850
(D) 2000

50. If the minimum maintenance cost is attained, then the maintenance cost for each apartment would be
(A) 1214
(B) 1188.57
(C) 1003
(D) 2014.57