MATHEMATICS

TIME:3 Hrs

MAXIMUM MARKS :80

General instructions:

- All questions are compulsory.
- The question paper consists of 30 questions divided into 4 sections, A, B, C and D.
- Section-A consists of 6 questions of 1 mark each. Section-B consists of 6 questions of 2 marks each. Section-C consists of 10 questions of 3 marks each and Section-D consists of 8 questions of 4 marks each.
- Use of calculator is not permitted.

SECTION-A ($1 \times 6 = 6$ Marks)

1. Find the value of k if one of the zeroes of the quadratic polynomial $(k-1)x^2 + kx + 1$ is -3.
2. If positive integer a and b are written as $a = x^3y^2$ and $b = xy^3$, where x and y are prime numbers, then find the H.C.F. of a and b.
3. For what value of k, do the equations $3x - y + 8 = 0$ and $6x - ky = -16$ represent coincident lines?
4. If the n^{th} term of an a.p. is $3n-2$, find the sum of first 20 terms.
5. If angle between two tangents drawn from a point P to a circle of radius $\sqrt{3}$ cm and centre O i 60^0.Find the length of OP.
6. State the following statement true or false with reasons: "$\sqrt{1.44}$ is an irrational number."

SECTION – B ($2 \times 6 = 12$ Marks)

7. If one of the zeroes of the cubic polynomial $ax^3 + bx^2 + cx + d$ is 0, then find the product of other two zeroes.
8. Find the altitude of an equilateral triangle of side 8 cm.
9. If a pole 6m high casts a shadow $2\sqrt{3}m$long on the ground, then find the Sun's elevation.
10. Prove that $(\sqrt{3} + 1)(3\text{-}\cot 30^0) = \tan^3 60^0 - 2\sin 60^0$.
11. Prove that $(\sin\alpha + \cos\alpha)(\tan\alpha + \cot\alpha) = \sec\alpha + \text{cosec}\alpha$.
12. If $\sqrt{3}\tan\emptyset = 1$,then find the value of $\sin^2\emptyset - \cos^2\emptyset$.

SECTION – C ($3 \times 10 = 30$ Marks)

13. Find the largest number which divides 70 and 125 leaving remainder 5 and 8 respectively.
14. Show that one and only one out n,n+4,n+8,n+12 and n+16 is divisible by 5,where n is any positive integer.
15. If the zeroes of the cubic polynomial $x^3 - 6x^2 + 3x + 10$ are of the form a , a + b and a + 2b f some real numbers a and b,find the values of a and b.

16. Two numbers are in the ratio 5: 6 .If 8 is subtracted from each of the numbers, the ratio becomes 4: 5.Find the numbers.

17.How many numbers lie between 10 and 300, which if divided by 4 leave a remainder 3.

18.If A and B are respectively the points on the sides PQ and PR of a ΔPQR such that PQ = 12.5cm, PA=5cm, BR=6cm and PB=4cm.Is AB||QR?

19.Two tangents PQ and PR are drawn from an external point to a circle with centre O.Prove that QORP is a cyclic quadrilateral.

20.Prove that the centre of a circle touching two intersecting lines lies on the angle bisector of the lines.

21.A child's game has 8 triangles of which 3 are blue and rest are red, and 10 squares of which 6 are blue and rest are red.One piece is lost at random. Find the probability that it is a

i) Triangle
ii) Square of blue colour
iii) Square

22.Show that: $\frac{sinA}{secA+tanA-1} + \frac{cosA}{cosecA+cotA-1} = 1$

SECTION – D (4 × 8 = 32 Marks)

23.If $(x-\sqrt{5})$ is a factor of the cubic polynomial $x^3 - 3\sqrt{5}\,x^2 + 13x - 3\sqrt{5}$, then find all the zeroes of the polynomial.

24.Draw the graph of the pair of equations $2x + y = 4$ and $2x - y = 4$.Write the vertices of the triangle formed by these lines and the y-axis. Find the area of this triangle.

25.If the first term of an AP is a, the second term is b and the last term is c, then show that the sum of the AP is equal to $\frac{(a+c)(b+c-2a)}{2(b-a)}$.

26.If s denotes the semi-perimeter of a ΔABC in which BC = a, CA = b and AB = c and if a circle touches the sides BC, CA, AB at D, E, F respectively. Prove that BD = s – b.

27.In ΔPQR, PD ⊥ QR such that D lies on QR, if PQ = a, PR = b, QD = c and DR = d, then prove that $(a + b).(a - b) = (c + d)(c - d)$.

28.Prove that the area of the equilateral triangle drawn on the hypotenuse of a right angled triangle is equal to the sum of the areas of the equilateral triangle drawn on the other two sides of the triangle.

29.Prove that : $\left(\frac{1+sinx-cosx}{1+sinx+cosx}\right)^2 = \frac{1-cosx}{1+cosx}$

30.Prove that $\frac{\sin\emptyset}{\cos\emptyset+1} + \frac{1+\cos\emptyset}{\sin\emptyset} = 2\text{ cosec }\emptyset$.