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. ▶ Given U = {3, 4, 5, 6, 7}, P = {3, 4, 5,}, Q = {4, 5, 6} and R = P ∩ Q

a. Write the methods of describing sets.   2

b. Determine P(P ∩ Q) and R × Q.   4

c. Using venn diagram show that, $(P \cup Q)' = P' \cap Q'$.   4

2. ▶ Given a, b, c are ordered proportional.

a. What type of proportional b and c?   2

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

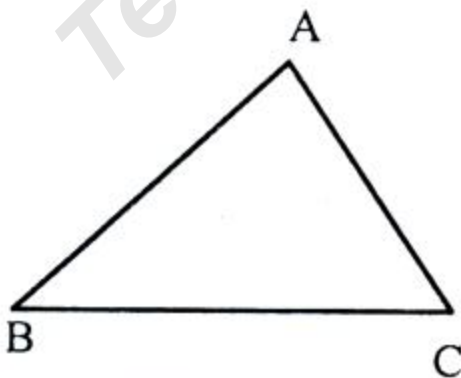c. If $\dfrac{a^3 + b^3}{a - b + c} = a(a + b)$, then prove that a, b, c are ordered proportional.   4

3. ▶ Given 5 + x + y + 135 is a geometric series.

a. The first term of arithmetic series be a and the common difference be d. Find common term of arithmetic series.   2

b. Find the value of x and y?   4

c. Show that $1^3 + 2^3 + 3^3 + ... + n^3 = (1 + 2 + 3 + ... + n)^2$ 4

Group-B: Geometry

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

4. ▶

Given ∠ACB > ∠ABC

a. In triangle ABC, Pythagoras theorem is applicable or not, why?   2

b. Prove that, AB > AC.   4

c. If D is the mid point of BC. Prove that, AB + AC > 2AD.   4

5. ▶ Given an arc BC of a circle subtending angles ∠BOC at the centre O and ∠BAC at a point A of the circle ABC.

a. Draw the figure with above information.   2

b. Prove that, ∠BOC = 2∠BAC.   4

c. Two chords AB and CD of a circle interest at an interior point E. Prove that, the sum of the angles subtended by the arcs AC and BD at the centre is twice ∠AEC. **4**

6. ▶ The base of a triangle, the base adjacent an acute angle and the difference of the other two sides are given.

a. Define Acute and Obtuse Angles. **2**

b. Construct the triangle and write the description. **4**

c. To draw a circle inscribed in a triangle and write the description. **4**

Group-C: Trigonometry and Mensuration

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

7. ▶
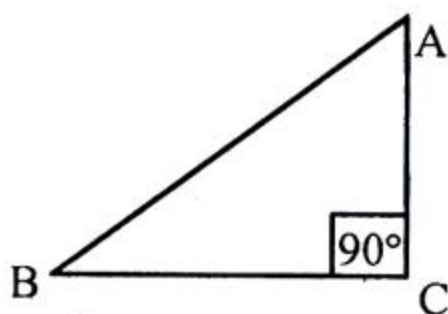
a. If $\sin B = \dfrac{1}{2}$, find the value of $\tan B$? **2**

b. If $\sqrt{2} \cos(A - B) = 1$, $\sqrt{2} \sin(A - B) = 3$, find the values of A and B, according to the stem. **4**

c. Prove that, $\tan 2A = \dfrac{2\tan A}{1 - \tan^2 A}$, when $A = 30°$. **4**

8. ▶ ABCD is a square whose length of each side is 24 m. and AED region is a half circle.

a. Describe the above information with a figure. **2**

b. Determine the area of the whole region. **4**

c. How many stones will be required to cover the square region with square stones of 40 cm each? **4**

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

9. ▶ Frequency distribution table of the marks obtained in mathematics of 50 students of class X are provided.

Class interval	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Frequency	7	8	10	11	5	6	3

a. Which is the median class. **2**

b. Find the mean from the table in short-cut method. **4**

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

[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. Which one is the correct decimal form $\frac{17}{35}$?
   - (a) .48
   - (b) .49
   - (c) .50
   - (d) .47

2. Which one is a irrational number?
   - (a) $3\sqrt{4}$
   - (b) $\sqrt{14}$
   - (c) $\sqrt{144}$
   - (d) $\sqrt{324}$

3. Who invented the set?
   - (a) George Cantor
   - (b) Pythagoras
   - (c) Ptolemy
   - (d) Lami

4. If P = {x:x is a factor of 16} then which one is the correct?
   - (a) {1, 2, 4, 8}
   - (b) {2, 4, 8, 9}
   - (c) {2, 4, 8, 16}
   - (d) {1, 2, 4, 8, 16}

5. If $(x + 1, y + 1) = (3x - 3, 2y - 1)$, what is the value of x and y?
   - (a) (2, 2)
   - (b) 2, –2)
   - (c) (–2, 2)
   - (d) (– 2, –2)

6. If A = {4, 3} and B = {6, 2} then A × B = ?
   - (a) {(4, 2), (4, 6), (3, 2)}
   - (b) {(4, 6), (4, 2), (3, 2)}
   - (c) (4, 2), (4, 6), (3, 2), (3, 6)
   - (d) {(4, 6), (4, 2), (3, 6), (3, 2)}

If $x + y = 4$ and $xy = 6$. In respect of the given information answer the questions 7-8.

7. Find the value of $x^2 + y^2$.
   - (a) 40
   - (b) 2
   - (c) 4
   - (d) 28

8. What is the value of $x^3 + y^3 + 6(x - y)^2$?
   - (a) 64
   - (b) –64
   - (c) 56
   - (d) –56

9. If $x = \sqrt{3} + \sqrt{2}$, find the value of $x^2 + \frac{1}{x^2}$?
   - (a) 10
   - (b) 12
   - (c) 14
   - (d) 16

10. Which is the factor of $6x^2 - 19x + 10$?
    - (a) $(2x - 5)(3x + 2)$
    - (b) $(2x - 5)(3x - 2)$
    - (c) $(2x - 2)(3x + 2)$
    - (d) $(2x - 5)(3x + 5)$

11. If $f(x) = x^4 - 4x^2 + 3$, find the value of $f(-2)$?
    - (a) 1
    - (b) 2
    - (c) 3
    - (d) 4

12. Which is correct for simple profit?
    - (a) P = Inr
    - (b) C = Pnr
    - (c) P = Pnr
    - (d) I = Pnr

13. If $\log_x 16 = 2$, what is the value of x?
    - (a) 4
    - (b) 5
    - (c) –4
    - (d) –5

14. If $4^x = 256$, then what is the value of x?
    - (a) 2
    - (b) 4
    - (c) 8
    - (d) 16

15. Which one of the following is the lowest form of $\frac{x^2 - y^2}{x^2 + 2xy + y^2}$?
    - (a) $\frac{x + y}{2xy}$
    - (b) $\frac{x + y}{2x - y}$
    - (c) $\frac{x + y}{x - y}$
    - (d) $\frac{x - y}{x + y}$

16. If a book is sold at Tk. 22, there is a profit of 10%. What was the cost price of the book?
    - (a) 10
    - (b) 20
    - (c) 30
    - (d) 40

17. Observe the following information:
    - i. A point is that which has no part.
    - ii. A line has no end point.
    - iii. A surface is that which has length and breadth only.

    On the basis of information above, which one of the following is correct?
    - (a) i and ii
    - (b) ii and iii
    - (c) i and iii
    - (d) i, ii and iii

18. On what condition $a° = 1$?
    - (a) $a \neq 0$
    - (b) $a = 0$
    - (c) $a > 0$
    - (d) $a \neq 1$

19. Which one of the following is correct for reflex angle θ?
    - (a) $2\pi < \theta < 4\pi$
    - (b) $\pi < \theta < 2\pi$
    - (c) $\frac{\pi}{2} < \theta < \pi$
    - (d) $2\pi < \theta < 3\pi$

20. If $\tan A + \sec A = \frac{5}{2}$, what is the value of $\sec A - \tan A$?
    - (a) $\frac{4}{5}$
    - (b) $\frac{2}{5}$
    - (c) $\frac{5}{3}$
    - (d) $\frac{3}{5}$

21. Which one of the following is the area of the circle?
    - (a) $4\pi r^2$
    - (b) πr^2
    - (c) $2\pi r$
    - (d) πr

22. How many independent data are required for construction of a definite quadrilateral?
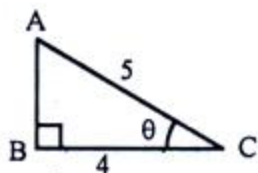   - (a) four
    - (b) three
    - (c) two
    - (d) five

23. Observe the following information:
    - i. A straight line can intersect a circle in more than two points.
    - ii. All equal chords of a circle are equidistant from the centre.
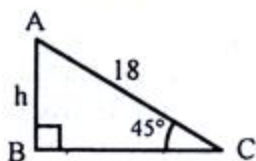   - iii. The diameter is the greatest chord of a circle.

    On the basis of information above, which one of the following is correct?
    - (a) i and ii
    - (b) ii and iii
    - (c) i and iii
    - (d) i, ii and iii

Answer the question number 24-26 with given above statement.

24. What is the value of AB?
   ⓐ 3   ⓑ 4   ⓒ 5   ⓓ 6

25. What is the value of $\csc\theta - \cot\theta$?
   ⓐ $\dfrac{3}{5}$ ⓑ $\dfrac{3}{4}$ ⓒ $\dfrac{1}{4}$ ⓓ $\dfrac{1}{3}$

26. What is the value of $\tan\theta$?
   ⓐ $\dfrac{4}{3}$ ⓑ $\dfrac{3}{4}$ ⓒ $\dfrac{4}{5}$ ⓓ $\dfrac{4}{12}$

Answer the question number 27-29 with given above figure.

27. Find the value of h?
   ⓐ $9\sqrt{2}$ ⓑ $12\sqrt{2}$
   ⓒ $15\sqrt{2}$ ⓓ $18\sqrt{2}$

28. If $\angle ACB = 30°$ and BC = 75, find the value of h?
   ⓐ $15\sqrt{3}$ ⓑ $10\sqrt{3}$
   ⓒ $15\sqrt{3}$ ⓓ $25\sqrt{3}$

29. If $\angle ACB = 60°$ and h = 105, find the value of BC?
   ⓐ $15\sqrt{3}$ ⓑ $35\sqrt{3}$
   ⓒ $45\sqrt{3}$ ⓓ $25\sqrt{3}$

30. The ratio of present ages of father and son is 7 : 2, if father's age is 35, what is the son's age?
   ⓐ 10   ⓑ 20
   ⓒ 5   ⓓ 15

31. If the ratio of two numbers is 3 : 4 and their L.C.M. is 180, find the two numbers?
   ⓐ 10, 30   ⓑ 80, 40
   ⓒ 60, 30   ⓓ 45, 60

32. The ratio of rice and husk in paddy to 7 : 3. What is the percentage of rice in it?
   ⓐ 60%   ⓑ 70%
   ⓒ 80%   ⓓ 90%

33. Observe the following information:
   i. The equations 2x − y = 0 and x − 2y = 0 are mutually dependent.
   ii. Graph of the equation x − 2y + 3 = 0 passes through the point (−3, 0).
   iii. Graph of the equation 3x + 4y = 1 is a straight line.

   On the basis of information above, which one of the following is correct?
   ⓐ i and ii   ⓑ ii and iii
   ⓒ i and iii   ⓓ i, ii and iii

34. $1 + 2 + 3 + ... + 50 = ?$
   ⓐ 1175   ⓑ 1275
   ⓒ 1075   ⓓ 1375

35. $8 + 11 + 14 + 17 + ...$ Which term of the series is 392?
   ⓐ 128   ⓑ 127
   ⓒ 129   ⓓ 130

36. What is the general term of the series $128 + 64 + 32 + ...$?
   ⓐ $\dfrac{1}{2^{n-8}}$ ⓑ $\dfrac{n}{2^{n-7}}$
   ⓒ $\dfrac{1}{2^{n-7}}$ ⓓ $\dfrac{n}{2^{n-8}}$

A frequency distribution table is given below :

Class Interval	Frequency
40 - 44	5
45 - 49	4
50 - 54	7
55 - 59	3
60 - 64	6
Total	25

According to the above table answer the question no (37 − 38).

37. What is the class interval of the presented data?
   ⓐ 4   ⓑ 5
   ⓒ 6   ⓓ 7

38. What is the mode class of the presented data?
   ⓐ 40-44   ⓑ 45-49
   ⓒ 50-54   ⓓ 55-59

The length of diagonal of the surface of a cube is $8\sqrt{2}$ cm .

Answer the question number 39-40 with given above statement.

39. Find the length of its diagonal.
   ⓐ $8\sqrt{2}$ cm   ⓑ $8\sqrt{3}$ cm
   ⓒ $9\sqrt{2}$ cm   ⓓ $9\sqrt{3}$ cm

40. Find its volume.
   ⓐ 412 cm³   ⓑ 512 cm³
   ⓒ 624 cm³   ⓓ 724 cm³

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
ⓑ	ⓓ	ⓑ	ⓐ	ⓓ	ⓑ	ⓐ	ⓓ	ⓑ	ⓐ	ⓓ	ⓑ	ⓑ	ⓑ	ⓒ	ⓐ	ⓑ	ⓒ	ⓑ	ⓑ