Model Question of SSC Examination-2016 (All Board)

Mathematics

Subject Code | 1 | 0 | 9 |

(Creative)

Time — 2 Hours 10 Minutes

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.▶ Given $x = 2 + \sqrt{3}$.

a. From above equation show that $\frac{1}{x} = 2 - \sqrt{3}$. 2

b. Find the value of $x^4 + \frac{1}{x^4}$. 4

c. Show that, $\left(x^2 - \frac{1}{x^2}\right)\left(x^3 - \frac{1}{x^3}\right) = 720$ 4

2.▶ $P = x^a$, $q = x^b$ and $r = x^c$.

a. Find the value of $\left(\frac{p}{q}\right)^c \times \left(\frac{q}{r}\right)^a \times \left(\frac{r}{p}\right)^b$. 2

b. Simplify:

$$4abc\left[\left(\frac{p}{q}\right)^{\frac{1}{ab}} \times \left(\frac{q}{r}\right)^{\frac{1}{bc}} \times \left(\frac{r}{p}\right)^{\frac{1}{ca}} \times \sqrt{a^{-3}b^{-2}c} \times \sqrt{c^{-3}a}\right]$$ 4

c. Show that, $\log_e \frac{a^3b^3}{c^3} + \log_e \frac{b^3c^3}{d^3} + \log_e \frac{c^3d^3}{a^3} - 3\log_e b^2c = 0$ 4

3.▶ The first term of a geometric series is 'a', common ratio is 'r'. The 5th term of the series is $\frac{2\sqrt{3}}{9}$ and the 10th term is $\frac{8\sqrt{2}}{81}$.

a. Express the above information by the two equations. 2

b. Find the third term of the series. 4

c. Find the series and then determine the sum of the first eight terms of series? 4

Group-B: Geometry

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

4.▶ In the right-angled triangle ABC, $\angle C = 1$ right angle and $\angle B = 2\angle A$.

a. Find the value of $\angle A$ and $\angle B$. 2

b. Prove that, $AB = 2BC$. 4

c. Show that, the line segment joining the mid-points of any two sides of a ΔABC is parallel to the third side of ΔABC and in length it is half. 4

5.▶ ABCD is a quadrilateral inscribed in a circle with centre O. The diagonals AC and BD intersect at the point E.

a. Draw the figure with above information. 2

b. Prove that the sum of two opposite angles of the quadrilateral ABCD is two right angle. 4

c. Show that, $\angle AOB + \angle COD = 2\angle AEB$. 4

6.▶ AB = 4 cm., BC = 5 cm., $\angle A = 80°$, $\angle B = 85°$ and $\angle C = 95°$ of quadrilateral ABCD.

a. What is the area of a trapezium? 2

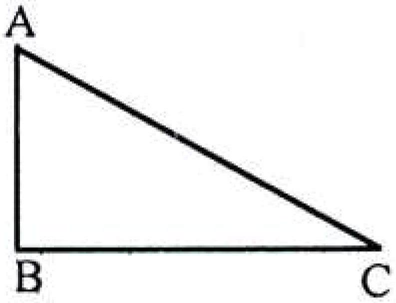
b. With the above given information construct the quadrilateral ABCD. 4

c. Construct an equilateral triangle whose perimeter is equal to the perimeter of the quadrilateral ABCD. 4

Group-C: Trigonometry and Mensuration

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

7.▶



$AB = a$, $AC = \sqrt{a^2 + b^2}$, $\angle C = \theta$.

a. Find the trigonometric ratio of $\tan\theta$. 2

b. Use the value of $\tan\theta$, find the value of $\frac{a\sin\theta - b\cos\theta}{a\sin\theta + b\cos\theta}$. 4

c. If $\tan A + \sin A = m$, $\tan A - \sin A = n$ then prove that, $m^2 - n^2 = 4\sqrt{mn}$. 4

8.▶ The length and the breadth of a rectangular region are 12m and 5m respectively. There is a circular region just around the rectangle. The places which are not occupied by the rectangle are planted with grass.

a. Describe the above information with a figure. 2

b. Find the diameter of the circular region and also area of the circular region. 4

c. If the cost of planting grass per square meter is tk. 50, then find the total cost. 4

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

9.▶ The production cost (in hundred taka) of a commodity at different stages is shown in the following table.

Production cost (in hundred taka)	2-6	6-10	10-14	14-18	18-22	22-26	26-30	30-34
Frequency	1	9	21	47	52	36	19	3

a. What is the range and mid-value of the class? 2

b. Draw the histogram of the given table. 4

c. Find the mean of the expenditure. 4

Answers

1. (b) 194 2. (a) 1 (b) 4

3. (a) $ar^4 = \frac{2\sqrt{3}}{9}$ and $ar^9 = \frac{8\sqrt{2}}{81}$ (b) $\frac{1}{\sqrt{3}}$

(c) $\frac{\sqrt{3}}{2} + \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} + \ldots$ and, $\frac{65}{54}(\sqrt{3} + \sqrt{2})$

4. (a) 30°, 60°

6. (a) $\frac{1}{2} \times (a + b) \times h$ sq. units

7. (a) $\frac{a}{b}$ (b) $\frac{a^2 - b^2}{a^2 + b^2}$

8. (b) 13 meter, 132.73 sq. metre (approx.)
(c) Tk. 3636.5 (approx.)

9. (c) 19.21

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. If $x + y = 3$, $xy = 2$, then what is the value of $x^3 + y^3$?
ⓐ 9 ⓑ 18 ⓒ 19 ⓓ 27

2. What is the correct factorized form of $\left(\frac{a+b}{2}\right)^2 - \left(\frac{a-b}{2}\right)^2$?
ⓐ $a^2 + b^2$ ⓑ $\frac{a^2+b^2}{2}$
ⓒ $a^2 - b^2$ ⓓ ab

3. If $f(x) = x^2 - 4x + 3$, for what value of x, $f(x) = 0$?
ⓐ 3, 1 ⓑ 4, 3
ⓒ −3, −1 ⓓ 1, 2

4. If A is a proper subset of B then which one is the correct relation?
ⓐ $A \subset B$ ⓑ $A \supset B$
ⓒ $A \in B$ ⓓ $A \subseteq B$

5. If $x : y = 3 : 4$ and $y : z = 3 : 5$ then $x : y : z = ?$
ⓐ 3 : 12 : 5 ⓑ 9 : 12 : 20
ⓒ 9 : 12 : 5 ⓓ 9 : 12 : 15

6. if $\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = \frac{g}{h}$ then each ratio will be equal to what?
ⓐ $\frac{a+c+e+g}{b+d+f+h}$ ⓑ $\frac{b+d+f+h}{a+c+e+g}$
ⓒ $\frac{aceg}{bdfh}$ ⓓ $\frac{bdfh}{aceg}$

7. If $\log_x 4 = 2$, what is the value of x?
ⓐ 2 ⓑ ±2 ⓒ 4 ⓓ 10

8. If $a^x = a^y$, under what condition $x = y$?
ⓐ $a > 0, a \neq 1$ ⓑ $a = 0, a = 1$
ⓒ $a = 1, a < 0$ ⓓ $a > 1, a > 0$

The digit of the tens place of a number are consisting of two digits is twice the digit of the unit place. In respect of the given information answer the questions 9, 10, 11.

9. If the digit of unit place is x, what is the number?
ⓐ 45x ⓑ 41x ⓒ 31x ⓓ 21x

10. If the places of the digits are interchanged, what will be number?
ⓐ 10x ⓑ 12x ⓒ 13x ⓓ 14x

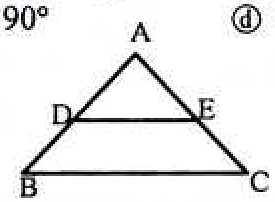
11. If x = 3, what will be the difference between original number and the number by interchanged their places?
ⓐ 17 ⓑ 27 ⓒ 37 ⓓ 47

12. What is the value of $\frac{4^n - 1}{2^n + 1}$?
ⓐ $2^n - 1$ ⓑ $2^n + 1$
ⓒ $2^n + 2$ ⓓ $4^n + 1$

13. If $x = -5$ then what is the value of $|x|$?
ⓐ −5 ⓑ 5
ⓒ x ⓓ −x

14. If $x^4 = 16$, then what is the value of x?
ⓐ 2 ⓑ 4 ⓒ 8 ⓓ 16

15. ∠A is complementary angles of x°, ∠A = what?
ⓐ 180° − x° ⓑ 90° + x°
ⓒ 90° ⓓ 90° − x°



16. In the figure AD = BD and AE = CE
i. DE ∥ BC
ii. DE = BC
iii. $DE = \frac{1}{2}BC$
iv. DE ⊥ AB
Which is correct by the above information?
ⓐ i and iii ⓑ i and ii
ⓒ i and iv ⓓ ii and iv

A circle is inscribed in a square and its radius r. With the above information answer the questions 17, 18 and 19.

17. Which one of the following is the ratio of the area of the circle and square?
ⓐ 4 : π ⓑ π : 4
ⓒ 2 : r ⓓ r : 2

18. Which one of the following is the length of the diagonal of the square?
ⓐ $2r\sqrt{2}$ ⓑ $4r$
ⓒ $2\sqrt{2r}$ ⓓ $4\sqrt{2r}$

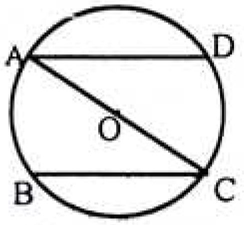
19. Which one of the following is the perimeter of the circle?
ⓐ $4\pi r^2$ ⓑ πr^2 ⓒ $2\pi r$ ⓓ πr

20. If $\sin A = \frac{4}{5}$, what is the value of tan A?
ⓐ $\frac{4}{5}$ ⓑ $\frac{4}{3}$ ⓒ $\frac{5}{3}$ ⓓ $\frac{3}{4}$

21. If the height of a trapezium is 8cm and the length of the parallel sides are 11cm and 9cm. What is its area in cm²?
ⓐ 60 ⓑ 70 ⓒ 80 ⓓ 99

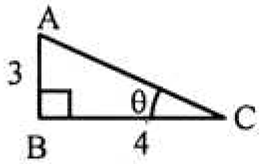
22. Which one indicates the data included in each class when the data are classified?
ⓐ class limit
ⓑ mid point of the class
ⓒ number of classes
ⓓ class frequency

23.



'O' is the centre of the given circle and chord AD = chord BC. Choice the correct answer?

ⓐ AD > BC ⓑ BC > AD
ⓒ AD || BC ⓓ AD ⊥ BC



In the given right angled triangle ABC, $\angle C = \theta$, AB = 3cm and BC = 4cm. Answer the question 24, 25, 26.

24. What is the length of the side AC?

ⓐ 3cm ⓑ 4cm ⓒ 5cm ⓓ 6cm

25. What is the value of sin θ?

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

26. What is the value of cot θ?

ⓐ $\frac{4}{12}$ ⓑ $\frac{4}{5}$ ⓒ $\frac{3}{4}$ ⓓ $\frac{4}{3}$

27. If the perimeter of square is 40 cm, then which one of the following is the area of a square?

ⓐ 40 sq. cm ⓑ 10 sq.cm
ⓒ 100 sq.cm ⓓ 110 sq.cm

28. Which one of the following is the area of an equilateral triangle?

ⓐ $\frac{\sqrt{3}}{4}a^2$ ⓑ $\frac{4}{\sqrt{3}}a^2$
ⓒ $\frac{3}{4}a^2$ ⓓ $\frac{4}{3}a^2$

29. The angle inscribed in a major arc in a circle is what?

ⓐ acute angle
ⓑ right angle
ⓒ obtuse angle
ⓓ complementary angle

30. Sum of two exterior angles of a triangle is what?

ⓐ two right angle
ⓑ less than two right angle
ⓒ greater than two right angle
ⓓ 360°

Length of the floor of a rectangular room is 2 meters more than its breadth and perimeter of the floor is 20 meters.

Answer the question number 31–33 with given above statement.

31. What is the length of the floor of the room in meter?

ⓐ 10 ⓑ 8
ⓒ 6 ⓓ 4

32. What is the area of the floor of the room in square meter?

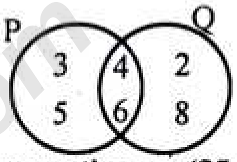
ⓐ 24 ⓑ 32
ⓒ 48 ⓓ 80

33. How much taka will be the total cost for decorating the floor with mosaic at tk. 900 per square meter?

ⓐ 72000 ⓑ 43200
ⓒ 28800 ⓓ 21600

34. A ladder of 18 meters long touches the roof of a wall and make an angle 45° with the horizon. What is the height of the ladder?

ⓐ $9\sqrt{2}$ ⓑ $12\sqrt{2}$
ⓒ $15\sqrt{2}$ ⓓ $18\sqrt{2}$



Answer the question no (35 and 36) with the above figure.

35. $P \cap Q = ?$

ⓐ {2,3,5} ⓑ {4,6}
ⓒ {5,6,8} ⓓ {3,8}

36. $P \cup Q = ?$

ⓐ {3,4,6,8} ⓑ {3,4,5,6,8}
ⓒ {2,3,4,5,6,8} ⓓ {5,6,8}

37. log 2 + log 4 + log 8 + ... which are the common difference of the series?

ⓐ 2 ⓑ 4
ⓒ log 2 ⓓ 2log2

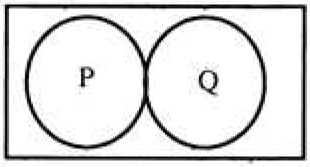
38. The length of three sides of a triangle are 7cm, 8cm and 9cm. What is its area in sq.cm?

ⓐ 26.833 ⓑ 50.2
ⓒ 55.2 ⓓ 60.2

39. What is the value of $\log_{\sqrt{3}} 81$?

ⓐ 2 ⓑ 8 ⓒ 4 ⓓ 5

40.



Above two circle touches externally and their radii are 5cm and 6cm. What is the distance in cm between the two centre?

ⓐ 11 ⓑ 16 ⓒ 17 ⓓ 18

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	ⓐ