SSC PUBLIC EXAMINATION - 2021

MODEL PAPER-1

MATHEMATICS

Time : 2.45 hours **Marks : 100**

SECTION – I

Answer all questions. Each question carries 1 mark. **12 × 1 = 12**

1. The value of $\log_{343}^{49}$

   A) $\frac{3}{2}$ B) $\frac{2}{3}$ C) 3 D) 2

2. Write the set builder form of a rational number.

3. Zero value of $5x + 1$ is .....

4. Define Arithmetic progressin.

5. $x = \frac{1}{2}$ is a root of $2x^2 + 3x - 1 = 0$ is it true/false ? .....

6. The value of $\sin 45° + \cos 45°$

   A) $\sqrt{2}$ B) $\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}$ C) $\frac{2}{\sqrt{2}}$ D) All

7. Match the following properly

1. $1 + \tan^2\theta$	a) $\cot\theta$
2. $1 - \cos^2\theta$	b) $\sec^2\theta$
3. $\frac{\cos\theta}{\sin\theta}$	c) $\sin^2\theta$

   A) 1 – a, 2–b, 3–c B) 1–b, 2–c, 3–a C) 1–b, 2–a, 3–c D) 1–c, 2–a, 3–b

8. If a dice is thrown once the probability of getting a number less than 3 and greater than 2.

   A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) 0 D) 1

9. In A.M = $a + \frac{\Sigma f_i u_i}{\Sigma f_i} \times h$. Here 'h' represents .....

10. TSA of Hemisphere is .....

11. Match the following properly

1. 10^{th} term of – 0.1, – 0.2, – 03.	a) 0
2. No.of tangents to a circle from a Point P lies inside the circle	b) 1
3. cos 0°	c) –1

A) 1 – a, 2–b, 3–c B) 1–b, 2–a, 3–c C) 1–c, 2–b, 3–a D) 1–c, 2–a, 3–b

12. Draw a cicle and two lines parallel to a given line such that one is a tangent and the other a secant to the circle.

SECTION – II

Answer all questions. Each question carries 2 marks. **8 × 2 = 16**

13. A = {2, 3, 4, 5, 6}, B = {3, 6, 9, 12} then find A Δ B
14. Find a quadratic polynomial whose zeroes are – 2 and – 3.
15. Find the solution for equation 2 (x + 3) = 18
16. Check whether – 3, – 2, – 1, 0, ... are in A.P. write its common difference.
17. If the distance between the two points (x, 7) and (1, 15) is 10 find the value of x.
18. Find the median of 20, 27, 24, 18, 28, 30, 25, 26.
19. Two coins are tossed simultaneously, find the probability of getting no head ?
20. A large balloon has been tied with a rope and it is floating in the air. A person has observed the balloon from the top of the building at an angle of elevation of θ_1, and foot of the rope at an angle of depression of θ_2. The height of the building is h feet. Draw the diagram for this date.

SECTION – III

Answer all the questions. Each question carries 4 marks. **8 × 4 = 32**

21. Solve $3^x = 5^{x-2}$
22. Pardhu's father is 25 years older than him. The produtof their ages 3 years from now will be 350. Represent the above situation in the form of a quadratic equation.
23. If P = {x/x is a letter in the word CORONA}
    Q = {x/x is a letter in the word SANITIZER}
    the find P ∪ Q and P ∩ Q
24. What i the quadratice polynomial whose sum of zeroes is $-\frac{3}{2}$ and product of zeroes is – 1.
25. Check whether (5, – 2), (6, 4) and (7, – 2) are the vertices of an Isosceles triangle.
26. Find the mode of the given data.

Hours	0–20	20–40	40–60	60–80	80–100	100–120
Frequency	10	35	52	61	38	29

27. If $\tan 2A = \cot (A - 18°)$, where 2A is an acute angle find the value of A.

28. a) Can $\frac{7}{2}$ be the probability of an event ? Explain.

b) A letter is chosen from the word 'SOCIAL DISTANCE' what is the probability that it is a vowel.

SECTION – IV

Note : Answer all questions. Each question carries 8 marks.
Internal choice is there. **5 × 8 = 40**

29.a) If A = {3, 6, 9, 12, 15, 18, 21}, B = {4, 8, 12, 16, 20}, C = {5, 10, 15, 20}, D = {2, 4, 8, 10, 12] then find
i) $A \cap B$ ii) $B \cup C$ iii) C – D iv) A – D

(Or)

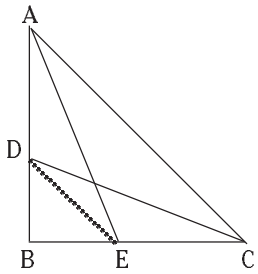
b) If $x^2 + y^2 = 2xy$ thens how that $2 \log (x + y) = 3 \log 3 + \log x + \log y$

30.a) If $\sec \theta + \tan \theta = P$ then product that $\sin \theta = \frac{P^2 - 1}{P^2 + 1}$

(Or)

b) A chord of a circle of radius 6 cm is making an angle 60° at the centre. Find the length of the chord.

31.a) ABC is a right triangle right angled at B.
Let D and E be any points on AB and BC
respectively. Prove that $AE^2 + CD^2 = AC^2 + DE^2$



(Or)

b) Check whether the following are quadratic equations ?
i) $(x + 1)^2 = 2(x - 3)$ ii) $(x - 2)(x + 1) = (x - 1)(x + 3)$

32.a) Find the mean of the date in Step deviation method.

Female Teachers Percent	15–25	25–35	35–45	45–55	55–65	65–75	75–85
No.of Stages	6	11	7	4	4	2	1

(Or)

b) Srikanth removed all Jacks and aces from the pack of 52 cards.IN these well shuffled cards find the probability of the following.
i) get a black queen ii) a red card iii) a spade card iv) a face card

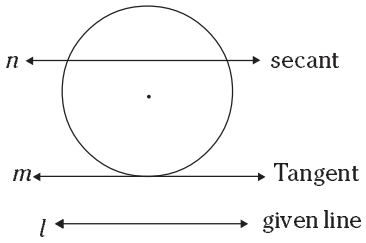
33.a) Draw the graph of the given polynomial $x^2 - 6x + 9$ and find its zero.

(Or)

b) Construct a tangent to a circle of radius 4 cm from on the concentric circle of radius 6 cm and measure its length. Also verify the measurement by actual calculation.

ANSWERS

SECTION – I

1. B
2. $\{x/x \in p/q, \text{where } p, q \in Z \text{ and } q \neq 0\}$
3. $-\frac{1}{5}$
4. An arithmetic progression is a list of numbers in which each term is obtained by adding a fixed number to the term except the first term.
5. False
6. D
7. B
8. C
9. length of the class
10. $3\pi r^2$
11. D
12. 

13. $A = \{2, 3, 4, 5, 6\}, B = \{3, 6, 9, 12\}$

    $A \Delta B = (A \cup B) - (A \cap B)$

    $A \cup B = \{2, 3, 4, 5, 6\} \cup \{3, 6, 9, 12\} = \{2, 3, 4, 5, 6, 9, 12\}$

    $A \cap B = \{2, 3, 4, 5, 6, 9, 12\} - \{3, 6\} = \{2, 4, 5, 9, 12\}$
14. Zeroes are $\alpha = -2, \beta = -3$

    $\alpha + \beta = -2 + (-3) = -5$

    $\alpha.\beta = -2 \times -3 = 6$

    $x^2 - (\alpha + \beta)x + \alpha\beta \Rightarrow x^2 - (-5)x + 6 = x^2 + 5x + 6$
15. $2(x + 3) = 18$

    $2x + 6 = 18$

    $2x = 18 - 6 = 12$

    $2x = 12 \Rightarrow x = \frac{12}{2} = 6$

16. $-3, -2, -1, 0$ .....

$d = a_2 - a_1 = -2 - (-3) = -2 + 3 = 1$

$= a_3 - a_2 = -1 - (-2) = -1 + 2 = 1$

Common difference is constant and it is 1

$\therefore -3, -2, -1, 0$ ..... lies in A.P.

17. det A (x, 7), B (1, 15) be the two given points.

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$AB = \sqrt{(1-x)^2 + (15-7)^2} = 10$

Squaring on both sides,

$(1-x)^2 + 8^2 = 10^2$

$(1-x)^2 = 100 - 64 = 36 = 6^2$

$(1-x)^2 = 6^2 \Rightarrow 1 - x = 6 \Rightarrow x = -5$

18. Arrange the date in ascending order

18, 20, 24, 25, 26, 27, 28, 30

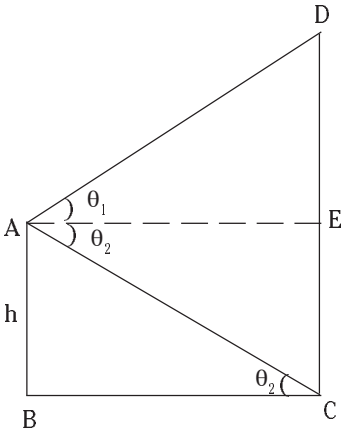
$\text{median} = \frac{25+26}{2} = 25.5$

19. If two coins are tossed simultaneously

Sample space is HH, HT, TH, TT

$\therefore$ P (getting o head) $= \frac{\text{No.of favourable out comes}}{\text{No.of Total possible out comes}} = \frac{1}{4}$

20.



AB = h = height of the building

θ_1 = angle of elevation

θ_2 = angleof depression

SECTION – III

21. $3^x = 5^{x-2}$ Taking 'long' on both sides.

$\log 3^x = \log 5^{x-2}$

$x \log 3 = (x-2) \log 5$

$x \log 3 = x \log 5 - 2 \log 5$

$x \log 5 - x \log 3 = 2 \log 5$

$x (\log 5 - \log 3) = 2 \log 5$

$\therefore x = \dfrac{2 \log 5}{\log 5 - \log 3}$

22. Let the present age of Pardhu is x years.

his father age is (x + 25) years

Three years from now, Pardhu's age = x + 3

father's age = (x + 25) + 3 = (x + 28)

By the given condition we have (x + 3) (x + 28) = 350

$x^2 + 28x + 3x + 84 = 350$

$x^2 + 31x + 84 - 350 = 0$

$\Rightarrow x^2 + 31x - 266 = 0$

23. P = {C, O, R, N, A}

Q = {S, A, N, I, T, Z, E, R}

$P \cup Q$ = {C, O, R, N, A} $\cup$ {S, A, N, I, T, Z, E, R}

= {C, O, R, N, A, S, I, T, Z, E}

$P \cap Q$ = {C, O, R, N, A} {S, A, N, I, T, Z, E, R}

= {A, R, N}

24. Sum of zeroes = $-\dfrac{3}{2} = \alpha + \beta$

Product of zeroes = $-1 = \alpha.\beta$

$K [x^2 - (\alpha + \beta)x + \alpha\beta]$

$= K \left[x^2 - \left(-\dfrac{3}{2} \right) x - 1 \right]$ if K = 2

Quadratic polynomial is $2x^2$ 3x – 2

25. Let A (5, – 2), B (6, 4), C (7, – 2)

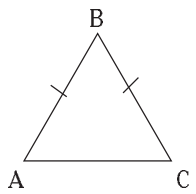
$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{(6-5)^2 + (4+2)^2} = \sqrt{1^2 + 6^2} = \sqrt{1+36} = \sqrt{37}$

$BC = \sqrt{(7-6)^2 + (-2-4)^2} = \sqrt{(1)^2 + (-6)^2} = \sqrt{1+36} = \sqrt{37}$

$AC = \sqrt{(7-5)^2 + (-2+2)^2} = \sqrt{2^2 + 0^2} = \sqrt{4} = 2$

AB = BC = $\sqrt{37}$ units

$\therefore \Delta ABC$ is an Isosceles Triangle.



26.

C.I.	fr
0–20	10
20–40	35
40–60	52
60–80	61
80–100	38
100–120	29

Maximum class frequency is 61

Model class is 60–80

Lower boundary $l = 60$, Class size h = 20

$f_1 = 61,\ f_0 = 52,\ f_2 = 38$

$$\text{Mode} = l + \left[\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right] \times h$$

$$\text{Mode} = 60 + \left[\frac{61 - 52}{2 \times 61 - 52 - 38}\right] \times 20$$

$$= 60 + \left[\frac{9}{122 - 90}\right] \times 20 = 60 + \frac{180}{32} = 60 + 5.625$$

$\therefore$ Mode = 65.625

27. $\tan 2A = \cot (A - 18°)$

$\cot (90 - 2A) = A - 18$

i.e., $90 - 2A = A - 18$

$$90 + 18 = A + 2A \Rightarrow 3A = 108 \Rightarrow A = \frac{108}{3} = 36$$

$\therefore A = 36°$

28. a) No, because the value of probability is always lies in between 0 and 1. But $\frac{7}{2} > 1$

b) Social Distance

No. of letters = 14

No. of vowels = 6

$$P(E) = \frac{\text{No.of favourable out comes}}{\text{No.of Total posible out comes}}$$

$$= \frac{6}{14}$$

$$= \frac{3}{7}$$

SECTION – IV

29.a) $A = \{3, 6, 9, 12, 15, 18, 21\}$, $B = \{4, 8, 12, 16, 20\}$,

$C = \{5, 10, 15, 20\}$, $D = \{2, 4, 8, 10, 12]$

i) $A \cap B = \{3, 6, 9, 12, 15, 18, 21\} \cap \{4, 8, 12, 16, 20\}$

$= \{12\}$

ii) $B \cup C = \{4, 8, 12, 16, 20\} \cup \{5, 10, 15, 20\}$

$= \{4, 8, 12, 16, 20, 5, 10, 1\ 5\}$

iii) $C - D = \{5, 10, 15, 20\} - \{2, 4, 8, 10, 12]$

$= \{5, 15, 20\}$

iv) $A - D = \{3, 6, 9, 12, 15, 18, 21\} - \{2, 4, 8, 10, 12]$

$= \{3, 6, 9, 15, 18, 21\}$

(or)

b) $x^2 + y^2 = 25xy$

$2 \log (x + y) = \log (x + y)^2$ $[\because \log x^n = n \log x]$

$= \log [x^2 + y^2 + 2xy]$

$= \log (25xy + 2xy)$

$= \log (27\, xy)$ $[\because \log xyz = \log x + \log y + \log z]$

$= \log 27 + \log x + \log y$

$= \log 3^3 + \log x + \log y$

$= 3 \log 3 + \log x + \log y$

30.a) $\sec q + \tan \theta = P$ ..... (1)

$\sec^2 \theta - \tan^2 \theta = 1$

$(\sec \theta - \tan \theta)(\sec \theta + \tan \theta) = 1$

$(\sec \theta - \tan \theta).P = 1$

$\sec \theta - \tan \theta = \frac{1}{P}$ .....(2)

$\sec \theta + \tan \theta = P$

$\sec \theta - \tan \theta = \frac{1}{P}$

$2 \sec \theta = P + \frac{1}{P} \Rightarrow 2 \operatorname{Sec} \theta = \frac{P^2 + 1}{P} \Rightarrow \sec \theta = \frac{P^2 + 1}{2P}$

$\operatorname{cosec} \theta = \frac{1}{\sec \theta}$ $\therefore \cos \theta = \frac{1}{\frac{P^2 + 1}{2P}} = \frac{2P}{P^2 + 1}$

$$\sin\theta = \sqrt{1-\cos^2\theta} = \sqrt{1-\left(\frac{2P}{P^2+1}\right)^2} = \sqrt{\frac{(P^2+1)^2-(2P)^2}{(P^2+1)^2}}$$

$$\therefore \sin\theta = \sqrt{\frac{(P^2-1)^2}{(P^2+1)^2}} \qquad [(a+b)^2-4ab=(a-b)^2]$$

$$\therefore \sin\theta = \frac{P^2-1}{P^2+1}$$

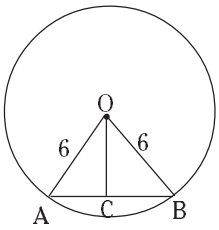
(Or)

b) Given the radius of the circle

OA = OB = 6 cm

$\angle AOB = 60°$

$OC \perp AB$ and it is a angle bisector then $COA = 30°$



In $\Delta COA \sin 30° = \frac{AC}{OA}$

$$\frac{1}{2} = \frac{AC}{6} \Rightarrow AC = \frac{6}{2} = 3$$

But length of the chord AB = 2.AC = $2 \times 3 = 6$

$\therefore$ Length of the chord = 6 cm.

31.a) In $\Delta ABC, \angle B = 90°$

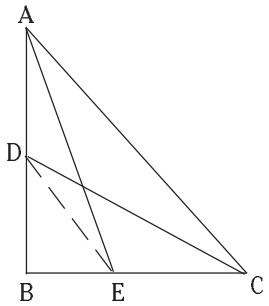
In ΔABC

$AE^2 = AB^2 + BE^2$ ..... (1) [By using Pythagorous Theorem]

In ΔBDC, $CD^2 = BD^2 + BC^2$ ..... (2)

In ΔABC, $AC^2 = AB^2 + BC^2$ ..... (3)

In Δ,BDE, $DE^2 = BD^2 + BE^2$ ..... (4)



Adding (1) and (2) $AE^2 = AB^2 + BE^2$ ..... (1)

$CD^2 = BD^2 + BC^2$ ..... (2)

$$AE^2 + CD^2 = AB^2 + BD^2 + BE^2 + BC^2$$

$$= AB^2 + BC^2 + BD^2 + BE^2$$

$$= AC^2 + DE^2 \quad [\text{using 3 and 4}]$$

$\therefore AE^2 + CD^2 = AC^2 + DE^2$

(Or)

b) i) $(x+1)^2 = 2(x-3)$

$x^2 + 2x + 1 = 2x - 6$

$x^2 + 2x - 2x + 1 = 6 = 0$

$x^2 + 7 = 0$ ..... (1)

Yes. It is a quadratic equation.

ii) $(x-2)(x+1) = (x-1)(x+3)$

$x^2 + x - 2x - 2 = x^2 + 3x - x - 3$

$x^2 - x - 2 = x^2 + 2x - 3$

$2x + x - 3 + 2 = 0$

$3x - 1 = 0$

There is no x^2 term. So it is not a quadratic equation. It is only a linear equation.

iii) $(x-3)(2x+1) = x(x+5)$

$2x^2 + x - 6x - 3 = x^2 + 5x$

$2x^2 - 5x - 3 = x^2 + 5x$

$2x^2 - x^2 - 5x - 5x - 3 = 0 \Rightarrow x^2 - 10x - 3 = 0$

It is in the form of $ax^2 + bx + c = 0$. It is a quadratic equation.

iv) $x^2 + 3x + 1 = (x-2)^2$

$x^2 + 3x + 1 = x^2 - 4x + 4$

$3x + 4x + 1 - 4 = 0$

$7x - 3 = 0.$

It is a linear equation. Not a quadratic equation. Because there is no x^2 term.

32.

Class Interval	**Frequency**	x_i	u_i	f_iu_i
15–25	6	20	– 3	– 18
25–35	11	30	– 2	– 22
35–45	7	40	– 1	– 7
45–55	4	50 a	0	0
55–65	4	60	+ 1	4
65–75	2	70	+ 2	4
75–85	1	80	+ 3	3
Total	$\Sigma f_i = 35$			$\Sigma f_iu_i = -47 + 11 = -36$

In step deviation method $AM = a + \frac{\Sigma f_i u_i}{\Sigma f_i} \times h$

$a = 50, \Sigma f_iu_i = -36, \Sigma f_i = 35, h = 10$

$$A.M = 50 + \frac{-36}{35} \times 10$$

$$= 50 - \frac{72}{7} = 50 - 10.28 = 39.72 \qquad \text{(Or)}$$

b) All Jacks and aces are removed
No. of Total cards = 52 – 8 = 44

i) No. of black queen = 2

$$P(E) = \frac{\text{No.of favourable out comes}}{\text{No.of Total possible out comes}} = \frac{2}{44} = \frac{1}{22}$$

ii) No.of red cards = 22

$P(E) = \frac{22}{44} = \frac{1}{2}$

iii) No. of spade cards = 13 – 2 = 11

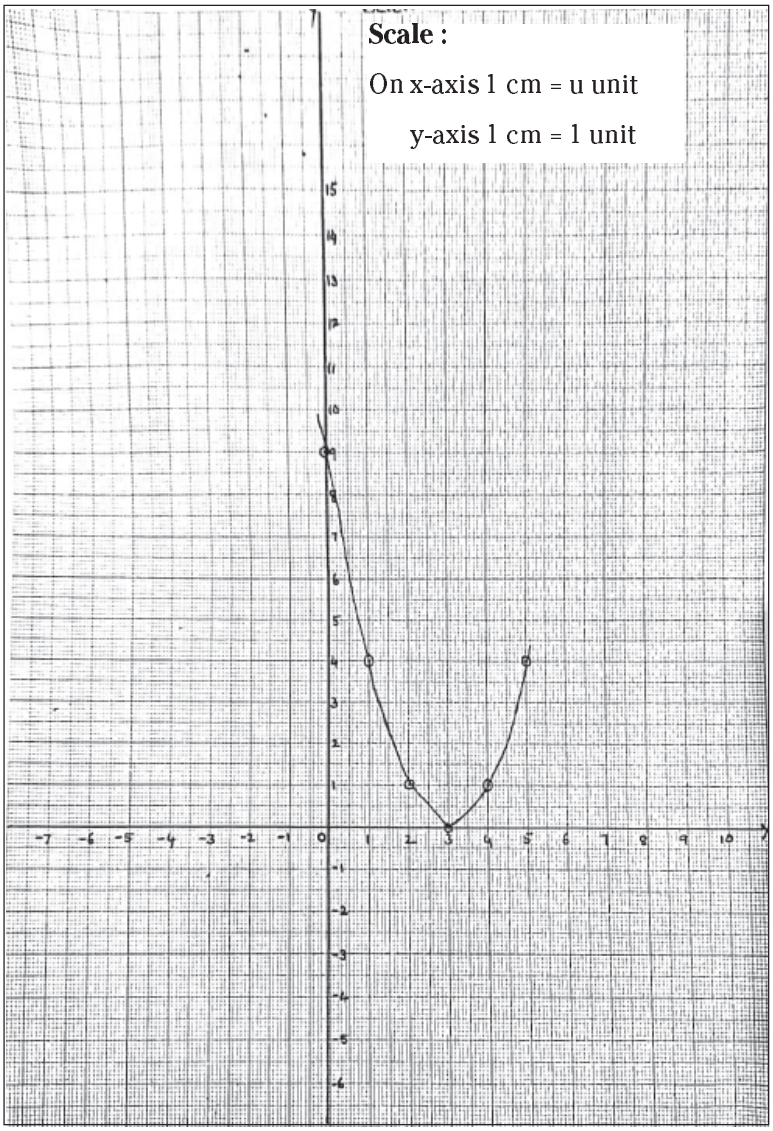
$P(E) = \frac{11}{44} = \frac{1}{4}$

iv) No.of face cards = 8

$P(E) = \frac{8}{44} = \frac{2}{11}$

33.

x	0	1	2	3	4	5
$y = x^2 - 6x + 9$	9	4	1	0	1	4
(x, y)	(0, 4)	(1, 4)	(2, 1)	(3, 0)	(4, 1)	(5, 4)



Verification :

$x^2 - 6x + 9$

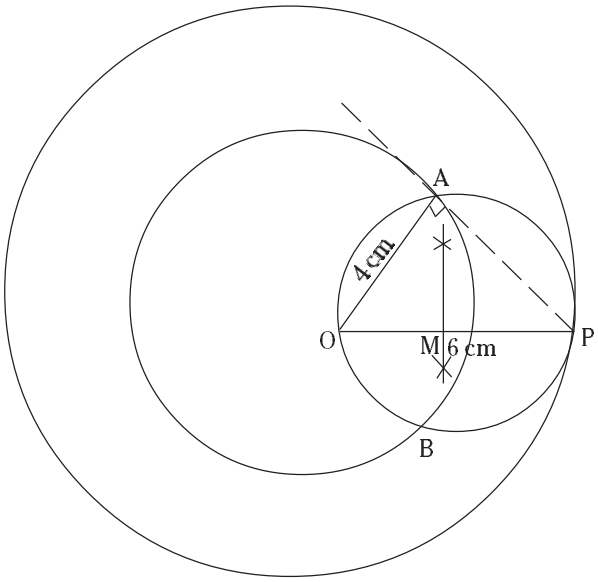
$x^2 - 3x - 3x + 9$ $\quad$ $x - 3 = 0$ $\quad$ $x - 3 = 0$

$x(x - 3) - 3(x - 3)$ $\quad$ $x = 3$ $\quad$ $x = 3$

$(x - 3)(x - 3)$

$\therefore$ x has same zeroes (3, 3)

b)



Draw two concentric circles of radius 4 cm and 6 cm having the centre 'O'.

Join OP, and draw perpendicular bisector to OP.

M is the mid point of OP.

Taking M as centre, and OM as radius draw a circle.

It interesects inner circle at A and B.

Join PA

In ΔOAP $OP^2 = OA^2 + AP^2$

$6^2 = 4^2 + AP^2$

$AP^2 = 6^2 - 4^2 = 36 - 16 = 20$

$AP = \sqrt{20} = 4.47$ cm

On measuring AP actually I get approximately 4.5 cm.

SSC PUBLIC EXAMINATION - 2021

MODEL PAPER-2

MATHEMATICS

Time : 2.45 hours **Marks : 100**

SECTION – I

Answer all questions. Each question carries 1 mark. **12 × 1 = 12**

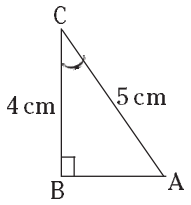
1. Find the value of $\log_2^{32}$

2. Is x, x + y, x + 2y, x + 3y ..... in A.P or not ? If it is in A.P find comon difference.

3. Verify '–1' is on zero of $P(x) = 4x^2 + 3x - 1$ or not.

4. 'SUJALA' coliculated the distance between A (5, 2) and B (–4, – 1) to the nearest tenth is 9.5 units what to do you say ?

5. Write the Hypotenuse and opposite side of angle 'C' in the adjacent figure.



6. p : If $\sec\theta + \tan\theta = p$ then $\sec\theta - \tan\theta = \frac{1}{p}$

   q : If $\text{cosec}\,\theta + \cot\theta = 2$ then $\text{cosec}\,\theta - \cot\theta = 0.5$

   A) p is true, q is false B) p, q are false

   C) p, q are true D) p is false, q is true

7. Which of the following is not in the first quadrant.

   A) (x, y) B) (–x, y) C) (x, – y) D) (– x, – y)

   i) A only ii) B, C only iii) B, C, D iv) All

8. Mode =

   A) $l \times \left[\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right] \times h$ B) $l + \left(\frac{f_1 - f_0}{f_1 - f_0 - f_2}\right) \times h$ C) $l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$ D) None

9. $P(E) + P(\overline{E}) = 1$, Here E and $\overline{E}$ are called .....

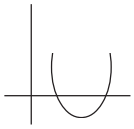
10. Match the following.

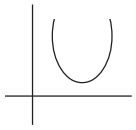
1. Linear polynomial	i) $ax^2 + bx + c$
2. quadratic polynomial	ii) $ax^3 + bx^2 + cx + d$
3. cubic polynomial	iii) $ax + b$

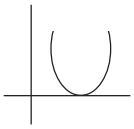
A) A–(i), B–(ii), C–(iii) B) A – (iii), B – (i), C - (ii)

C) A–(i), B–(iii), C-(ii) D) None

11. Match the following.

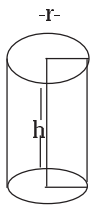
A)  i) No. of zedroes '2'

B)  ii) No. of zeroes '1'

C)  iii) No. of zeros '0'

A) A–(i), B–(ii), C–(iii) B) A – (i), B – (iii), C - (ii)

C) A–(iii), B–(ii), C-(i) D) None

12. 

Total surface area of the figure.

A) $2\pi rh$ B) $2\pi r^2 + 2\pi rh$ C) $2\pi r(r + h)$ D) $\pi r^2 h$

a) A only b) B, C true c) C only d) All

SECTION – II

Answer all questions. Each question carries 2 marks. **8 × 2 = 16**

13. Try to write all the subsects of A = {a, b, c}

14. Write the rough graphs of $ax^2 + bx + c$ polynomial if (i) $a > 0$ ii) $a < 0$

15. Amulya bought 5 masks and 3 sanitizers and paid to ₹205. Express this in the form of linear equation, in two variables.

16. Make an A.P. in which the common difference is negative.

17. Where do these following points lie $(0, -3), (0, -8), (0, 6), (0, 4)$

18. Srithi and Sushma are friends. What is the probability that both will have i) different brith class ii) same birthday (not leap year)

19. Find the mean of $x - 2, x - 1, x, x + 1, x + 2$

20. If $\cos(A + B) = \frac{1}{2}$ and $\sin(A - B) = \frac{1}{2}$ then find 'A' and 'B'

SECTION – III

Answer all the questions. Each question carries 4 marks. **8 × 4 = 32**

21. Find the zeroes of quadratic polynomial $x^2 - 2x - 8$ and verify the relationship between the zeroes and the coefficients.

22. If $2^{x+1} = 3^{1-x}$ then find the value of 'x'.

23. If A and B are disjoint sets then how can you find $n(A \cup B)$

24. Write any two sets of pair of linear equations in two variables.

25. Check whether the following are quadratic equations or not.

    i) $(2x + 1)(3x + 1) = b(x - 1)(x - 2)$ ii) $3y^2 = 192$

26. Verify that the points $(1, 5), (2, 3)$ and $(-2, -1)$ are collinear or not.

27. Prove that the sum of the square of the sides of a rhombus is equal to the sum of the squares of its diagonals.

28. Calculate the length of tangent from a point 15 cm qway from the centre of a circle of radius 9 cm.

SECTION – IV

Note : Answer all questions. Each question carries 8 marks.

Internal choice is there. **5 × 8 = 40**

29. a) Draw the Venn diagrams of

    i) $A - B$ ii) $B - A$ iii) $A \cup B$ iv) $A \cap B$

    (Or)

    b) Expand the following.

    i) $\log \frac{p^2q^3}{r}$ ii) $\log \sqrt{\frac{x^3}{y^2}}$

30.a) Given $\cot\theta = \frac{7}{8}$ then evaluate

i) $\frac{(1+\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(1-\cos\theta)}$ ii) $\frac{1+\sin\theta}{\cos\theta}$

(Or)

b) In ΔABC and ΔPQR, if $\angle A$ and $\angle P$ are acute angles. Such that $\sin A = \sin P$ then prove that $\angle A = \angle P$

31.a) The median of the following data is 525. Find the values of 'x' and 'y', if the total frequency is 100.

C.I	0–100	100–200	200–300	300–400	400–500	500–600	600–700	700–800	800–900	900–1000
Frequency	2	5	x	12	17	20	y	9	7	4

(Or)

b) Sudheer takes out all the hearts from the cards. What is the probability of

i) Picking out an ace ii) Picking out a diamonds

iii) Picking out a card that is not a hearth

iv) Picking out the Ace of hearts.

32.a) Draw the graph of $P(x) = x^2 - x - 6$ and find the zeroes. Justify your answer.

(Or)

b) Construct a triangle similar to a given triangle ABC with its sides equal to $\frac{3}{4}$ of corresponding sides of ΔABC.

33. Provel that the parallelogram circumscribing a circle is a rhombus.

(or)

Prove that '3' times the square of any side of an equilateral triangle is equal to '4' times the square of the altitude.

SSC PUBLIC EXAMINATION - 2021

MODEL PAPER-3

MATHEMATICS

Time : 2.45 hours **Marks : 100**

SECTION – I

Answer all questions. Each question carries 1 mark. **12 × 1 = 12**

1. Write the set builder form of $\left\{1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}\right\}$
2. Find the zeroes of the polynomial $p(y) = y^2 - 1$.
3. The quation $x - 4y = 5$ has

   A) no solution

   B) unique solution

   C) Two solutions

   D) infinite solutions
4. Verify whether '1' is zero of $2x^2 - 5x + 3$ or not.
5. 16, 19, 22, 25, ... is an A.P. Add a fixed number '2' to each and every term of A.P. Find the resulting numbers are in A.P or not ? Why ?
6. Amrutha says the distance of a point P (3, 4) from the origin is '5' units. Do you a gree with Amrutha or not, why ?
7. Write the statement of 'BAUDHAYAN' Theory.
8. A line intersecting a circle in two points is called a .....
9. What do you need to find the number of match sticks that can be put in the match box.
10. Evaluate $\cos 12° - \sin 78°$
11. Keerthi observing top of school building at an angle of elevation 'α' from a point which is at 'd' meter distance from foot of the building draw a rough sketch for this data.
12. Write the sample space of one tooss of coin.

SECTION – II

Answer all questions. Each question carries 2 marks. **8 × 2 = 16**

13. If $A = \{1, 2, 3\}$ and $B = \{3, 4, 5\}$ then illustrate $(A \cap B)$ is Venn-diagrams.
14. How will you show that $(17 \times 11 \times 2) + (17 \times 11 \times 5)$ is a composite number. Explain ?

15. Find a quadratic polynomila with zeroes – 2 and $\frac{1}{3}$

16. The product of two consecutive positive integers is 306. Represent the situation in the form of quadratic equation.

17. Find the coordinates of centroid of (–1, 3), (6, –3) and (–3, 6)

18. Two poles of height 6 m and 11 m stand on a plane ground. If the distance between the feet of the poles is 12 m. Find the distance between their toss.

19. If cos A = $\frac{12}{13}$ then find sin A and tan A.

20. If sin A = cos B then prove that A + B = 90°.

SECTION – III

Answer all the questions. Each question carries 4 marks. **8 × 4 = 32**

21. Find 'x' if 2 log 5 + $\frac{1}{2}$ log 9 – log 3 = log x

22. Write two examples for each.
    i) Finite A.P ii) Infinite A.P

23. Find the point on the 'x'-axis which is equidistance from (2, – 5) and (–2, 9).

24. A wire attached to vertical pole of height 18 m is 24 m long and has a stake attached to the other end. How far from the base of the pole should the stove be driven so that the wire will be tan t.

25. Show that the lengths of tangents drawn from an external point to a circle are equal.

26. If tan 2A = cot (A – 18°) where 2a is an acute angle. Find the value of A.

27. A bag contains a red ball, a blue ball and an yellow ball, all the balls being of the same size. Sujala takes out a ball from the boy withoug looking it. What is the probability that she taking 'a'.
    i) red ball ii) blue ball

28. The marks obtained in maths by 20 students are given below. Find the mean.

Marks obtained (x_i)	10	20	36	40	50	56	80	92	95
Number of students (f_i)	1	2	3	4	3	2	1	3	1

SECTION – IV

Note : Answer all questions. Each question carries 8 marks.
Internal choice is there. **5 × 8 = 40**

29.a) If A = {x : x is a natural number}, B = {x : x is an even natural number},
C = {x : x is an natural number} and D = {x : x is a prime number}
Find : i) $A \cap B$ ii) B – C iii) $B \cup C$ iv) $C \cap D$
What do you notice.

(Or)

b) If $(2.3)^x = (0.23)^y = 1000$ then find the value of $\frac{1}{x} - \frac{1}{y}$

30. Find the trisectional points of line joining (2, 6) and (–4, 8).

(Or)

ABC is a right triangle righe angled at 'C'.

Let BC = a, CA = b, AB = c and Let 'P' be the length of perpendicular from 'C' on AB. Prove that

i) pc = ab ii) $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$

31. If A, B and C are interior angles of triangle ABC then show that $\sin \frac{B+C}{2} = \cos \frac{A}{2}$

(Or)

State and prove converse of pythagorous theorem.

32. Find the mode at the following data.

C.I	1–3	3–5	5–7	7–9	9–11
Frequency	7	8	2	2	1

(Or)

One card is drawn from a well shuffled deck of 52 cards. Calculate the probability that the cord will i) be an ace ii) not be an ace iii) A king of red colour iv) A face card

33.a) Draw the graph $p(x) = x^2 + 3x - 4$ and find the zeroes. Justify the answer.

(Or)

b) Draw a pair of tangents to a circle of radius 5 cm. Which are inclined to each other at an angle of 60°.