SHREE RADHEY COACHING CENTER

SAMPLE PAPER 2

Class 12 - Mathematics

Time Allowed: 1 hour and 30 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 20 MCQs, attempt any 16 out of 20. 3
3. . Section - B has 20 MCQs, attempt any 16 out of 20
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

Attempt any 16 questions

1. Let R be the relation on N defined as by x + 2 y = 8. The domain of R is **[1]**

   a) {2, 4, 6, 8} b) {2, 4, 8}

   c) {1, 2, 3, 4} d) {2, 4, 6}

2. The feasible solution for a LPP is shown in Figure. Let Z = 3x – 4y be the objective function. (Maximum value of Z + Minimum value of Z) is equal to **[1]**

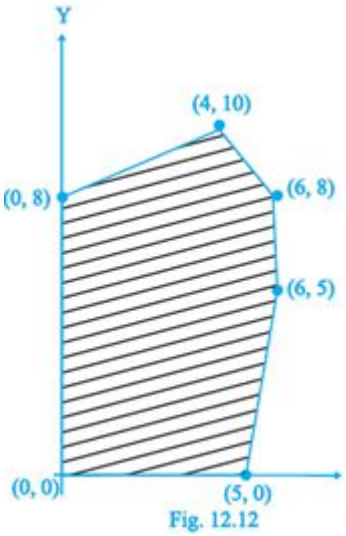


Fig. 12.12

   a) 13 b) - 17

   c) 1 d) – 13

3. If $y = x\sqrt{1-x^2} + \sin^{-1}x$,then $\frac{dy}{dx}$ is equal to **[1]**

   a) $\frac{1}{\sqrt{1-x^2}}$ b) $\sqrt{1-x^2}$

c) $2\sqrt{1-x^2}$

d) None of these

4. If $A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$, then A^5 = **[1]**

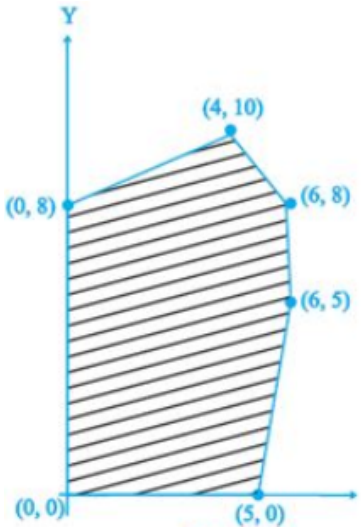
a) 16A

b) 10A

c) 5A

d) 32A

5. The feasible solution for an LPP is shown in Figure. Let Z = 3x – 4y be the objective function. Minimum of Z occurs at **[1]**



a) (0, 8)

b) (0, 0)

c) (5, 0)

d) (4, 10)

6. If $y = e^{\sin\sqrt{x}}$ then $\frac{dy}{dx} = ?$ **[1]**

a) $\frac{e^{\sin\sqrt{x}}\cos\sqrt{x}}{2\sqrt{x}}$

b) $\frac{e^{\sin\sqrt{x}}}{2\sqrt{x}}$

c) None of these

d) $e^{\sin\sqrt{x}} \cdot \cos\sqrt{x}$

7. If A and B are 2-rowed square matrices such that (A + B)$= \begin{bmatrix} 4 & -3 \\ 1 & 6 \end{bmatrix}$ and (A - B) $= \begin{bmatrix} -2 & -1 \\ 5 & 2 \end{bmatrix}$ then AB = ? **[1]**

a) $\begin{bmatrix} 7 & -5 \\ 1 & 5 \end{bmatrix}$

b) $\begin{bmatrix} -7 & 5 \\ 1 & -5 \end{bmatrix}$

c) $\begin{bmatrix} 7 & -1 \\ 5 & -5 \end{bmatrix}$

d) $\begin{bmatrix} 7 & -1 \\ -5 & 5 \end{bmatrix}$

8. If y = $\tan^{-1}\left(\frac{1+x^2}{1-x^2}\right)$ then $\frac{dy}{dx} = ?$ **[1]**

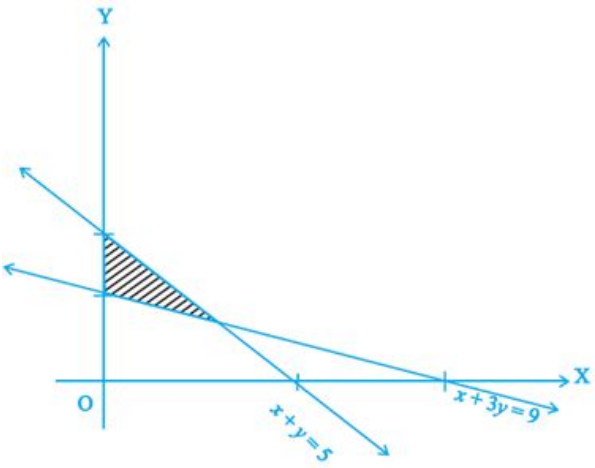
a) $\frac{-2x}{(1+x^4)}$

b) None of these

c) $\frac{2x}{(1+x^4)}$

d) $\frac{x}{(1+x^4)}$

9. The feasible region for a LPP is shown in Figure. Find the minimum value of Z = 11x + 7y. **[1]**



a) 22

b) 21

c) 19

d) 20

10. If A = $\begin{bmatrix} 2 & -1 & 3 \\ -4 & 5 & 1 \end{bmatrix}$ and B = $\begin{bmatrix} 2 & 3 \\ 4 & -2 \\ 1 & 5 \end{bmatrix}$ then **[1]**

a) only BA is defined

b) only AB is defined

c) AB and BA both are not defined

d) AB and BA both are defined

11. If $f(x) = \begin{cases} \frac{1}{1+e^{1x}} & , x \neq 0 \\ 0 & , x = 0 \end{cases}$ then f(x) is **[1]**

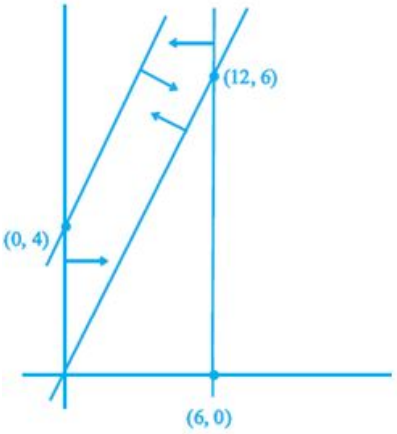
a) none of these

b) differentiable but not continuous at x = 0

c) continuous but not differentiable at x = 0

d) continuous as well as differentiable at x = 0

12. The feasible region for an LPP is shown in the Figure. Let F = 3x - 4y be the objective function. Maximum value of F is. **[1]**



a) - 18

b) 0

c) 8

d) 12

13. If f(x) = $\frac{1}{4x^2+2x+1}$, then its maximum value is **[1]**

a) 1

b) $\frac{4}{3}$

c) $\frac{3}{4}$

d) $\frac{2}{3}$

14. If f(x) = $|x^2 - 9x + 20|$, then f'(x) is equal to **[1]**

a) -2x + 9 for all x ∈ R

b) none of these

c) 2x - 9 if 4 < x < 5

d) -2x + 9 if 4 < x < 5

15. If $y = x^{n-1} \log x$ then $x^2 y_2 + (3 - 2n) xy_1$ is equal to **[1]**

a) $-(n - 1)^2 y$

b) $(n - 1)^2 y$

c) $-n^2 y$

d) $n^2 y$

16. The function $f(x) = 2x^3 - 15x^2 + 36x + 4$ is maximum at x = **[1]**

a) 2

b) 4

c) 0

d) 3

17. The curve $y = x^{1/5}$ has at (0, 0) **[1]**

a) a vertical tangent

b) oblique tangent

c) a horizontal tangent

d) no tangent

18. $\sin\left(\frac{1}{2}\cos^{-1}\frac{4}{5}\right)$ = ? **[1]**

a) $\frac{1}{\sqrt{10}}$

b) $\frac{2}{\sqrt{5}}$

c) $\frac{1}{\sqrt{5}}$

d) $\frac{2}{\sqrt{10}}$

19. The derivative of f(x) = | x | at x = 0 is **[1]**

a) 1

b) – 1

c) All of these

d) None of these

20. Let $f(x) = x^3 + ax^2 + bx + 5 \sin^2 x$ be an increasing function on the set R. Then, a and b satisfy **[1]**

a) $a^2 - 3b + 15 > 0$

b) a > 0 and b > 0

c) $a^2 - 3b + 15 < 0$

d) $a^2 - 3b - 15 > 0$

SECTION – B

Attempt any 16 questions

21. Let f(x) $\sqrt{\frac{x-1}{x-4}}$ then, dom f(x) = ? **[1]**

a) [1,4]

b) $(-\infty, 4]$

c) [1,4)

d) $(-\infty, 1] \cup (4, \infty)$

22. If $y = \sec^{-1}\left(\frac{1}{2x^2-1}\right)$ then $\frac{dy}{dx} = ?$ **[1]**

a) $\frac{-2}{(1-x^2)}$

b) $\frac{-2}{\sqrt{1-x^2}}$

c) $\frac{-2}{(1+x^2)}$

d) None of these

23. The corner points of the feasible region determined by the system of linear constraints are (0, 0), (0, 40), (20, 40), (60, 20), (60, 0). The objective function is Z = 4x + 3y. **[1]**

Compare the quantity in Column A and Column B

Column A	Column

	B
Maximum of Z	325
(A) The quantity in column A is greater	
(B) The quantity in column B is greater	
(C) The two quantities are equal	
(D) The relationship can not be determined on the basis of the information supplied	

a) The quantity in column A is greater

b) The quantity in column B is greater

c) The two quantities are equal

d) The relationship can not be determined on the basis of the information supplied

24. The radius of the base of a cone is increasing at the rate of 3 cm/minute and the altitude is decreasing at the rate of 4 cm/minute. The rate of change of lateral surface when the radius = 7cm and altitude 24 cm is **[1]**

a) $7\pi \text{cm}^2/\text{min}$

b) $54\pi \text{cm}^2/\text{min}$

c) none of these

d) $27\text{cm}^2/\text{min}$

25. The function $f(x) = \begin{cases} x^2a & , \quad 0 \leq x < 1 \\ a & , \quad 1 \leq x < \sqrt{2} \\ \frac{2b^2-4b}{x^2} & , \quad \sqrt{2} \leq x < \infty \end{cases}$ is continuous for $0 \leq x < \infty$, then the most suitable values of a and b are **[1]**

a) a = -1, b = 1

b) a = -1, b = 1^+

c) a = - 1, b = -1

d) none of these

26. The value of the expression sin [$\cot^{-1}$ (cos ($\tan^{-1}$ 1))] is **[1]**

a) $\sqrt{\frac{2}{3}}$

b) 0

c) $\frac{1}{\sqrt{3}}$

d) 1

27. Let $f : R \to R$ be defined by f (x) = $\frac{1}{x}$, $\forall\, x \in R$. Then f is **[1]**

a) one – one

b) Bijective

c) f is not defined

d) Onto

28. Which of the following corresponds to the principal value branch of $\tan^{-1}$? **[1]**

a) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ - {0}

b) (0, π)

c) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

d) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

29. The maximum value of $\left(\frac{\log x}{x}\right)$ is **[1]**

a) 1

b) e

c) $\frac{2}{e}$

d) $\left(\frac{1}{e}\right)$

30. If A is a square matrix then (A - A') is **[1]**

a) A null matrix

b) An identity matrix

c) A skew-symmetric matrix

d) A symmetric matrix

31. If f (x)= x^2g(x) and g (x) is twice differentiable then f'(x) is equal to **[1]**

a) 2 g"(x)

b) None of these

c) $x^2g''(x) + 2\ x\ g'(x) + 2\ g(x)$

d) $x^2g''(x) + 4\ x\ g'(x) + 2\ g(x)$

32. Find the value of f(0), so that the function $f(x) = \frac{(27-2x)^{1/3}-3}{9-3(243+5x)^{1/5}} (x \neq 0)$ is continuous, is given by **[1]**

a) 6

b) $\frac{2}{3}$

c) 4

d) 2

33. Function f(x) = a^x is increasing on R, if **[1]**

a) a > 0

b) a < 0

c) a > 1

d) 0 < a < 1

34. If $3\tan^{-1}$ x + $\cot^{-1}$ x = π, then x equals **[1]**

a) -1

b) 1

c) 0

d) $\frac{1}{2}$

35. If $A = \begin{bmatrix} 1 & \lambda & 2 \\ 1 & 2 & 5 \\ 2 & 1 & 1 \end{bmatrix}$ is not invertible then $\lambda \neq$? **[1]**

a) 1

b) 2

c) 0

d) -1

36. Determine the maximum value of Z = 11x + 7y subject to the constraints :2x + y ≤ 6, x ≤ 2, x ≥ 0, y ≥ 0. **[1]**

a) 47

b) 43

c) 42

d) 45

37. For any two matrices A and B, **[1]**

a) AB = BA is always true

b) Whenever AB exists, then BA exists

c) Sometimes AB = BA and sometimes AB $\neq$ BA

d) AB = BA is never true

38. The curve y = $a\ x^3 + bx^2 + c\ x$ is inclined at 45° to the X – axis at (0, 0) but it touches X – axis at (1, 0) , then the values of a, b, c, are given by **[1]**

a) a = 1, b = – 2, c = 1

b) a = 1, b = 1, c = – 2

c) a = – 2, b = 1, c = 1

d) a = – 1, b = 2, c = 1.

39. Find the value of b for which the function $f(x) = \begin{cases} 5x-4 & ,0 < x \leq 1 \\ 4x^2+3bx & ,1 < x < 2 \end{cases}$ is continuous **[1]**

at every point of its domain, is

a) $\frac{13}{3}$ b) -1

c) 1 d) 0

40. Let T be the set of all triangles in the Euclidean plane, and let a relation R on T be defined as aRb if a is congruent to b a,b $\in$ T. Then R is **[1]**

a) an equivalence relation b) neither reflexive nor symmetric

c) transitive but not symmetric d) reflexive but not transitive

SECTION – C

Attempt any 8 questions

41. The solution of the equation $\cos^{-1}(\sqrt{3}x) + \cos^{-1}x = \frac{\pi}{2}$ is given by **[1]**

a) $-\frac{1}{2}$ b) None of these

c) $\pm\frac{1}{2}$ d) $\frac{1}{2}$

42. In a LPP, the linear inequalities or restrictions on the variables are called **[1]**

a) Limits b) Inequalities

c) Linear constraints d) Constraints

43. If $f(x) = \sqrt{x^2 + 6x + 9}$, then f'(x) is equal to **[1]**

a) 1 for all x $\in$ R b) none of these

c) 1 for x < -3 d) -1 for x < -3

44. The value of the determinant $\begin{vmatrix} a^2 & a & 1 \\ \cos nx & \cos(n+1)x & \cos(n+2)x \\ \sin nx & \sin(n+1)x & \sin(n+2)x \end{vmatrix}$ is independent of **[1]**

a) a b) n

c) none of these d) x

45. Equivalence classes are **[1]**

a) trivial sets b) mutually disjoint subsets

c) intersecting sets d) power sets

Question No. 46 to 50 are based on the given text. Read the text carefully and answer the questions:

To promote the making of toilets for women, an organisation tried to generate awareness through

i. house calls
ii. emails and
iii. announcements.

The cost for each mode per attempt is given below:

1. ₹ 50
2. ₹ 20
3. ₹ 40

The number of attempts made in the villages X, Y and Z are given below:

	(i)	(ii)	(iii)
X	400	300	100
Y	300	250	75
Z	500	400	150

Also, the chance of making of toilets corresponding to one attempt of given modes is

1. 2%
2. 4%
3. 20%

46. The total number of toilets that can be expected after the promotion in village X, is **[1]**

a) 30 b) 50

c) 40 d) 20

47. The total number of toilets that can be expected after the promotion in village Z, is **[1]**

a) 36 b) 56

c) 46 d) 26

48. The cost incurred by the organisation on village X is **[1]**

a) ₹ 30000 b) ₹ 15000

c) ₹ 10000 d) ₹ 20000

49. The cost incurred by the organisation on village Y is **[1]**

a) ₹ 25000 b) ₹ 28000

c) ₹ 23000 d) ₹ 18000

50. The cost incurred by the organisation on village Z is **[1]**

a) ₹ 19000 b) ₹ 39000

c) ₹ 50000 d) ₹ 45000