Standard X (Matric)
MATHEMATICS

Time : 2.30 hrs. Marks : 100

SECTION - A

I. Choose the correct answer: 15x1=15

1. Given $f(x) = (-1)^x$ is a function from N to Z. Then the range of f is .....

   a) N b) $\{1\}$ c) $\{1, -1\}$ d) Z

2. In a G.P., $t_2 = \frac{3}{5}$ and $t_3 = \frac{1}{5}$. Then Common ratio is

   a) $\frac{1}{5}$ b) $\frac{1}{3}$ c) 1 d) 5

3. If $1^2 + 2^2 + ... 10^2 = 385$ then $2^2 + 4^2 + 6^2 + ... 20^2 = ?$

   a) 770 b) 1150 c) 1540 d) 385 x 385

4. If the system $6x - 2y = 3$, $kx - y = 2$ has a unique solution, then

   a) $k = 3$ b) $k \neq 3$ c) $k = 4$ d) $k \neq 4$

5. If $\frac{a^3}{a-b}$ is added with $\frac{b^3}{b-a}$, then the new expression is

   a) $a^2 + ab + b^2$ b) $a^2 - ab + b^2$ c) $a^3 + b^3$ d) $a^3 - b^3$

6. If $A = \begin{pmatrix} 1 & -2 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} -1 \\ 2 \\ 3 \end{pmatrix}$ then $A + B$

   a) $\begin{pmatrix} 0 & 0 & 0 \end{pmatrix}$ b) $\begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$ c) (–14) d) not defined

7. The equation of a straight line passing through the point (2, –7) and parallel to x-axis is

   a) $x = 2$ b) $x = -7$ c) $y = -7$ d) $y = 2$

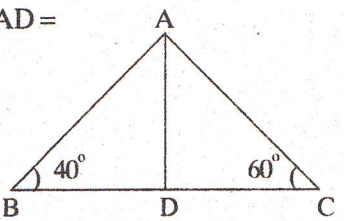
8. The point of intersection of the straight lines $y = 0$ and $x = -4$ is

   a) (0, –4) b) (–4, 0) c) (0, 4) d) (4, 0)

9. In the figure if $\frac{AB}{AC} = \frac{BD}{DC}$, $\angle B = 40^\circ$ and $\angle C = 60^\circ$ then $\angle BAD =$

   a) 30° b) 50°

   c) 80° d) 40°



10. The areas of two similar triangles are 16 cm^2 and 36 cm^2 respectively. If the altitude of the first triangle is 3 cm, then the corresponding altitude of the other triangle is

    a) 6.5 cm b) 6 cm c) 4 cm d) 4.5 cm

11. If $\tan\theta = \frac{a}{x}$, then the value of $\frac{x}{\sqrt{a^2+x^2}} =$

a) $\cos\theta$ b) $\sin\theta$ c) $\text{cosec}\theta$ d) $\sec\theta$

12. $\sec\theta\sqrt{1-\sin^2\theta} = ...$

a) $\cos\theta$ b) 1 c) 0 d) $\sec\theta$

13. The total surface area of a solid right circular cylinder whose radius is half of its height h is equal to

a) $\frac{3}{2}\pi h$ sq.units b) $\frac{2}{3}\pi h^2$ sq.units c) $\frac{3}{2}\pi h^2$ sq.units d) $\frac{2}{3}\pi h$ sq.units

14. Two right circular cones have equal radii. If their slant heights are in the ratio 4 : 3, then their respective curved surface areas are in the ratio.

a) 16 : 9 b) 8 : 6 c) 4 : 3 d) 3 : 4

15. The variance of 10, 10, 10, 10, 10 is

a) 10 b) $\sqrt{10}$ c) 5 d) 0

SECTION - B

10x2=20

*Note : i) **Answer any ten questions.***
*ii) **Answer any nine questions from the first fourteen questions.***
*iii) **Question No.30 is compulsory.***

16. For the given function $F = \{(1, 3), (2, 5), (4, 7), (5, 9), (3, 1)\}$ write the domain and range.

17. Which term of the arithmetic sequence $24, 23\frac{1}{4}, 22\frac{1}{2}, 21\frac{3}{4}, ...$ is 3 ?

18. If the quotient on dividing $x^4 + 10x^3 + 35x^2 + 50x + 29$ by $x + 4$ is $x^3 - ax^2 + bx + 6$ then find a, b and also the remainder.

19. Simplify : $\frac{x^3 - 27}{x^2 - 9}$ into their lowest forms.

20. Construct a 2×3 matrix $A = (a_{ij})$ whose elements are given by $a_{ij} = |2i - 3j|$.

21. Let $A = \begin{pmatrix} 3 & 2 \\ 5 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 8 & -1 \\ 4 & 3 \end{pmatrix}$. Find the matrix C if C = 2A + B.

22. Find the point which divides the line segment joining the points (3, 5) and (8, 10) internally in the ratio 2 : 3.

23. In ΔABC, $DE \| BC$ and $\frac{AD}{DB} = \frac{2}{3}$. If AE = 3.7 cm, find EC.

24. AB and CD are two chords of a circle which intersect each other internally at P. If CP = 4 cm, AP = 8 cm, PB = 2 cm, then find PD.

25. Prove the identity $(\sin^6\theta + \cos^6\theta) = 1 - 3\sin^2\theta\cos^2\theta$.

26. A girl of height 150 cm stands in front of a lamp-post and casts a shadow of length $150\sqrt{3}$ cm on the ground. Find the angle of elevation of the top of the lamp-post.

27. The radii of two right circular cylinders are in the ratio of 3 : 2 and their heights are in the ratio 5 : 3. Find the ratio of their curved surface areas.

28. If the volume of a solid sphere is $7241\frac{1}{7}$ cu.cm, then find its radius. $\left(\text{Take } \pi = \frac{22}{7}\right)$

29. The standard deviation of 20 observations is $\sqrt{5}$. If each observation is multiplied by 2, find the standard deviation and variance of the resulting observations.

30. a) Which term of the arithmetic sequence $24, 23\frac{1}{4}, 22\frac{1}{2}, 21\frac{3}{4}, \ldots\ldots$ is 3 ?

(OR)

b) Find the equation of the straight line whose slope is $\frac{2}{3}$ and passing through (5, –4).

SECTION - C

9x5=45

*Note : i) **Answer any nine questions.***
*ii) **Answer any eight questions from the first fourteen questions.***
*iii) **Question No.45 is compulsory.***

31. A radio station surveyed 190 students to determine the types of music they liked. The survey revealed that 114 liked rock music, 50 liked folk music and 41 liked classical music, 14 liked rock music and folk music, 15 liked rock music and classical music, 11 liked classical music and folk music. 5 liked all the three types of music. Find (i) How many did not like any of the 3 types? (ii) How many liked any two types only? (iii) How many liked folk music but not rock music?

32. A function $f : (-7, 6) \Rightarrow R$ is defined as follows:

$$f(x) = \begin{cases} x^2 + 2x + 1; & -7 \le x < -5 \\ x + 5; & -5 \le x \le 2 \\ x - 1; & 2 < x < 6 \end{cases}$$

Find (i) $2f(-4) + 3f(2)$ (ii) $f(-7) - f(-3)$ (iii) $\frac{4f(-3) + 2f(4)}{f(-6) - 3f(1)}$

33. In an arithmetic series, the sum of first 14 terms is –203 and the sum of the next 11 terms is –572. Find the arithmetic series.

34. Find the sum of first n terms of the series 0.4 + 0.94 + 0.999 + ...

35. Solve $x + \frac{y}{2} = 4$, $\frac{x}{3} + 2y = 5$ equation by elimination method.

36. Find the value of a and b if the following polynomials are perfect squares $x^4 - 4x^3 + 10x^2 - ax + b$.

37. If $A = \begin{pmatrix} 5 & 2 \\ 7 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & -1 \\ -1 & 1 \end{pmatrix}$ verify that $(AB)^T = B^T A^T$.

38. If $A=\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ and $I_2=\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ then show that $A^2-(a+d)A=(bc-ad)I_2$.

39. The vertices of ΔABC are A(1, 2) B(–4, 5) and C(0, 1). Find the slopes of the altitudes of a triangle.

40. Find the equation of the straight line segment whose end points are the point of intersection of the straight lines $2x-3y+4=0$, $x-2y+3=0$ and the midpoint of the line joining the points (3, –2) and (–5, 8).

41. State and prove Tangent Chord theorem.

42. From the top and foot of a 40 m high tower the angles of elevation of the top of a light house are found to be 30^o and 60^o respectively. Find the height of the lighthouse. Also find the distance of the top of the light house from the foot of the tower.

43. A iron right circular cone of diameter 8 cm and height 12 cm is melted and recast into spherical lead shots each of radius 4 mm. How many lead shots can be made?

44. The marks scored by two students A, B in a class are given below.

A	58	51	60	65	66
B	56	87	88	46	43

Who is more consistent?

45. a) Find the GCD of the following polynomials $3x^4+6x^3-12x^2-24x$ and $4x^4+14x^3+8x^2-8x$.

(OR)

b) The total surface area of a solid right circular cylinder is 231 cm^2. Its curved surface area is two thirds of the total surface area. Find the radius and height of the cylinder.

SECTION - D

2x10=20

Note : i) This section contains two questions, each with two alternatives.
ii) Answer both the questions choosing either of the alternatives.

46. a) Draw a circle of diameter 10 cm. From a point P, 13 cm away from its centre, draw the two tangents PA and PB to the circle and measure their lengths.

(OR)

b) Construct a cyclic quadrilateral PQRS such that PQ = 5.5 cm, QR = 4.5 cm $\angle QPR = 45^\circ$ and PS = 3 cm.

47. a) Solve graphically $2x^2+x-6=0$.

(OR)

b) The cost of the milk per litre is Rs.15. Draw the graph for the relation between the quantity and cost. Hence find (i) the proportionality constant. (ii) the cost of 3 litres of milk.

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