Model Question of SSC Examination-2016 (All Board)

Mathematics Subject Code 1 0 9

Time — 2 Hours 10 Minutes **(Creative)** Full marks — 60

*[N.B. - The figure in the right margin indicate full marks. Answer **six** questions in total, taking **two** from Algebra part, **two** from Geometry part, **one** from Trigonometry and Mensuration part and **one** from Statistics part.]*

Group-A: Algebra

(Answer any two of the following questions) 10×2=20

1.▶ Universal set, $U = \{x : x \in \mathbb{N} \text{ and } x \text{ is an odd number}\}$

$A = \{x \in \mathbb{N} : 2 \le x \le 7\}$

$B = \{x \in \mathbb{N} : 3 < x < 6\}$

$C = \{x \in \mathbb{N} : x^2 > 5 \text{ and } x^3 < 130\}$

From above information, answer the following questions:

a. Express A in tabular method. 2

b. Find A′ and C – B. 4

c. Find B × C and P(A ∩ C). 4

2.▶ Suppose, $a = \sqrt{3} + \sqrt{2}$,

a. Find the value of $a + \frac{1}{a}$. 2

b. Prove that, $a^3 + \frac{1}{a^3} = 18\sqrt{3}$. 4

c. Find the value of $\frac{a}{a^2 - \sqrt{2}a - 1}$. 4

3.▶ If a, b, c are ordered proportional then answer the following questions:

a. If $a : b = c : d$, then show that, $\frac{a-b}{b} = \frac{c-d}{d}$. 2

b. Prove that, $a^2b^2c^2\left(\frac{1}{a^3} + \frac{1}{b^3} + \frac{1}{c^3}\right) = a^3 + b^3 + c^3$. 4

c. If $\frac{a^2 + b^2}{b^2 + c^2} = \frac{(a+b)^2}{(b+c)^2}$, prove that, a, b, c are ordered proportional. 4

Group-B: Geometry

(Answer any two of the following questions) 10×2=20

4.▶ Read the following statement attentively and answer the questions given below:

Suppose ABC be a right angled triangle, ∠A = 1 right angle and D is the mid-point of BC.

a. Now from given data draw a geometric figure. 2

b. Prove that, $AD = \frac{1}{2}BC$. 4

c. Draw again ΔABC, such that hypontenuse BC = 4 cm and AB + AC = 5 cm. [Description and sign of drawing are necessary] 4

5.▶ The bisector AD of $\angle A$ of the triangle ABC intersects BC at D. The line segment CE parallel to DA intersects the line segment BA extended.

a. Draw the specified figure. 2

b. Prove that, BD : DC = BA : AC. 4

c. If a line segment parallel to BC intersect AB and AC at P and Q respectively, prove that BD : DC = BP : CQ. 4

6.▶ Suppose ABC is an isosceles triangle. O is the point inside ABC which equal distance from A, B and C.

a. Draw an isosceles triangle and what is the name of the centre O. 2

b. Construct a circum-circle in the triangle ABC. 4

c. If a line segment parallel to BC intersect AB and AC at P and Q respectively, prove that, BD : DC = BP : CQ. 4

Group-C: Trigonometry and Mensuration

(Answer any one of the following questions) 10×1=10

7.▶ $\angle B$ is the right angle of a right angled triangle ABC. AC = 2 and AB = 1.

a. Find the value $\angle A$. 2

b. Find the value of $\frac{\text{cosec}A - \sec A}{\text{cosec}A + \sec A}$, when $\tan A = \frac{1}{\sqrt{3}}$. 4

c. Solve: $2\cos^2 C + 3\sin C = 3$. 4

8.▶ A tree is broken by storm, such that the broken part makes an angle 60° with the ground at a distance 35 meters.

a. Draw the figure according to the above information. 2

b. Find the length of the whole tree. 4

c. Find the length and area of the surroundings after breaking the tree. 4

Group-D: Statistics (Mandatory) 10×1=10

9.▶ The frequency distribution table of weights (in kg) of 60 students of a class are:

Interval	45-49	50-54	55-59	60-64	65-69	70-74
Frequency	04	08	10	20	12	06

a. Make frequency distribution table considering 5 as a class interval. 2

b. Find the Arithmetic Mean from the table in short-cut method. 4

c. Draw frequency polygon of the presented data in frequency distribution table. 4

Answers

1. (a) {3, 5, 7} (b) {1, 9, 11, ... }; {3} (c) {(5, 3), (5, 5)} and {{3, 5}, {3}, {5}, φ}
2. (a) $2\sqrt{3}$ (c) $\frac{1}{\sqrt{2}}$
6. (a) circumcentre
7. (a) 60° (b) $2-\sqrt{3}$ (c) 30°
8. (b) 130.62 meter (c) 165.62 meter (approx.) and 1060.88 sq. meter
9. (b) 60.83 kg (approx.)

Multiple Choice Questions

Time — 40 minutes Full marks— 40 Subject Code | 1 | 0 | 9 |

[NB. 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. Candidates are asked not to leave any mark or spot on the question paper.]

1. $0.1\dot{3}$ as a simple fraction, then which one is correct?

ⓐ $\frac{13}{90}$ ⓑ $\frac{13}{99}$

ⓒ $\frac{2}{15}$ ⓓ $\frac{4}{33}$

2. X = { }, then the elements of P(X) is which one?

ⓐ 0 ⓑ 1 ⓒ 2 ⓓ 3

Answer the question number 3, 4 from following information:

S = {(–2, 4), (–1, 1), (0, 0), (1, 1), (2, 4)} is a relation.

3. Dom S = what?

ⓐ {0, 1, –1, 2} ⓑ {0, 1, –1, 2, –2}

ⓒ {0, 1, 2, –2} ⓓ {0, 1, 2, –1}

4. Range S = what?

ⓐ {1, 2, 4} ⓑ {0, 2, 4}

ⓒ {0, 1, 4} ⓓ {0, 1, 2, 4}

5. Which one is the range of the relation ℝ = {(–2, 4), (–1, 1), (0, 0)}?

ⓐ {0, 1, 4} ⓑ {–2, –1, 0}

ⓒ {2, 4, 1} ⓓ {4, 1, 1}

Answer question no. 6, 7, and 8.

If $f(x) = x^3 - 27$.

6. Then $f(-3)$ = what?

ⓐ –3 ⓑ 3 ⓒ 0 ⓓ –54

7. If $f(x) = 0$, which one is the value of x?

ⓐ –27 ⓑ –3 ⓒ 3 ⓓ 9

8. Which one of the following is a factor of $f(x)$?

ⓐ $x^2 + 6x + 9$ ⓑ $x - 9$

ⓒ $x^2 - 3x + 9$ ⓓ $x^2 + 3x + 9$

9. Which is scientific type of the following number?

ⓐ 225×10^{-4} ⓑ 22.5×10^{-3}

ⓒ 2.25×10^{-2} ⓓ 225×10^{-1}

10. Which one of the following is the $\sqrt{3}$ based log of 81?

ⓐ 9 ⓑ 8

ⓒ $\sqrt{6}$ ⓓ $\sqrt{3}$

11. If $a^4 = b^2$, then which of the following relation is correct?

ⓐ $\log_b a = 2$ ⓑ $\frac{1}{2} = \log_b a$

ⓒ $\frac{1}{2} = \log_a b$ ⓓ $2a = \log_a b$

12. If (x + y, 1) = (3, x – y), which one is (x, y)?

ⓐ (2, 0) ⓑ (2, 1)

ⓒ (1, 2) ⓓ (–2, 1)

If $p^4 - p^2 + 1 = 0$, then answer to the question number 13, 14 and 15:

13. Which one is the value of $p^2 + \frac{1}{p^2}$?

ⓐ 0 ⓑ 1 ⓒ 2 ⓓ 4

14. Which one is the value of $\left(p + \frac{1}{p}\right)^2$?

ⓐ 1 ⓑ 2 ⓒ 3 ⓓ 4

15. Which one is the value of $p^3 + \frac{1}{p^3}$?

ⓐ 0 ⓑ 1 ⓒ 2 ⓓ 4

16. If $\sqrt{3x} + 3 = 4$ which one of the following is true of the value of x?

ⓐ 1 ⓑ $\frac{1}{\sqrt{3}}$ ⓒ $\frac{1}{3}$ ⓓ 3

Answer the question number 17, 18 from following information:

Give the equation is $x(x - 5) = 0$.

17. Which one is correct constant term of the given equation?

ⓐ 0, 5 ⓑ 0

ⓒ 5 ⓓ –5, 0

18. What are the roots of the equation?

ⓐ 0, 5 ⓑ 1, 5

ⓒ 5 ⓓ –5, 0

19. For what value of c_1 and c_2 the system of the equations $x + y = c_2$, $2x + 2y = c_1$ will be inconsistent?

ⓐ $c_1 = c_2 = 0$ ⓑ $c_1 = c_2^* \neq 1$

ⓒ $c_1 = c_2 = 2$ ⓓ $c_1 \neq c_2$

20. Which one of the following is the 21th term of the series – a + a – a + a – a.....?

ⓐ –a ⓑ –21a

ⓒ a ⓓ 21a

21. Which one is the area of rhombus ABCD?

ⓐ $\frac{1}{2} \times$ base × height

ⓑ base × height

ⓒ $\frac{1}{2} \times AC \times BD$

ⓓ $\frac{1}{2} \times (AC + BD)$

22. What is the area of an equilateral triangle if the side of the triangle is 4 cm?

ⓐ $2\sqrt{3}$ ⓑ $4\sqrt{2}$

ⓒ $4\sqrt{3}$ ⓓ $8\sqrt{3}$

Answer the questions number 22, 23, 24 from following information:

The area of a square ABCD is 150 sq. cm.

23. Which one is the length of a side of a square?

ⓐ $5\sqrt{6}$ ⓑ $10\sqrt{3}$
ⓒ $20\sqrt{6}$ ⓓ $25\sqrt{6}$

24. Which one is the perimeter of a square?

ⓐ $5\sqrt{6}$ ⓑ $40\sqrt{3}$
ⓒ $20\sqrt{6}$ ⓓ $25\sqrt{6}$

25. Which one is the length of a diagonal BD of a square?

ⓐ $10\sqrt{3}$ ⓑ $10\sqrt{6}$
ⓒ $20\sqrt{3}$ ⓓ $20\sqrt{6}$

26. Area of rhombus is 144 sq.cm, what is it's perimeter?

ⓐ 24 ⓑ 36
ⓒ 48 ⓓ 72

27. Which one is the area of a circle?

ⓐ πr ⓑ πr^2
ⓒ $2\pi r^2$ ⓓ $4\pi r^2$

Answer the questions number 28, 29, and 30 from following expression:

$3^{-x} = 27, 2^y = 64, 4^z = 256$

28. What is the value of x?

ⓐ -3 ⓑ 3
ⓒ $\frac{1}{3}$ ⓓ $-\frac{1}{3}$

29. What is the value of y?

ⓐ -5 ⓑ -6
ⓒ 5 ⓓ 6

30. What is the value of z?

ⓐ -3 ⓑ -4
ⓒ 3 ⓓ 4

31. For which one a triangle will be drawn?

i. the length of the sides are 2 cm, 3 cm, 4 cm
ii. the length of the sides are 2cm, 3 cm, 5 cm
iii. the angles are 60°, 70°, 80°

Which one of the following is correct?

ⓐ i ⓑ ii
ⓒ ii and iii ⓓ all

32. Ratio of A : B : C is $\frac{1}{2} : \frac{1}{8} : \frac{3}{16}$ which one is the correct of the simple ratio of the three proportions?

ⓐ 8 : 2 : 3 ⓑ 2 : 3 : 8
ⓒ 3 : 2: 8 ⓓ 16 : 2 : 3

33. θ is not equal to true for which one?

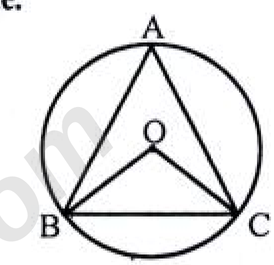
ⓐ $\sin^{-1}\frac{3}{5}$ ⓑ $\cos^{-1}\frac{5}{4}$
ⓒ $\tan^{-1}\frac{3}{4}$ ⓓ 30°

34. If the length of a side of a cube is 'a' unit then what is the length of it's diagonal?

ⓐ $\sqrt{2}a$ ⓑ $\sqrt{3}a$
ⓒ $\sqrt{5}a$ ⓓ $\sqrt{6}a$

ABC is a equilateral tringle and also a circle with the centre O.

Answer the following questions (35, 36 and 37) from the above information and the figure of the right side.



35. If ∠OBC = 30°, then ∠OCA = which value?

ⓐ 30° ⓑ 45°
ⓒ 60° ⓓ 90°

36. Which value is true of the ∠BOC = ?

ⓐ 45° ⓑ 60°
ⓒ 90° ⓓ 120°

37. The circle of the triangle ABC is?

ⓐ Ex-circle
ⓑ Circumscribed circle
ⓒ Ellipse
ⓓ Inscribed circle.

Weight	30-35	36-41	42-47	48-53	53-59	60-65
Frequency	3	10	18	25	8	6

From the above table answer the question of the following (38, 39 and 40)

38. Class interval of table is?

ⓐ 3 ⓑ 5 ⓒ 6 ⓓ 25

39. What is the cummulative frequency of the data?

ⓐ 3 ⓑ 6
ⓒ 25 ⓓ 70

40. Which one is the lower limit of mode class?

ⓐ 3 ⓑ 30
ⓒ 48 ⓓ 53

Ans.																																								
	1	ⓒ	2	ⓑ	3	ⓑ	4	ⓒ	5	ⓐ	6	ⓓ	7	ⓒ	8	ⓓ	9	ⓒ	10	ⓑ	11	ⓑ	12	ⓑ	13	ⓑ	14	ⓒ	15	ⓐ	16	ⓒ	17	ⓑ	18	ⓐ	19	ⓒ	20	ⓐ
	21	ⓒ	22	ⓒ	23	ⓐ	24	ⓒ	25	ⓐ	26	ⓓ	27	ⓑ	28	ⓐ	29	ⓓ	30	ⓓ	31	ⓐ	32	ⓐ	33	ⓑ	34	ⓑ	35	ⓐ	36	ⓓ	37	ⓑ	38	ⓒ	39	ⓓ	40	ⓒ