

Subject- Mathematics (Standard)

Time Allowed: 3 Hrs.

Maximum Marks : 80

General Instructions:

1. This Question Paper has 5 Sections A-E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.



SECTION A

1. If $p = x^2y^3z^k$ and $q = x^my^2z^2$ and $\text{hcf}(p,q) = xy^2z$ then $k + m =$
a) 1 b) 2 c) 3 d) 4
2. A polynomial of two degree touches x axis at -3, then that polynomial can be
a) $(x-3)^2$ b) x^2+6x+9 c) cannot be deduced d) none of these
3. The probability that a man born will die is
a) 0 b) 0.5 c) 1 d) -0.2
4. If $x =$ mean of first 10 natural numbers and $M =$ median of first 10 natural numbers then $x/M =$
a) 1 b) 2 c) 3 d) none of these
5. Find the radius of circle having center $C(2,-3)$ and any point on circle as $(1,4)$
a) $2\sqrt{5}$ b) $5\sqrt{2}$ c) 7 d) 22
6. If $\sin A + \cos A = \cos A$, then $\cos A =$
a) 0 b) 1 c) $\frac{1}{2}$ d) can be any number
7. If equation $ax^2 + bx + c = 0$ has equal and real roots then
a) $\sqrt{ac} = \frac{|b|}{2}$ b) $b = 0$ c) $b^2 = ac$ d) none of these
8. Consider the following frequency distribution of the heights of 60 students of a class

Height (in cm)	150-155	155-160	160-165	165-170	170-175	175-180
	5	0	5	0	5	0
No of students	15	13	10	8	9	5

The upper limit of the median class in the given data is

- (a) 165 (b) 155 (c) 160 (d) 170
9. The following lines are coincident for what values of p

$$3x - y - 5 = 0$$

$$6x - 2y - p = 0$$

- (a) all real values except 10 (b) 10 (c) $\frac{5}{2}$ (d) $\frac{1}{2}$
10. The perimeters of two similar triangles $\triangle ABC$ and $\triangle PQR$ are 35cm and 45cm respectively, then the ratio of the areas of the two triangles is _____.
- a) 5 : 7 b) 49 : 81 c) 25 : 81 d) 5 : 9
11. The radii and heights of a cylinder and a cone are equal. Then, the volume of the cylinder = \times the volume of the cone.
- (A) 1 (B) 2 (C) 3 (D) $\frac{1}{3}$
12. A running track is in the shape of a circular ring. The difference of its outer circumference and inner circumference is 44 m. Then, the width of the track is m.
- (A) 3.5 (B) 7 (C) 11 (D) 22
13. While calculating the area of a circle, its radius was taken to be 6 cm instead of 5 cm. The calculated area is % more than the actual area.
- (A) 20 (B) 24 (C) 44 (D) 40
14. The tops of two poles of height 18 m and 12 m are connected by a wire. If the wire makes an angle of measure 30 with horizontal, then the length of the wire is
- (A) 12 m (B) 10 m (C) 8 m (D) 4 m
15. If A (0, 0), B (2, 0), C (2, 2) and D (0, 2), then ABCD is a.....
- (A) square (B) rectangle (C) rhombus (D) trapezium
16. The length of a longest stick that can be placed in a cuboidal box of length 4 unit, breadth 3 units and height 12 units is
- (A) 5 (B) $\sqrt{160}$ (C) $\sqrt{153}$ (D) 13
17. In the A.P., 5, 7, 9, 11, 13, 15, ... the sixth term which is prime is
- (A) 13 (B) 19 (C) 23 (D) 15
18. The speed of a motor-boat in still water is x km/hr and the speed of the current of the river be 5 km/hr. Where $x > 5$, then time taken to cover the distance of y km in upstream is.....
- (A) $\frac{x+5}{y}$ (B) $\frac{y}{x+5}$ (C) $\frac{y}{x-5}$ (D) $\frac{x-5}{y}$

DIRECTION: In the question number 19 and 20, a statement of **assertion (A)** is followed by a statement of **Reason (R)**.

Choose the correct option

19. **Statement A (Assertion):** For an AP $a_{n-1} = a + (n-1)d$

Statement R(Reason) : If the difference between two consecutive terms is same then the sequence is an AP

- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)
- (b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)
- (c) Assertion (A) is true but reason (R) is false.
- (d) Assertion (A) is false but reason (R) is true.

20. **Statement A (Assertion):** Mean, median and mode are three measures of central tendency.

Statement R(Reason) : Mode = 3Median – 2Mean.



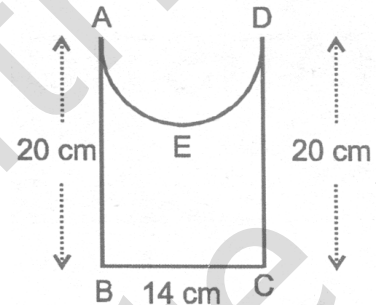
- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)
- (b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)
- (c) Assertion (A) is true but reason (R) is false.
- (d) Assertion (A) is false but reason (R) is true.

SECTION B

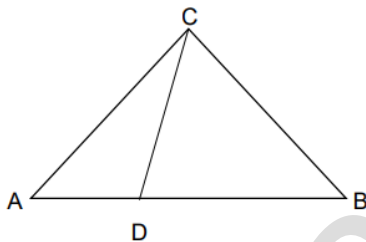
- 21. Two tangents making an angle of 120° with each other, are drawn to a circle of radius 6 cm. Show that the length of each tangent is $2\sqrt{3}$ cm.
- 22. Draw graph of the equations $2x + 3y = 12$, $x - y = 1$. Find the co-ordinate of the vertices of the triangle formed by two straight lines and y-axis.
- 23. Find the perimeter of figure, where AED is a semi-circle and ABCD is a rectangle.

OR

The angle between two radii of a circle is 90° and radius is 8.4 cm. find the length of corresponding arc of the circle.



- 24. In the figure, if $\angle ACB = \angle CDA$, $AC = 6$ cm and $AD = 3$ cm, then find the length of AB.



- 25. If $\sin\theta + \cos\theta = \sqrt{2}\cos\theta$, find value of $\tan\theta$.

OR

If $\sin(A+B) = 1$ and $\cos(A-B) = \sqrt{3}/2$ where A and B are acute angles, find $3A + 2B$.

SECTION C

- 26. Rahul had some chocolates, and he divided them into two lots A and B. He sold the first lot at the rate of ₹2 for 3 chocolates and the second lot at the rate of ₹1 per chocolate, and got a total of ₹400. If he had sold the first lot at the rate of ₹1 per chocolate, and the second lot at the rate of ₹4 for 5 chocolates, his total collection would have been ₹460. Find the total number of chocolates he had .

OR

At a certain time in a deer park, the number of heads and the number of legs of deer and human visitors were counted and it was found there were 39 heads & 132 legs. Find the number of deer and human visitors in the park.

- 27. A right angle triangle ΔABC right angled at B circumscribes a circle such that the sides of the triangle touches the circle. If $AB = 24$ cm , $BC = 10$ cm , then find the radius of the circle.

OR

A circle touches all the sides of quadrilateral ABCD. Prove that $AB + CD = AD + BC$.

- 28. If θ is measure of an acute angle and $q \sin \theta = p \cos \theta$, then evaluate the following:

$$\frac{p \sin \theta + q \cos \theta}{p \sin \theta - q \cos \theta}$$

29. If $P(A) - P(\bar{A}) = 0.3$, then find $P(\bar{A})$.

30. Prove that $\sqrt{2} + \sqrt{3}$ is irrational.

31. If one zero of the $p(x) = (k - 1)x^2 - 10x + 3$ is the reciprocal of the other, then find value of k and hence find both the zeros.

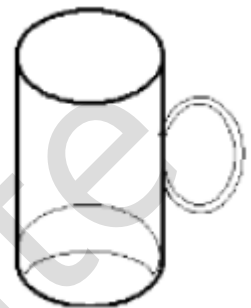
SECTION D

32. Govind is making wooden toys for small children of his village. Each wooden toy is in the form of hemisphere surmounted by a cone of same radius. The radius of hemisphere is 3.5 cm and total wood used in making

each toy is $166\frac{5}{6}$ cm³. Find the height of the toy. Also, find the cost of painting the hemispherical part of the toy at the rate of Rs. 10 per cm²

OR

Two dairy owners A and B sell flavored milk filled to capacity in mugs of negligible thickness, which are cylindrical in shape with a raised hemispherical bottom. The mugs are 14 cm high and have a diameter of 7 cm as shown in the given figure. Both A and B sell flavored milk at the rate of Rs 80 per litre. The dairy owner A uses the formula $\pi r^2 h$ to find the volume of milk in the mug and charges Rs 43.12 for it. The dairy owner B is of the view that the price of the actual quantity of milk should be charged. What according to him should be the price one mug of milk ?



33. Prove that if a line is drawn parallel to one side of a triangle intersecting the other two sides in distinct points, then the other two sides are divided in the same ratio.

Using the above theorem prove that a line through the point of intersection of the diagonals and parallel to the base of the trapezium divides the non parallel sides in the same ratio.

34. The hypotenuse of a right angled triangle is 6m more than twice the shortest side. If the third side is 2m less than the hypotenuse, find the sides of the triangle.

OR

If the roots of the equation $a(b - c)x^2 + b(c - a)x + c(a - b) = 0$ are equal, show that $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in A.P.

35. In the retail market fruit vendors were selling apples kept in packing boxes. These boxes contained varying number of apples. If the median number of apples in a box was 42 and the total number of boxes was 550, then find the missing frequencies f_1 and f_2 in the following distribution table:

Number of apples in a box	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
Number of boxes	20	67	f_1	f_2	125	35	25

SECTION E

CASE STUDY BASED



36. A thief runs away from a Police Station with a uniform speed 100m/minutes. After one minute a Policeman runs behind the thief to catch him. He goes at a speed of 100m/minute in first minute and increases the speed 10m/minute on each succeeding minute.

- i) Which mathematical concept is used to solve the above problem.?
- ii) After how many minutes the Policeman catches the thief ?
- iii) What is the total distance travelled by the Policeman ?



[1]
[1]
[2]

37. Figure below shows a circular play ground.



The centre of the circle is $(2a + 3, 2a - 1)$. If one end of a diameter is $(11, 9)$ and diameter is of 20 units then:

- i) Find value of a. [2]
- ii) What are the coordinates of centre of ground? [1]
- iii) Find coordinates of other end of diameter. [1]

38. A straight highway leads to the foot of a tower. A man standing on the top of the tower observes a car at an angle of depression with measure 30° . The car is approaching the foot of the tower with a uniform speed. Six seconds later, the angle of depression of the car has measure 60° . Let uniform speed of car be v m/s.

- i) Draw a neat figure to explain the above condition. [1]
- ii) Find distance travelled by car in six seconds in terms of v . [1]
- iii) Find the further time taken by the car to reach the foot of the tower. [2]

