Time : 3 hours   Maximum Marks : 80

Instructions : All the questions are compulsory. Section A contains 6 questions of 1 mark each. Section B contains 6 questions of 2 marks each. Section C contains 10 questions of 3 marks each and Section D contains 8 questions of 4 marks each.   Calculators are not allowed.

SECTION A

1   If the HCF of 22 and 46 is of the form $22m - 20.$, then find m .

2   Find the zeroes of the polynomial $x^2 - 3$.

3   In the given figure O is a point inside $\triangle$ PQR,
    such that $\angle POR = 90^0$, OP = 6 cm. OR = 8 cm .
    If QR = 26 cm and $\angle QPR = 90^0$,   then find PQ.

4   If $5 \tan \theta = 3$, then evaluate $\dfrac{(5 \sin \theta - 3 \cos \theta)}{(5 \sin \theta + 3 \cos \theta)}$
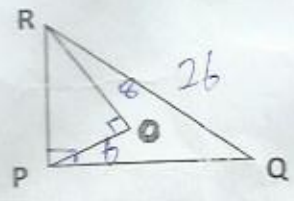
5   Find the value of k for which the quadratic equation $3x^2 + 2x + k = 0$ has real roots.

6   A die is thrown once . What is the probability that it shows a multiple of 3 greater than 4.

SECTION B

7   Evaluate : $2 \cos^2 60^0 + 3 \sin^2 45^0 - 3 \sin^2 30^0 + 2 \cos^2 90^0$.

8   If $\sin 3A = \cos (A - 10^0)$, where 3A is an acute angle, then find the value of A.

9   Solve: $3\sqrt{7} x^2 + 4x - \sqrt{7} = 0$

10   If one zero of the polynomial $x^2 - 9x + 6k$ is twice the other, then find the value of k.

11   If the height of a tree is $3\sqrt{3}$ k metres and it's shadow is of length 9k metres, then find the angle of elevation of the Sun at that time of the day.

12   Show that every positive odd integer is of the form (4q + 1) or (4q + 3) for some integer q.

SECTION C

13   Prove that $\sqrt{3}$ is an irrational number and hence $5 + \sqrt{3}$ is also an irrational number.

14   Find the zeroes of the quadratic polynomial $6x^2 - 7x - 3$ and verify relation between it's zeroes and coefficients .

15   The sum of the squares of two odd positive numbers is 290, find the numbers.

16   In the given figure , the line segment XY II AC of $\triangle$ ABC, and it divides the triangle into two parts of equal area . Prove that
    AX : AB = $(\sqrt{2} - 1)$: $\sqrt{2}$
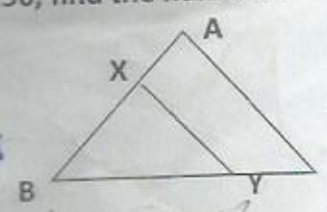
17. Prove that the area of an equilateral triangle described on a side of a square is half the area of the equilateral triangle described on the diagonal of the same square.

18. From the top of a hill, the angles of depression of two consecutive km stones in the same direction are found to be 30^0 and 45^0. Find the height of the hill.($\sqrt{3}$ =1.72)

19. Prove that : $\sec\theta$ (1- $\sin\theta$) ($\sec\theta$ + $\tan\theta$) = 1

20. Two coins are tossed simultaneously. Find the probability of getting
    (i)Exactly one tail   (ii)at most one head   (iii)no tail

21. A card is drawn at random from a well shuffled deck of cards. Find the probability that the card drawn is
    (i)   a card of spades or an ace   (ii)   a face card

22. Calculate the mode of the following frequency distribution :

Class	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55
frequency	25	34	50	42	38	14

SECTION D

23. Prove that : $(\sin\theta + \text{cosec}\theta)^2 + (\cos\theta + \sec\theta)^2 = 7 + \tan^2\theta + \cot^2\theta$

24. If $x = r \sin\alpha \cos\beta$, $y = r \sin\alpha \sin\beta$ and $z = r \cos\alpha$ then prove that $r^2 = x^2 + y^2 + z^2$

25. In an equilateral $\triangle ABC$, D is a point on the side BC such that 3BD = BC. Prove that $9AD^2 = 7AB^2$.

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

27. Solve :
$$\frac{1}{(a+b+x)} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$$

28. The angles of depression of the top and bottom of a building from the top of a 60 m high tower are 30^0 and 60^0 respectively. Find the height of the building.

29. The following data gives production yield per hectare of wheat of 100 farms of a village. Draw a 'more than type ogive' and also find the median using it.

Production yield (kg/hectare)	40 - 45	45 - 50	50 - 55	55 - 60	60 - 65	65 - 70
Number of farms	5	7	14	19	30	25

30. The arithmetic mean of the following frequency distribution is 25. Find the value of p.

Class	0 - 10	10 -20	20 - 30	30 - 40	40 - 50
frequency	5	18	15	p.	6

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