GYAN BHARATI SCHOOL

First Pre Board Examination (2024-25)
Mathematics (041)
Class- S2

Time: 3 Hr. Marks: 80

General Instructions:

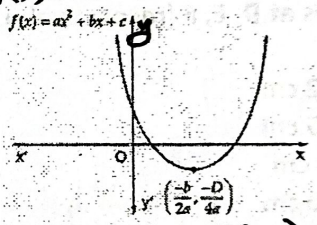
1. This Question Paper has 38 questions, 5 Sections A, B, C, D and E and total 6 pages
2. Section A has 20 MCQs carrying 1 mark each including 2 assertion- reason questions.
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions 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, 2 and 1 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Questions of 5 marks, 2 Questions of 3 marks and 2 Questions of 2 marks have been provided. An internal choice has been provided in the 2 marks questions of Section E

Section A

1 (HCF × LCM) for the numbers 30 and 70 is: (1)

a) 21
b) 70
c) 2100
d) 210

2 Figure show the graph of the polynomial $f(x) = ax^2 + bx + c$ for which (1)



a) $a > 0, b < 0$ and $c > 0$
b) $a < 0, b < 0$ and $c < 0$
c) $a < 0, b > 0$ and $c > 0$
d) $a > 0, b > 0$ and $c < 0$

3 The pair of equations $x + 2y + 5 = 0$ and $-3x - 6y + 1 = 0$ have (1)

a) a unique solution
b) infinitely many solutions
c) no solution
d) exactly two solutions

4 In the Maths Olympiad of 2020 at Animal Planet, two representatives from the donkey's side, while solving a quadratic equation, committed the following mistakes. (1)

(i) One of them made a mistake in the constant term and got the roots as 5 and 9.
(ii) Another one committed an error in the coefficient of x and he got the roots as 12 and 4. But in the meantime, they realised that they are wrong and they managed to get it right jointly, the quadratic equation is

a) $2x^2 + 7x - 24 = 0$
b) $x^2 + 4x + 14 = 0$
c) $3x^2 - 17x + 52 = 0$.
d) $x^2 - 14x + 48 = 0$

5 What is the common difference of an AP in which $a_{18} - a_{14} = 32$? (1)

a) -8
b) 4
c) -4
d) 8

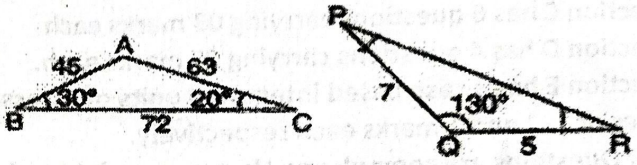
6 ABCD is a rectangle whose three vertices are B (4,0), C (4,3) and D (0,3). The length of one of its diagonals is

a) 5
b) 3
c) 4
d) 25

7 In what ratio, does x-axis divide the line segment joining the points A(3, 6) and B(-12, -3)? (1)

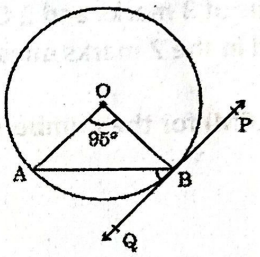
a) 2: 1
b) 1: 2
c) 4: 1
d) 1: 4

8 In the figures find the measures of ∠P and ∠R (1)



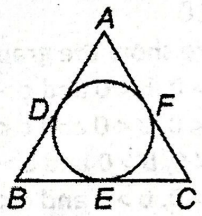
a) 20°, 30°.
b) 50°, 40°.
c) 30°, 20°.
d) 40°, 50°

9 In the given figure, PQ is tangent to the circle centred at O. If ∠AOB = 95°, then the measure of ∠ABQ will be (1)



a) 85°
b) 47.5°
c) 95°
d) 42.5°

10 A circle inscribed in △ ABC having AB = 10 cm, BC = 12 cm, CA = 18 cm touching sides at D, E, F (respectively). Then AD + BE + CF = _____. (1)



a) 22 cm
b) 25 cm
c)18 cm
d) 20 cm

11 $1+\frac{cot^2A}{1+cosecA}=$ (1)

a) sin A
b) sec A
c) cosec A
d) tan A

12 If $Cos\ A = \frac{4}{5}$ then tan A = (1)

a) $\frac{3}{4}$
b) $\frac{4}{3}$
c) $\frac{3}{5}$
d) $\frac{5}{3}$

13 A ladder makes an angle of 60° with the ground when placed against a wall. If the foot of the ladder is 2 m away from the wall, then the length of the ladder (in metres) is (1)

a) $2\sqrt{2}$
b) $4\sqrt{3}$
c) 4
d) $4/\sqrt{3}$

14 In a circle of radius 14 cm, an arc subtends an angle of 120^0 at the centre. If $\sqrt{3} = 1.73$ then area of segment of the circle is (1)

a) 124.63 cm^2

b) 130.57 cm^2

c) 120.56 cm^2

d) 118.24 cm^2

15 If a pendulum swings through an angle of 30^0 and describes an arc 8.8 cm in length, then the length of the pendulum is (1)

a) 8.8 cm

b) 17 cm

c) 15.8 cm

d) 16.8 cm

16 A die is thrown once. The probability of getting an even number is (1)

a) $\frac{1}{3}$

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

c) $\frac{5}{6}$

d) $\frac{1}{6}$

17 3 rotten eggs are mixed with 12 good ones. One egg is chosen at random. The probability of choosing a rotten egg is (1)

a) $\frac{1}{15}$

b) $\frac{1}{5}$

c) $\frac{2}{5}$

d) $\frac{4}{5}$

18 The distribution below gives the marks obtained by 80 students on a test: (1)

Marks	Less than10	Less than20	Less than30	Less than40	Less than50	Less than60
Number of students	3	12	27	57	75	80

The modal class of this distribution is:

a) 30- 40

b) 10- 20

c) 20- 30

d) 50- 60

19 Assertion(A): A piece of cloth is required to completely cover a solid object. The solid object is composed of a hemisphere and a cone surmounted on it. If the common radius is 7 m and height of the cone is 1 m, 463.39 cm^2 is the area of cloth required. (1)

Reason(R): Surface area of hemisphere = 2 r^2.

a) Both (A) and (R) are true and (R) is the correct explanation for (A).

b) Both (A) and (R) are true and (R) is not the correct explanation for (A).

c) (A) is true but (R) is false.

d) (A) is false but (R) is true.

20 Assertion(A): Sum of first n terms in an A.P. is given by the formula: Sn = 2n [2a + (n - 1)d] (1)

Reason(R): Sum of first 15 terms of 2, 5 , 8 ... is 345.

a) Both (A) and (R) are true and (R) is the correct explanation for (A).

b) Both (A) and (R) are true and (R) is not the correct explanation for (A).

c) (A) is true but (R) is false.

d) (A) is false but (R) is true.

Section B

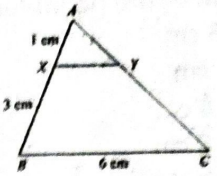
21 Find the length of the arc of a circle of diameter 42 cm which subtends an angle of 60° at the centre. (2)

OR

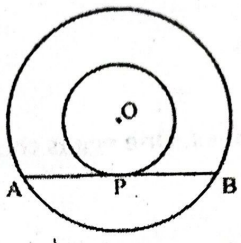
A horse is tethered to one corner of a rectangular field of dimensions 70 m × 52 m, by a rope of length 21 m. How much area of the field can it graze?

22 Find the largest number which divides 320 and 457 leaving remainder 5 and 7 respectively. (2)

23 In the given figure XY||BC. Find the length of XY. (2)



24 Two concentric circles with centre O are of radii 3 cm and 5 cm. Find the length of chord AB of the larger circle which touches the smaller circle at P. (2)



25 Show that: $\tan^4\theta + \tan^2\theta = \sec^4 - \theta \sec^2\theta$ for $90° \leq \theta \geq 0°$ (2)

OR

Prove that: $\frac{tan\theta}{1-cot\theta} + \frac{cot\theta}{1-tan\theta} = 1 + tan\theta + cot\theta$ = 1 + tan θ + cot θ

Section C

26 Prove that $3 + \sqrt{5}$ is an irrational number. (3)

27 If α and β are the zeros of the Polynomial $f(x) = 6x^2 + x - 2$, then find the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$. (3)

28 A two-digit number is 4 times the sum of its digits. If 18 is added to the number, the digits are reversed. Find the number. (3)

OR

A plane left 30 minutes late than its scheduled time and in order to reach the destination 1500 km away in time, it had to increase its speed by 100 km/h from the usual speed. Find its usual speed.

29 The percentage of marks obtained by 100 students in an examination are given below: (3)

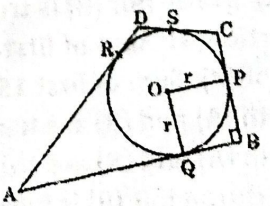
Marks	30- 35	35- 40	40- 45	45- 50	50- 55	55- 60	60- 65
Frequency	14	16	18	23	18	8	3

Determine the median percentage of marks.

(3)

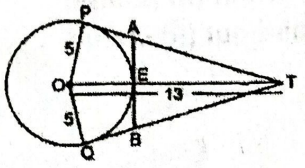
30 Prove that: $\frac{tan\theta+sec\theta-1}{tan\theta-sec\theta+1} = \frac{1+sin\theta}{cos\theta}$

31 In the given figure, a circle is inscribed in a quadrilateral ABCD in which B = 90°. If AD = 17 cm, AB = 20 cm and DS = 3 cm, then find the radius of the circle. (3)



OR

In figure, O is the centre of a circle of radius 5 cm. T is a point such that OT = 13 cm and OT intersects circle at E. If AB is a tangent to the circle at E, find the length of AB. where TP and TQ are two tangents to the circle.



32 Solve: $\frac{x-1}{2x+1} + \frac{2x+1}{x-1} = 2, x \neq -1/2, 1$ (5)

Section D

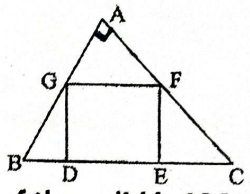
OR

₹ 9000 were divided equally among a certain number of persons. Had there been 20 more persons, each would have got ₹ 160 less. Find the original number of persons.

33 In Fig., DEFG is a square in a triangle ABC right angled at A. Prove that (5)

i. △ AGF ~ △DBG

ii. △ AGF ~△ EFC



34 A solid is composed of a cylinder with hemispherical ends. If the whole length of the solid is 104 cm and the radius of each of the hemispherical ends is 7 cm, find the cost of polishing its surface at the rate of ₹10 per dm^2. (5)

OR

A solid is in the form of a cylinder with hemispherical ends. The total height of the solid is 19 cm and the diameter of the cylinder is 7 cm. Find the volume and total surface area of the solid (Use $\pi = 22/7$)

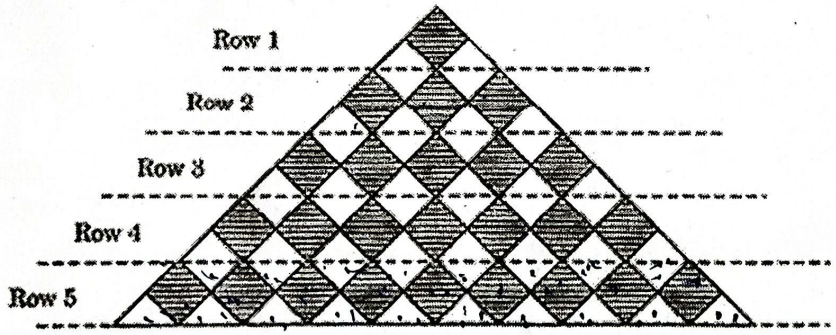
35 Find the mean from the following frequency distribution of marks at a test in statistics: (5)

Marks	5	10	15	20	25	30	35	40	45	50
No. of Students	15	50	80	76	72	45	39	9	8	6

Section E

Case Based Questions:

36 A fashion designer is designing a fabric pattern. In each row, there are some shaded squares and unshaded triangles.



(a) Wrie an A.P. for the number of squares in each row. (1)

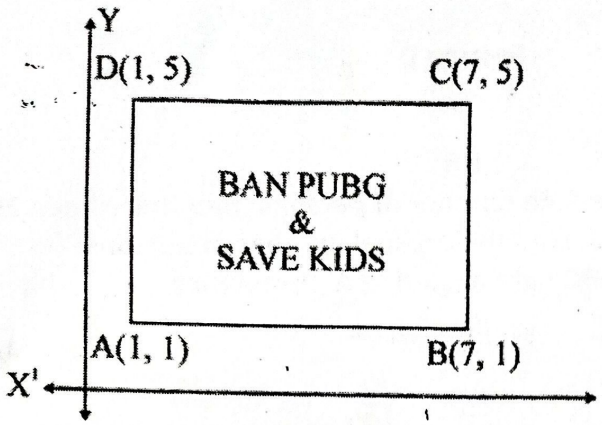
(b) Write the formula for finding the number of squares in n^{th} row. Hence find a_{15}. (2)

OR

(b) Write a formula for finding total number of triangles in n number of rows. Hence, find S_{10}.

(c) If each shaded square is of side 2 cm, then find the shaded area when 15 rows have been designed. (1)

37 Use of mobile screen for long hours makes your eye sight weak and give you headaches. Children who are addicted to play "PUBG" can get easily stressed out. To raise social awareness about ill effects of playing PUBG, a school decided to start 'BAN PUBG' campaign, in which students are asked to prepare campaign board in the shape of a rectangle. One such campaign board made by class X student of the school is shown in the figure:



(a) Find the coordinates of the point of intersection of diagonals AC and BD. (1)

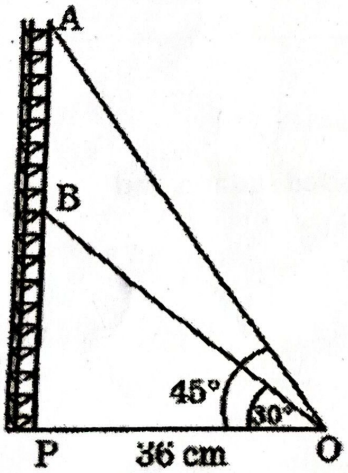
(b) Find the length of the diagonal AC. (2)

OR

(b) Find the ratio of the length of side AB to the length of the diagonal AC.

(c) Find the area of the campaign Board ABCD. (1)

38 Radio towers are used for transmitting a range of communication services including radio and television. The tower will either act as an antenna itself or support one or more antennas on its structure. On a similar concept, a radio station tower was built in two Sections A and B. Tower is supported by wires from a point O. Distance between the base of the tower and point O is 36 cm. From point O, the angle of elevation of the top of the Section B is 30° and the angle of elevation of the top of Section A is 45°.



(a) Find the length of the wire from the point O to the top of Section B. (1)

(b) Find the distance AB (2)

OR

(b) Find the height of the Section A from the base of the tower.

(c) Find the area of △OPB. (1)

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