

43. If a die is rolled twice, find the probability of getting an even number in the first time or a total of 8.
44. Two unbiased dice are rolled once. Find the probability of getting
i) a sum 8 ii) a doublet iii) a sum greater than 8.
45. a) A bag contains 10 white, 5 black, 3 green and 2 red balls. One ball is drawn at random. Find the probability that the ball drawn is white or black or green.

(OR)

- b) A cylindrical bucket of height 32 cm and radius 18 cm is filled with sand. The bucket is emptied on the ground and a conical heap of sand is formed. If the height of the conical heap is 24 cm, find the radius and slant height of the heap.

IV Answer both the questions choosing either of the alternatives: 2x10=20

46. a) Construct a cyclic quadrilateral PQRS with $PQ = 4$ cm, $\angle P = 100^\circ$, $\angle PQS = 40^\circ$ And $\angle SQR = 70^\circ$

(OR)

- b) Construct a cyclic quadrilateral ABCD where $AB = 6$ cm, $AD = 4.8$ cm, $BD = 8$ cm and $CD = 5.5$ cm.

47. a)

x	1	3	5	7	8
y	2	6	10	14	16

Draw the graph for the above table and hence find.

- i) The value of y is x = 4.
ii) The value of x if y = 12.

(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.

X UNIVERSAL MATRIC HR. SEC. SCHOOL
HALF PORTION - 4 (G)

Time : 2:30hr MATHEMATICS Marks : 100

I Choose the correct answer: 15x1=15

1. If A is of order 3×4 and B is of order 4×3 , then the order of BA is
a) 3×3 b) 4×4 c) 4×3 d) not defined
2. If $A = \begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix}$ and $A + B = O$, then B is
a) $\begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix}$ b) $\begin{bmatrix} -1 & 2 \\ 3 & -4 \end{bmatrix}$ c) $\begin{bmatrix} -1 & -2 \\ -3 & -4 \end{bmatrix}$ d) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
3. Which one of the following is true for any two square matrices A and B of same order?
a) $(AB)^T = A^T B^T$ b) $(A^T B)^T = A^T B^T$
c) $(AB)^T = BA$ d) $(AB)^T = B^T A^T$
4. The square root of $49(x^2 - 2xy + y^2)^2$ is
a) $7|x - y|$ b) $7(x + y)(x - y)$ c) $7(x + y)^2$ d) $7(x - y)^2$
5. A quadratic equation whose one root is 3 is
a) $x^2 - 6x - 5 = 0$ b) $x^2 + 6x - 5 = 0$ c) $x^2 - 5x - 6 = 0$ d) $x^2 - 5x + 6 = 0$
6. Let $b = a + c$. Then the equation $ax^2 + bx + c = 0$ has equal roots, if
a) $a = c$ b) $a = -c$ c) $a = 2c$ d) $a = -2c$
7. The square root of $x^2 + y^2 + z^2 + 2xy + 2yz - 2zx$
a) $|x + y - z|$ b) $|x - y + z|$ c) $|x + y + z|$ d) a) $|x - y - z|$
8. $(1 + \tan^2 \theta) \sin^2 \theta =$
a) $\sin^2 \theta$ b) $\cos^2 \theta$ c) $\tan^2 \theta$ d) $\cot^2 \theta$
9. $\frac{\sec \theta}{\cot \theta + \tan \theta} =$
a) $\cot \theta$ b) $\tan \theta$ c) $\sin \theta$ d) $-\cot \theta$
10. $9 \tan^2 \theta - 9 \sec^2 \theta =$
a) 1 b) 0 c) 9 d) -9
11. Base area of a right circular cylinder is 80 cm^2 . If its height is 5 cm, then the volume is equal to
a) 400 cm^3 b) 16 cm^3 c) 200 cm^3 d) $\frac{400}{3} \text{ cm}^3$
12. The ratios of the respective heights and the respective radii of two cylinders are $1 : 2$ and $2 : 1$
a) $4 : 1$ b) $1 : 4$ c) $2 : 1$ d) $1 : 2$

13. If S is the sample space of a random experiment, then $P(S) =$
 a) 0 b) $\frac{1}{8}$ c) $\frac{1}{2}$ d) 1
14. The perimeter of two similar triangles ΔABC and ΔDEF are 36 cm and 24 cm respectively. If $DE = 10$ cm, then AB is
 a) 12 cm b) 20 cm c) 15 cm d) 18 cm
15. If \emptyset is an impossible event, then $P(\emptyset) =$
 a) 1 b) $\frac{1}{4}$ c) 0 d) $\frac{1}{2}$
- II i) Answer ten Questions. 10x2=20
 ii) Question No.30 is compulsory. Select any 9 questions from the first 14 questions.
16. If $A = \begin{pmatrix} 4 & -2 \\ 5 & -9 \end{pmatrix}$ and $B = \begin{pmatrix} 8 & 2 \\ -1 & -3 \end{pmatrix}$ find $6A - 3B$.
17. If $A = \begin{pmatrix} 1 & 3 \\ 9 & -6 \end{pmatrix}$, then verify $AI = IA = A$, where I is the unit matrix of order 2.
18. Construct a 2×3 matrix $A = [a_{ij}]$ whose elements are given by $a_{ij} = |2i - 3j|$.
19. Find the square root of $121 x^8 y^6 \div 81 x^4 y^8$.
20. Form the quadratic equation whose roots are $7 + \sqrt{3}$ and $7 - \sqrt{3}$.
21. Solve : $3x - \frac{8}{x} = 2$
22. If α and β are the roots $3x^2 - 5x + 2 = 0$ then find the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$.
23. The radius and height of a right circular solid cone are 7 cm and 24 cm respectively. Find its curved surface area and total surface area.
24. Find the volume of the largest right circular cone that can be cut out of a cube whose edge is 14 cm.
25. If the circumference of the base of a solid right circular cylinder is 154 cm and its height is 16 cm, find its curved surface area.
26. Find the angular elevation (angle of elevation from the ground level) of the sun when the length of the shadow of a 30m long pole is $10\sqrt{3}$ m.
27. Prove that $\frac{1}{\sin^2\theta} - \frac{1 - \sin^2\theta}{1 - \cos^2\theta} = 1$
28. A die is thrown twice. Find the probability of getting a total of 9.
29. An integer is chosen from the first twenty natural numbers. What is the probability that it is a prime number

30. a) Find the volume of a sphere – shaped metallic shot- put having diameter of 8.4 cm. ($\pi = \frac{22}{7}$)

(OR)

- b) A card is drawn at random from a well – shuffled deck of 52 cards. Find the probability that it will be a spade or a king.

- III i) Answer nine questions. 9x5=45
 ii) Question No.45 is compulsory. Select any 8 questions from the first 14 questions.

31. If $A = \begin{pmatrix} 1 & -1 \\ 2 & 3 \end{pmatrix}$ then show that $A^2 - 4A + 5I_2 = 0$.
32. If $A = \begin{pmatrix} 3 & 2 \\ -1 & 4 \end{pmatrix}$, $B = \begin{pmatrix} -2 & 5 \\ 6 & 7 \end{pmatrix}$, and $c = \begin{pmatrix} 1 & 1 \\ -5 & 3 \end{pmatrix}$, verify that $A(B+C) = AB+AC$.
33. If $x^4 - 4x^3 + 10x^2 - ax + b$ is a perfect square, then find the values of a and b.
34. If α and β are the roots of the equation $3x^2 - 6x + 4 = 0$, find the value of $\alpha^2 + \beta^2$.
35. The base of a triangle is 4 cm longer than its altitude. If the area of the triangle is 48 sq.cm. then find its base and altitude.
36. A tent is in the shape of a right circular cylinder surmounted by a cone. The total height and the diameter of the base are 13.5 m and 28 m. If the height of the cylindrical portion is 3m, find the total surface area of the tent.
37. Using clay, a student made a right circular cone of height 48 cm and base radius 12 cm. Another student reshapes it in the form of a sphere. Find the radius of the sphere.
38. If $\tan \theta + \sin \theta = m$, $\tan \theta - \sin \theta = n$ and $m \neq n$, then show that $m^2 - n^2 = 4 \sqrt{mn}$
39. A jet fighter at a height of 3000 m from the ground, passes directly over another jet fighter at an instance when their angles of elevation from the same observation point are 60° and 45° respectively. Find the distance of the first jet fighter from the second jet at the instant.
40. Prove that $(\sin \theta + \operatorname{cosec} \theta)^2 + (\cos \theta + \sec \theta)^2 = 7 + \tan^2 \theta + \cot^2 \theta$.
41. If all sides of a parallelogram touch a circle, show that the parallelogram is a rhombus.
42. A point O in the interior of a rectangle ABCD is joined to each of the vertices A, B, C and D. Prove that $OA^2 + OC^2 = OB^2 + OD^2$.