

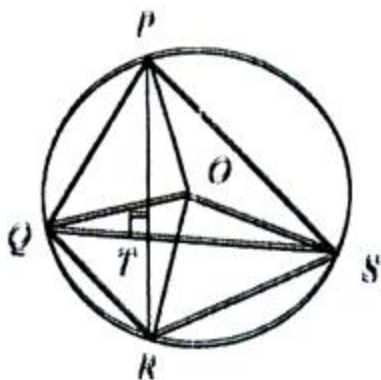
[N.B. - The figure in the right margin indicate full marks. Answer six questions in total, taking two from Algebra part, two from Geometry part, one from Trigonometry and Mensuration part and one from Statistics part.]

Group- A: Algebra

1. ► $A = \{x : x \in \mathbb{N} \text{ and } x^2 - 5x + 6 = 0\}$
 $B = \{1, 4\}$
 $C = \{a, 4\}$
- a. Determine set A in tabular method. 2
- b. Determine $P(B \cup C)$ and show that the number of elements of $P(B \cup C)$ supports 2^n . 4
- c. Show that, $A \times (B \cap C) = (A \times B) \cap (A \times C)$. 4
2. ► If $p + q = 6$ and $pq = 3$ where $p > q$.
- a. Determine the value of $p - q$. 2
- b. Determine the value of $p^3 - q^3 - 5(p^2 - q^2)$. 4
- c. Show that, $p^5 + q^5 = 4806$. 4
3. ► In a series, the general term is $2n + 1$ ($n \in \mathbb{N}$).
- a. Determine the series. 2
- b. Which term of the series is 169? 4
- c. Taking 1st number as the 1st term and common difference as the common ratio of the given series, determine the sum of 1st 10 terms of new series. 4

Group-B: Geometry

4. ► In $\triangle DEF$, the bisectors of $\angle E$ and $\angle F$ meet at point P and the external bisectors meet at point Q.
- a. Draw the figure on the basis of the above information. 2
- b. Prove that, $\angle EPF = 90^\circ + \frac{1}{2} \angle D$. 4
- c. Show that the points E, P, F and Q are concyclic. 4
5. ►



In the above figure, $PT \perp QS$, O is centre.

- a. Show that, $\frac{1}{2} \angle PQR + \frac{1}{2} \angle PSR = 90^\circ$. 2

- b. Prove that, $\angle POQ + \angle ROS = 2$ right angles. 4
 c. Prove that: $PQ^2 + PS^2 = 2PT^2 + QS^2 = 2QT.ST$. 4

6. ► a = 3cm & b = 3.5cm are the radii of A & B centered circles respectively.

- a. Determine the area of A centered circle. 2
 b. Construct two tangents from an external point Q to the B centered circle. [Sign and description of construction are compulsory] 4
 c. Taking a & b as the adjacent sides of right angle of a right angled triangle, construct a circumcircle. [Sign and description of construction are compulsory] 4

Group C - Trigonometry and Mensuration

7. ► In a right angled triangle, hypotenuse is $\sqrt{1+p}$ and an adjacent side of θ is $\sqrt{2p}$.

- a. Determine other side of the triangle presenting all the informations in a geometric figure. 2
 b. Find the value of $\sec^2\theta + \tan^2\theta$ (Putting values). 4
 c. Prove that, $\frac{1 + \operatorname{cosec}^2\theta}{1 - \operatorname{cosec}^2\theta} = -\frac{1}{p}$. 4

8. ► In front of Rumi's house, there is a rectangular garden the ratio of Length & breadth of which is 3 : 2 and area is 600 sq. metre. The perimeter of the garden is equal to the perimeter of a squared room. The room will be covered by square stones of 25cm each. The value of each stone is tk. 15.50.

- a. Determine the breadth of Rumi's garden. 2
 b. Determine the area of the room. 4
 c. What will be the total cost of covering the whole room with stones? 4

Statistics

9. ► To solve a MCQ question in Mathematics subject, the time (in second) is required for each student out of 20 students are given below:

45, 40, 25, 20, 16, 50, 55, 35, 40, 60,
 58, 52, 32, 18, 22, 25, 53, 51, 30, 44

- a. Make a frequency distribution table considering 5 as a class interval. 2
 b. Determine the mean from the table in short-cut method. 4
 c. Draw an "O give curve" from the table and give comments. 4

1. a. A = {2, 3}
 2. a. $2\sqrt{6}$ b. $6\sqrt{6}$
 3. a. $3 + 5 + 7 + \dots$
 b. 84th term is 169
 c. 3069

6. a. 28.2744 sq.cm. (Approx.)
 7. a. $\sqrt{1-p}$
 b. $\frac{1}{p}$
 8. a. 20m; b. 625 sq. m. ; c. 155000 tk
 9. b. 37.75

Multiple Choice Questions

Time — 40 minutes Full marks— 40

Subject Code

1	0	9
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[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 factors of $m^8 + m^4 - 2$?

- (a) $m^4 - 2$ (b) $m^3 - 1$
 (c) $m^2 + 2$ (d) $m + 1$

2. Which one is the factorized form of $y^2 + 5y + 6$?

- (a) $(y + 3)(y - 2)$ (b) $(y - 3)(y + 2)$
 (c) $(y + 6)(-1)$ (d) $(y - 6)(y + 1)$

3. What is the value of the equation?

$$\left(\frac{11}{\sqrt{5}}\right)^{5x-2} = \left(\frac{5}{\sqrt{5}}\right)^{2x+1}$$

(a) 7 (b) 1
 (c) $\frac{3}{5}$ (d) $\frac{1}{3}$

4. In Logarithm Methods—

- i. Algebraical expression is e base log
 ii. Number's is 10 base log
 iii. log table 10 is taken as the base

Which one of the following is correct?

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

5. What is the base if 4 the log of 729?

- (a) $6\sqrt{3}$ (b) 6
 (c) $3\sqrt{3}$ (d) 3

6. What is the 9 base log of $3\sqrt[3]{3}$?

- (a) $\frac{2}{3}$ (b) 1
 (c) $\frac{8}{3}$ (d) 4

7. Which one of the following is an identity?

- (a) $(x + 1)^2 - (x - 1)^2 = 4x$
 (b) $(x + 1)^2 - (x - 1)^2 = 2(x^2 + 1)$
 (c) $(x + y)^2 - (x - y)^2 = 2xy$
 (d) $(x - y)^2 = x^2 + 2xy + y^2$

8. If a, b, c are ordered proportional

- i. $a : b :: b : c$
 ii. $a^2 = bc$
 iii. $b^2 = ac$

Which one of the following is correct?

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

9. How many roots of the equation?

$$(x^2 - 3)^2 = 0$$

- (a) 1 (b) 2
 (c) 3 (d) 4

10. Length of three arms in cm are given bellow. In which position a triangle can be draw?

- (a) 3, 5, 6 (b) 4, 5, 6
 (c) 5, 6, 12 (d) 5, 7, 16

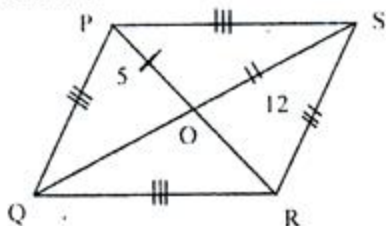
11. If $\triangle ABC \cong \triangle DEF$, then

- i. $AB = DE$, $BC = EF$ and $AC = DF$
 ii. $AB = DE$, $BC = EF$ and $\angle B = \angle E$
 iii. $\angle A = \angle D$, $\angle B = \angle E$ and $\angle C = \angle F$

Which one of the following is correct?

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

According to the figure answer the question no. 12 and 13 :



12. What is the area of $\triangle QOR$?

- (a) 17 square unit (b) 30 square unit
 (c) 60 square unit (d) 120 square unit

13. What is the perimeter of quadrilateral?

- (a) 34 unit (b) 52 unit
 (c) 60 unit (d) 169 unit

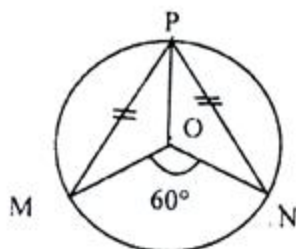
14. Which of the major arc of the circle in the angle of a quadrilateral inscribed?

- (a) Acute angle (b) Right angle
 (c) Obtuse angle (d) Reflex angle

15. How many tangent can be drawn in a certain point of a circle?

- (a) 1 (b) 2
(c) 3 (d) 4

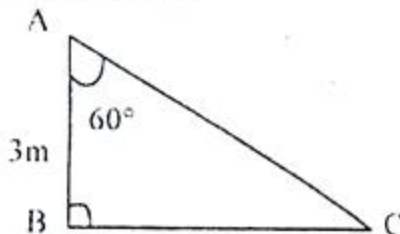
16.



In figure = $\angle POM = ?$

- (a) 60° (b) 90°
(c) 120° (d) 150°

According to the figure below answer to the questions 17 and 18 :



17. What is the length of BC?

- (a) $\frac{\sqrt{3}}{2}$ metre (b) $\sqrt{3}$ metre
(c) $2\sqrt{3}$ metre (d) $3\sqrt{3}$ metre

18. What is the length of AC?

- (a) $\frac{3\sqrt{3}}{2}$ (b) $3\sqrt{3}$ metre
(c) $6\sqrt{3}$ metre (d) $\sqrt{36}$ metre

19. If ΔPQR and ΔMNO are similar then—

- i. $\angle P = \angle M, \angle Q = \angle N$ and $\angle R = \angle O$
ii. $\frac{PQ}{MN} = \frac{QR}{NO} = \frac{PR}{MO}$
iii. Δ are $PQR : \Delta$ area $MNO = OR^2 / NO^2$

Which one of the following is correct?

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

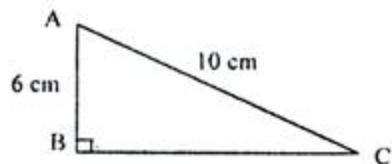
20. If the sides of a square increased by three times, what is the increased of its area?

- (a) 3 times (b) 4 times
(c) 8 times (d) 9 times

21. $ax + by = ab$ and $ax - by = ab$. Which one is correct solution?

- (a) (a, b) (b) (b, a)
(c) (b, o) (d) (o, b)

22.



In figure of ABC—

- i. Area 24 square cm
ii. Perimeter 60 cm
iii. $\angle BAC > \angle ACB$

Which one of the following is correct?

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

23. Which one of the following equation centre of mid point?

- (a) $2x = 3y + 2$ (b) $x + 3y = 5$
(c) $3x = 8y + 2$ (d) $4x = 3y$

24. A wheel rotates 18 times to cover 720 meter length, which is the perimeter of the wheel?

- (a) 40 meter (b) 738 meter
(c) 702 meter (d) 12980 meter

25. The height of cylinder is 13 cm and its radius is 6 cm then—

- i. the land of area is 113.10 square cm
ii. area of the whole surface is 490.09 sq cm
iii. volume is 1470.27 quibic cm

Which one of the following is correct?

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

According to the data below answer the questions 26 and 27 :

The first term of an arithmetic series is 2 and it common difference 3.

26. Which is the n-th term of the series?

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

27. What is the sum of first 8 terms of the series?

- (a) 23 (b) 25
(c) 100 (d) 124

28. What is the n-th term of the series?

$4 + 8 + 16 \dots\dots$

- (a) 2^{n-1} (b) 2^{n+1}
(c) 8^{n-1} (d) 8^{n+1}

29. How many lines of symmetry?

- (a) Circle's (b) Square's
(c) Triangle's (d) Rectangle's

30. 15, 17, 24, 21, 16, 17, 23, 18, 20, 22

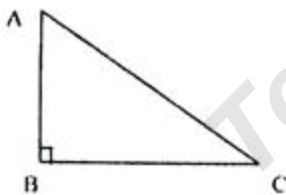
Which is the middle term of the score?

- (a) 17 (b) 17.5
(c) 18.5 (d) 19

31. The diagonal of the rhombus is 10 cm and 12 cm, what is the area of rhombus?

- (a) 11 square cm (b) 22 square cm
(c) 60 square (d) 120 square cm

32.



In figure $2AB = BC$ then—

- i. $\angle BAC = 60^\circ$
ii. $\angle BAC = \angle ACB = 45^\circ$
iii. $\angle ACB = 30^\circ$

Which one of the following is correct?

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

33. If $a + \frac{1}{a} = \sqrt{2}$, find the value of $a^2 + \frac{1}{a^2}$

- (a) -2 (b) 0
(c) 4 (d) 6

34. Find the value of $\log_{\sqrt{7}} 7$.

- (a) $\frac{1}{2}$ (b) 2
(c) $\sqrt{7}$ (d) 7

35. Which is the Rational number?

- (a) $\sqrt{13}$ (b) $\sqrt{14}$
(c) $\sqrt{15}$ (d) $\sqrt{16}$

36. Which one is the simple fraction of 0.61?

- (a) $\frac{20}{33}$ (b) $\frac{11}{18}$
(c) $\frac{61}{100}$ (d) $\frac{2}{3}$

37. If $A = \{1, 2\}$ and $B = \{3, 4\}$ then $A \times B = ?$

- (a) $\{1, 3\}, \{1, 4\}, \{2, 3\}, \{2, 4\}$
(b) $(1, 3), (1, 4), (2, 3), (2, 4)$
(c) $\{(1, 3), (1, 4), (2, 3), (2, 4)\}$
(d) $\{(1, 3), (1, 4)\}, \{(2, 3)\}, \{(2, 4)\}$

36. If $f(x) = \frac{1 + x^2 + x^3}{x^2}$, then find the value of $f(-1)$.

- (a) -3 (b) -1
(c) 1 (d) 3

According to the data below answer the questions 39 to 40.

$$p^3 + \frac{1}{p^3} = 0$$

39. What is the value of $p^2 + \frac{1}{p^2}$?

- (a) 0 (b) 1
(c) 3 (d) 5

40. What is the value of $\left(p - \frac{1}{p}\right)^2$?

- (a) -7 (b) -1
(c) 1 (d) 7

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