General Instructions:

1. All questions are **compulsory**.
2. The question paper consists of 31 questions divided into four sections A, B, C and D. Section-A comprises of 4 questions of 1 mark each; Section-B comprises of 6 questions of 2 marks each; Section-C comprises of 10 questions of 3 marks each and Section-D comprises of 11 questions of 4 marks each.
3. There is no overall choice in this question paper.
4. Use of calculator is not permitted.

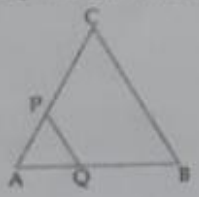
SECTION-A

Question numbers **1** to **4** carry one mark each

1. If $\sin\theta = \sqrt{3}\cos\theta$ find the value of $\frac{\tan\theta - 1}{\tan\theta + 1}$. 1

2. If the median of the series exceeds the mean by 3, find by what number the mode exceeds its mean. 1

3. In the figure, P and Q are points on AC and AB respectively such that $\frac{PC}{AC} = \frac{3}{4}$, PQ ∥ CB and BQ = 4.5 cm. Find AQ. 1



4. If $\tan 2A = \cot(A + 60°)$, find the value of A where 2A is an acute angle. 1

SECTION-B

Question numbers **5** to **10** carry two marks each.

5. In an equilateral triangle of side $3\sqrt{3}$ cm, find the length of the altitude. 2

6. In a ΔXYZ right angled at Y, if XY = 5 cm, XZ = $5\sqrt{2}$ cm, then determine the values of $\angle X$ and $\angle Z$. 2

7 Given below is a frequency distribution table showing daily income of 50 workers of a factory: 2

Daily income of Workers (in ₹)	200-250	250-300	300-350	350-400	400-450
Number of workers	06	10	12	08	14

Change this table to a 'less than type' cumulative frequency table.

8 Use Euclid division algorithm to find that the pair of numbers 615,154 is co - prime or not ? 2

9 Determine whether the $\frac{786}{1500}$ has a terminating decimal expansion or non-terminating repeating decimal expansion. 2

10 Find whether the lines representing the following pair of linear equations intersect at a point, are parallel or coincident : 2

$\frac{3}{2}x + \frac{5}{3}y = 7$

$\frac{3}{2}x + \frac{2}{3}y = 6$

SECTION-C

Question numbers **11** to **20** carry three marks each.

11 If α and β are zeroes of a quadratic polynomial $x^2 + 5$, then form a quadratic polynomial whose zeroes are $1 + \alpha$ and $1 + \beta$. 3

12 Evaluate : 3

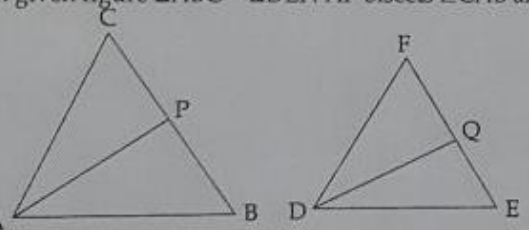
$(\sin^2 15° + \sin^2 75°) + \sqrt{3}$ (tan 13°.tan 60°. tan 27°. cot 20°. cot 70°.tan 77°. tan 63°)

13 What should be added in the polynomial $x^3 - 2x^2 - 3x - 4$ so that it is completely divisible by $x^2 - x$. 3

14 Prove the following identity : 3

$(\sin\theta + 1 + \cos\theta).(\sin\theta - 1 + \cos\theta).\sec\theta.\operatorname{cosec}\theta = 2$

15 In given figure $\Delta ABC \sim \Delta DEF$. AP bisects $\angle CAB$ and DQ bisects $\angle FDE$ 3



Prove that

(a) $\frac{AP}{DQ} = \frac{AB}{DE}$

(b) $\Delta CAP \sim \Delta FDQ$.

16 Sum of the ages of a father and the son is 40 years. If father's age is three times that of his son, then find their respective ages. 3

17 Pens are sold in pack of 8 and notepads are sold in pack of 12. Find the least number of pack of each type that one should buy so that there are equal number of pen and notepads. 3

18 Following frequency distribution shows the daily expenditure on milk of 30 households in a locality : 3

Daily expenditure on milk (in ₹)	0-30	30-60	60-90	90-120	120-150
Number of households	5	6	9	6	4

Find the mode for the above data.

19 If in a right angle ΔABC, right angled at C, P and Q are respectively the middle points of BC and AC, then prove that $AP^2 + BQ^2 = 5PQ^2$. 3

20 In the following distribution, if mean is 78, find the missing frequency (z) : 3

Class	50-60	60-70	70-80	80-90	90-100
Frequency	8	6	12	11	x

SECTION-D

Question numbers **21** to **31** carry four marks each.

21 If $\theta = 30°$, verify the following : 4

(i) $\cos 3\theta = 4\cos^3\theta - 3\cos\theta$

(ii) $\sin 3\theta = 3\sin\theta - 4\sin^3\theta$

22 On annual day of a school, 400 students participated in the function. Frequency distribution showing their ages is as shown in the following table : 4

Ages (in years)	05-07	07-09	09-11	11-13	13-15	15-17	17-19
Number of students	70	120	32	100	45	28	5

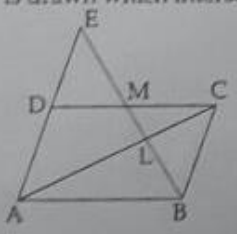
Find mean and median of the above data.

23 Prove that : 4

$$\frac{\sec^3\theta}{\sec^2\theta - 1} + \frac{\operatorname{cosec}^3\theta}{\operatorname{cosec}^2\theta - 1} = \sec\theta\operatorname{cosec}\theta(\sec\theta + \operatorname{cosec}\theta)$$

24 Find the HCF of 256 and 36 using Euclid's Division Algorithm. Also find their LCM and verify that HCF × LCM = product of the two numbers. 4

25 In a parallelogram ABCD, the middle point of CD is M. A line segment BM is drawn which intersects AC at L and meets AD extended at E. Prove that EL = 2 BL. 4



26 Obtain all other zeroes of the polynomial $x^4 - x^3 - 15x^2 + 3x + 36$, if two of its zeroes are $\sqrt{3}$ and $-\sqrt{3}$. 4

27 If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, show that $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$. 4

28 The following distribution gives the state-wise teacher-student ratio in Senior Secondary Schools of India. Draw a 'less than type' ogive and a 'more than type' ogive for this data. 4

Number of students per teacher	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65
Number of states	1	3	2	6	12	5	1	0	3	2

29 Draw the graph of the following pair of linear equations : 4

$3x + 2y = 15$ and $3x - 4y = -3$

Also shade the region bounded by these lines and $y = 0$. Write the coordinates of vertices of the triangle.

30 O is any point in the interior of rectangle ABCD. Prove that $OB^2 + OD^2 = OC^2 + OA^2$: 4

31 The owner of a taxi company decides to run all the taxis on CNG fuels instead of petrol/diesel. The taxi charges in city comprises of fixed charges together with the charge for the distance covered. For a journey of 13 km, the charge paid is ₹ 129 and for journey of 22 km, the charge paid is ₹ 210. 4

(i) What will a person have to pay for travelling a distance of 32 km ?

(ii) Why did he decide to use CNG for his taxi as a fuel ?