

# Model Question of SSC Examination 2020 for All Board

Higher Mathematics

Subject Code : 

1	2	6
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Time — 2 hours 30 minutes

Full Marks — 50

[N.B. — The figures in the right margin indicate full marks. Answer five questions taking at least one from each Group.]

## Group A -- Algebra

1. **★** A relation is described by  $x^2 + y^2 = 4$ .

- a. Express the relation in the form of  $y = f(x)$  & find the domain of  $f(x)$ . 2
- b. If  $y \geq 0$  then verify whether the relation is function & also prove that it is not one-one function. 4
- c. Draw the graph of the relation & also write down the geometric name of it? 4

2. **▶**  $P(x) = -x^2 - 15x - 10x^3 + 9$  &  $Q(x) = x^3 + x^2 - 6x$ .

- a. Write  $P(x)$  as the ideal expression of  $x$  & find the leading co-efficient? 2
- b. Resolve into Factors  $P(x)$ ? 4
- c. Express  $\frac{x^2 + x - 1}{Q(x)}$  in partial fraction? 4

3. **▶**  $A = \left(a + \frac{x}{3}\right)^7$  &  $B = \frac{2x}{x-1}$ , where  $a \neq 0$ .

- a. If  $a = 1$ , expand  $A$  up to 4<sup>th</sup> term by the help of pascal's triangle. 2
- b. In the expansion of  $A$  co-efficient of  $a^2$  is 1120, find the value of  $x$ . 4
- c. If  $6\sqrt{B} + \frac{5}{\sqrt{B}} - 13 = 0$ , then what is the value of  $x$ ? 4

## Group B – Geometry and Vector

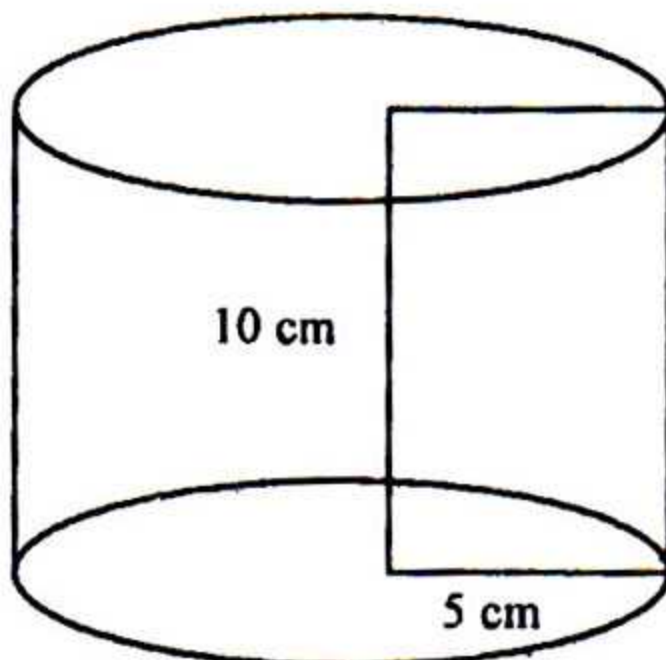
4. ★ The perpendiculars AD, BE & CF from the vertices to the opposite sides of the acute angled triangle ABC meet at the point O. Where  $AC = 5\text{cm}$ ,  $AB = 8\text{cm}$ ,  $BC = 4.15\text{cm}$  &  $\angle B = 60^\circ$ .

- a. If  $CD = 3\text{cm}$ , then find the length of AD? 2
- b. Prove that,  $AO \cdot OD = BO \cdot OE = CO \cdot OF$ . 4
- c. Construct a triangle whose base is half of AB, vertical angle is  $\angle B$  & sum of the lengths of the other two sides is equal to the length of  $AC + BC$ . 4

5. ►  $P(8, 3)$ ,  $Q(3, 8)$  &  $R(-2, 3)$  are the three vertices of a triangle. S & T be the middle points of the sides PQ & PR respectively.

- a. Find the slope of QR? 2
- b. Show that,  $\Delta PQR$  is an isosceles triangle & its area is 25 square units. 4
- c. The line joining the point P & Q intersects the X-axis & Y-axis at the points A & B respectively. Find the equation of the line AB & the length of AB? 4

6. ★



- a. Find the area of the base of the cylinder? 2
- b. Find the area of the curved surface & whole surface of the cylinder? 4
- c. A spherical ball exactly fits into the cylinder. Find the volume of the unoccupied portion of the cylinder. 4

### Group C - Trigonometry & Probability

7. ►  $f(x) = \sin x$ .

a. If  $f(x) = 3/5$ , then,  $\tan x = ?$  2

b. If  $3f(\theta) + 4f\left(\frac{\pi}{2} - \theta\right) = c$ , then prove that  $3f\left(\frac{\pi}{2} - \theta\right) - 4f(\theta) = \pm \sqrt{25 - c^2}$ . 4

c. Solve :  $2f(x).f\left(\frac{\pi}{2} - x\right) = f(x)$ , where  $0 \leq x \leq 2\pi$ . 4

8. ★ 20 tickets are numbered serially from 11 to 30. The tickets are mixed thoroughly & one ticket is drawn at random.

a. What do you mean by mutually exclusive events? 2

b. Find the probability that the drawn is multiply of 2 & divisible by 3? 4

c. Show that, the probability of the drawn that is prime number of multiple of 7 is less then that of odd or divisible by 4? 4

[N.B— Answer all the questions. Each question carries one mark. Block fully, with a ball-point pen, the circle of the letter that stands for the correct/best answer in the "Answer Sheet" for Multiple Choice Questions Examination.]

1. **★** If the complement set of A is A' then which of the following is correct?

- (a)  $A' = \{x : x \in U \ \& \ x \in A\}$   
 (b)  $A' = \{x : x \in U \ \& \ x \notin A\}$   
 (c)  $A' = \{x : x \notin U \ \& \ x \in A\}$   
 (d)  $A' = \{x : x \notin U \ \& \ x \notin A\}$

2. If  $f : A \rightarrow B$  &  $g : B \rightarrow A$ , f and g both are onto and  $A \neq B$

- i.  $g = f^{-1}$   
 ii.  $F(g(B)) = g(f(A))$   
 iii.  $f(A) \in B$  &  $g(B) \in A$

Which one of the following is correct?

- (a) i & ii                      (b) i & iii  
 (c) ii & iii                    (d) i, ii & iii

3. **★** Which is the homogeneous polynomial?

- (a)  $4x^4 - 5x^3y + 7y^4$     (b)  $5x^3 + \frac{3y^3}{x} + 8xy^2$   
 (c)  $\frac{1}{3}x^3 + \frac{2}{x^2} + 9y^3$     (d)  $4x^{-3} - 2x^3 + 12y^3$

4. In any circle—

- i. There is only one common point of a circle & a transversal.  
 ii. Tangent is perpendicular to the radius passing through the point of contact.  
 iii. It is impossible to draw more than two tangents from an external point of circle.

Which one of the following is correct?

- (a) i & ii                      (b) i & iii  
 (c) ii & iii                    (d) i, ii & iii

5. What will be formed by joining circumcenter, the centroid & the orthocenter of a triangle?

- (a) Straight line            (b) Triangle  
 (c) Rectangle                (d) Cone

6. In a cyclic quadrilateral the area of the rectangle contained by the two diagonals is equal to the sum of the area of two rectangles contained by the

two opposite sides, the theorem is called —?

- (a) Pythagoras theorem  
 (b) Apolloneous theorem  
 (c) Ptolemy's theorem  
 (d) Brahmamaguptas theorem

$ax^2 - 6x + 9 = 0$ , is a quadratic equation

According to the above information, answer question no. 7, 8 & 9.

7. **★** If the discriminant is 0, what is the value of a?

- (a) -1                              (b) 1  
 (c) 2                                (d) 9

8. **★** What is the nature of root of the equation if  $a = 1/4$ .

- (a) Rational & equal  
 (b) Rational & unequal  
 (c) Irrational & equal  
 (d) Irrational & unequal

9. **★** If  $x_1$  &  $x_2$  are the roots of the equation, then  $x_1 + x_2 = ?$

- (a)  $\frac{a}{-6}$                               (b)  $\frac{-6}{a}$   
 (c)  $\frac{6}{a}$                                 (d)  $\frac{a}{6}$

10. If  $a < b$  for negative value of c, which of the following is correct?

- (a)  $a/c < b/c$                       (b)  $-a/c < b/c$   
 (c)  $-a/c > -b/c$                     (d)  $a/c > b/c$

11. If  $n^{\text{th}}$  term of a series is  $\frac{1}{n}$ —

- i. 100-th term will be equal to  $10^{-2}$   
 ii. If n increases then n-th term decreases.  
 iii. If n is sufficiently increase & equal to infinity then n-th term will be equal to zero.

Which one of the following is correct?

- (a) i & ii                              (b) i & iii  
 (c) ii & iii                            (d) i, ii & iii

12. **★** If  $\tan\left(\frac{n\pi}{2} + \theta\right) = \sqrt{3}$  &  $\theta = \frac{\pi}{6}$ , then

what is the value of n?

- (a) 0                      (b)  $\frac{1}{3}$   
 (c)  $\frac{2}{3}$                     (d)  $\frac{3}{2}$

13. **★** If  $\sin\theta = \frac{1}{\sqrt{2}}$ , then what is the value

of  $\tan\theta - \cot\theta$ ?

- (a) 0                      (b) 1  
 (c)  $\frac{1}{\sqrt{2}}$                     (d)  $\sqrt{2}$

14. If a, b, c > 0, a ≠ 1, b ≠ 1 & c ≠ 0 then  $\log_{\sqrt{a}} a \times \log_{\sqrt{b}} b \times \log_{\sqrt{c}} c = ?$

- (a) 1                      (b) 8  
 (c) 16                    (d) 64

According to the information,  $X = {}^n C_R$  &  $Y = {}^n C_{p-1}$ , answer questions 15, 16 & 17.

15. If p = 0, then X = ?

- (a) 0                      (b) 1  
 (c) n                      (d)  $\frac{1}{n}$

16. If p = n, then X + Y = ?

- (a) n!                    (b) 1 - n  
 (c)  $\frac{1}{1+n}$                     (d) 1 + n

17. If p = n, then XY = ?

- (a) n                      (b) 1 + n  
 (c)  $\frac{1}{n}$                       (d) 1 - n

18. In x, y plane what is the graph of the equation 4x = 5?

- (a) Passes through the origin  
 (b) Semi circle  
 (c) Parallel to x-axis  
 (d) Parallel to y-axis.

19. If the three vertices of a triangle are O(0, 0), A(1, 0) & B(0, 1)?

- i. The point A lies on the X-axis  
 ii. The point B lies on the Y-axis  
 iii. Area of the triangle OAB = 2 sq. unit

Which one of the following is correct?

- (a) i & ii                    (b) i & iii  
 (c) ii & iii                (d) i, ii & iii

20. If  $\underline{a} + \underline{b} = 0$  &  $a \neq b$ , what will be the vector  $\underline{a}$  &  $\underline{b}$ ?

- (a) Unequal & same direction  
 (b) Unequal & not parallel  
 (c) Parallel & opposite direction  
 (d) Parallel & same direction

21. If the length of diagonal of a square is  $8\sqrt{2}$ cm, then what is the area of the square?

- (a) 8 sq. cm.              (b)  $8\sqrt{2}$  sq. cm  
 (c) 16 sq. cm             (d) 64 sq. cm

A sphere with radius 3 cm, is exactly fits in a cube.

On the basis of the above information answer to the questions 22, 23 & 24.

22. What is the length of one side of the cube?

- (a) 6 cm.                    (b) 3 cm.  
 (c)  $\frac{1}{3}$  cm.                    (d)  $\frac{1}{6}$  cm.

23. What is the volume of the cube?

- (a) 27 cu.cm.              (b) 64 cu.cm.  
 (c) 216 cu.cm.            (d) 262cu.cm.

24. What will be the volume of the unoccupied portion?

- (a) 102.9 cu.cm.        (b) 148.9cu.cm.  
 (c) 187.7cu.cm.        (d) 233.7cu.cm.

25. **★** A coin is tossed thrice. What will be the probability of not getting head?

- (a)  $\frac{1}{2}$                       (b)  $\frac{1}{3}$   
 (c)  $\frac{3}{8}$                       (d)  $\frac{1}{8}$

Ans.	1	(b)	2	(b)	3	(a)	4	(c)	5	(a)	6	(c)	7	(b)	8	(d)	9	(c)	10	(d)	11	(d)	12	(b)	13	(a)	14	(b)	15	(b)
	16	(d)	17	(a)	18	(d)	19	(a)	20	(c)	21	(d)	22	(a)	23	(c)	24	(a)	25	(d)										