SAMPLE QUESTION PAPER - II

MATHEMATICS, SA - 1

Time allowed : 3 to 3½ hours ***Maximum Marks : 80***

General Instructions

1. All questions are compulsory.
2. The question paper consists of 34 questions divided into four sections A, B, C and D. Section A comprises of 10 questions of 1 mark each. Section B comprises of 8 questions of 2 marks each. Section C comprises of 10 questions of 3 marks each and Section D comprises of 6 questions of 4 marks each.
3. Question numbers 1 to 10 in Section A are multiple choice questions where you are to select one correct option out of the given four.
4. There is no overall choice. How ever, internal choice has been provided in 1 question of 2 marks 3 questions of three marks each and 2 questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.
5. Use of calculators is not permitted.

SECTION A

Question number 1 to 10 are of 1 mark each

1. Euclid's Division Lemma states that for any two positive integers a and b, there exists unique integers q and r such that $a = bq + r$ where r must satisfy :

   (a) $0 < r < b$ (b) $0 \leq r \leq b$

   (c) $0 < r \leq b$ (d) $0 \leq r \leq b$

2. In Fig. 1, the graph of a polynomial $p(x)$ is shown. The number of zeroes of $p(x)$ is:

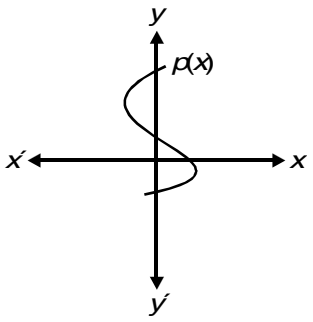

Fig. 1

(a) 1 (b) 2

(c) 3 (d) 4

3. In Fig. 2, if DE || BC, then x equals :

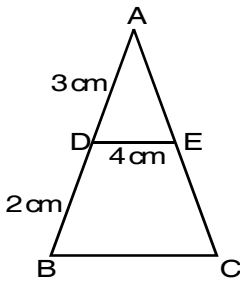

Fig. 2

(a) 3 cm (b) 2 cm

(c) 4 cm (d) $\frac{20}{3}$ cm

4. If $\sin(\theta + 36°) = \cos\theta$ where θ and $\theta + 36°$ are acute angles, then value of θ is

(a) 36° (b) 54°

(c) 27° (d) 90°

5. If $3\cos\theta = 2\sin\theta$ then the value of $\frac{4\sin\theta - 3\cos\theta}{2\sin\theta + 6\cos\theta}$ is :

(a) $\frac{1}{8}$ (b) $\frac{1}{3}$

(c) $\frac{1}{2}$ (d) $\frac{1}{4}$

6. In fig. 3, ΔABC is right angled at B and $\tan A = \frac{4}{3}$. If AC = 15 cm the length of BC is :

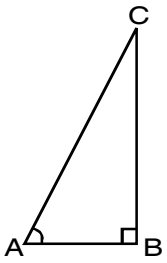

Fig.3

(a) 4 cm (b) 3 cm

(c) 12 cm (d) 9 cm

7. The decimal expansion of $\frac{21}{24}$ will terminate after how many places of decimal?

(a) 1 (b) 2

(c) 3 (d) 4

8. The pair of linear equations $x - 2y = 5$ and $2x - 4y = 10$ have :

(a) Many Solutions (b) No Solution

(c) One Solution (d) Two Solution

9. If $\tan A = \cot B = \frac{15}{7}$ then $A + B$ is equal to :

(a) zero (b) 90°

(c) < 90° (d) > 90°

10. For a given data with 50 observations 'the less than Ogive' and the 'more than Ogive' intersect at (38.5, 34). The median of the data is :

(a) 38.5 (b) 34

(c) 50 (d) 4.5

SECTION B

Question number 11 to 18 are of 2 marks each

11. Is $7 \times 11 \times 13 + 11$ a composite number? Justify your answer.

12. Can $(x + 2)$ be the remainder on division of a polynomial $p(x)$ by $(2x - 5)$. Justify your answer.

13. In Fig. 4, ABCD is a rectangle. Find the value of x and y.

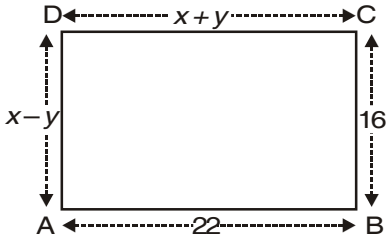

Fig. 4

14. If $\sin (A + B) = 1$ and $\cos (A - B) = 1$, $0° \leq A + B \leq 90°$, find A and B.

OR

If $\cot \theta = \frac{7}{8}$, evaluate $\frac{(1 + \sin \theta)(1 - \sin \theta)}{(1 + \cos \theta)(1 - \cos \theta)}$

15. $ABCD$ is a trapezium in which $AB \parallel DC$ and its diagonals intersect each other at O. Prove that $\frac{AO}{BO} = \frac{CO}{DO}$:

16. In Fig. 5, $\angle S = 90°$, $PQ = 10cm$, $QS = 6$ cm and $RQ = 6$ cm. Calculate the length PR.

17. The following table shows the distribution of the heights of a group of 50 factory workers.

Height (in cm)	150-155	155-160	160-165	165-170	170-175	175-180
No. of Workers	8	14	20	4	3	1

Convert the distribution to a less than type cumulative frequency distribution.

18. Find the mode of the following distribution :

Height (in cm)	30-40	40-50	50-60	60-70	70-80
No. of Plants	4	3	8	11	8

SECTION C

Question number 19 to 28 carry 3 marks each

19. Show that the square of any positive integer is of the form $3q$ or $3q + 1$ for some integer q :

20. Prove that $\frac{3\sqrt{2}}{5}$ is irrational.

OR

Prove $\left(5 + \sqrt{3}\right)$ is irrational.

21. A person starts his job with a certain monthly salary and earns a fixed increment every year. If his salary was Rs. 4500 after 4 years of service and Rs. 5400 after ten years of service, find his initial salary and the annual increment.

OR

After five years the age of Sudama will be three times that of his son. Five years ago Sudama was seven times that of his son. What are their present ages?

22. If α, β are the zeroes of the polynomial $3x^2 + 5x - 2$ then form a quadratic polynomials whose zeroes are 2α and 2β.

23. Prove that $\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\text{cosec } A - 1}{\text{cosec } A + 1}$:

24. If $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$, then prove that $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$:

25. In Fig. $AD \perp BC$. Prove that $AB^2 + CD^2 = BD^2 + AC^2$:

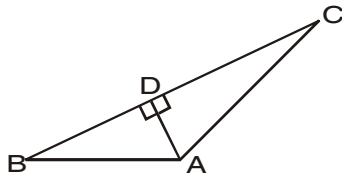

Fig. 6

26. Prove that the area of an equilateral triangle on the side of a square is half the area of an equilateral triangle formed on its diagonal.

27. Find mean of the following frequency distribution using step deviation method:

Classes	25-30	30-35	35-40	40-45	45-50
Frequency	7	14	22	16	11

OR

The mean of the following frequency distribution is 47. Find the value of p :

Classes	0-20	20-40	40-60	60-80	80-100
Frequency	5	15	20	p	5

28. Find the median of the following data :

Classes	40-45	45-50	50-55	55-60	60-65	65-70
Frequency	2	3	8	6	6	5

SECTION D

Question number 29 to 34 carry 4 marks each

29. Find all the zeroes of $2x^4 + 7x^3 + 19x^2 - 14x + 30$ given that two of its zeroes are $\sqrt{2}$ and $-\sqrt{2}$.

30. Prove that in a right triangle the square of the hypotenuse is equal to the sum of the squares of the other two sides :

OR

Prove that the ratio of the areas of two similar triangles is equal to the squares of the ratio of their corresponding sides.

31. Prove that $\cos^8 \theta - \sin^8 \theta = (\cos^2 \theta - \sin^2 \theta)(1 - 2\sin^2 \theta \cos^2 \theta)$:

OR

Find the value of :

$$\tan(90^\circ - \theta)\cot\theta - \sec(90 - \theta)\operatorname{cosec}\theta + \frac{3\left(\cot^2 27^\circ - \sec^2 63^\circ\right)}{\cot 26^\circ \cot 41^\circ \cot 45^\circ \cot 49^\circ \cot 64^\circ}$$

32. Prove that : $\dfrac{\cos A}{1 - \tan A} + \dfrac{\sin A}{1 - \cot A} = \sin A + \cos A$.

33. Solve graphically : $4x - y = 4$, $4x + y = 12$.

(*a*) Find the solution from the graph.

(b) Shade the triangle region formed by the lines and the x – axis :

34. The following distribution gives the heights of 100 pupils in a school :

Height (in cm)	120-130	130-140	140-150	150-160	160-170	170-180
No. of Pupils	12	16	30	20	14	8

Change the above distribution to 'more than type distribution' and draw its Ogive.

ANSWERS

1.	b	2.	a
3.	d	4.	c
5.	b	6.	c
7.	c	8.	a

9. B

10. A

11. Yes

12. No

13. $x = 19,\ y = 3$

14. $A = 45°,\ B = 45°$ **OR** $\frac{49}{64}$.

16. 17 cm.

18. 65

21. ₹ 3900, ₹ 150 **OR** 40 years, 10 years

22. $3x^2 + 10x - 8$

27. 38.3 or $p = 12$.

28. 58.8

29. $\sqrt{2}, -\sqrt{2}, 5, -3/2$.

33. $x = 2,\ y = 4$.