General Instructions

1. All questions are compulsory
2. The question paper consists of 25 questions divided into 3 sections A, B and C. Section A consists of 7 questions of 2 marks each. Section B consists of 12 questions of 3 marks each. Section C consists of 6 questions of 5 marks each.
3. There is no overall choice. However internal choice has been provided in two questions of 2 marks each, two questions of 3 marks each, two questions of 5 marks each.
4. In question on construction drawing should be neat and exactly as per given measurement.
5. Use of calculators is not permitted, however you may ask for mathematical tables.

Section A

1. Solve for x and y $8x - 3y = 5xy$, $6x - 5y = -2xy$

   Or

   Solve $ax + by = a - b$, $bx - ay = a + b$

2. Find the values of p and q so that the polynomial $f(x) = px^3 + 2x^2 - 19x + q$ is divisible by $x^2 + x - 6$.

3. Drive quadratic formula.

4. The mth term of an A.P. is n and nth term is m, find (m + n)th term

5. A fan is marked at Rs.970 cash or for Rs.210 cash down payment followed by three equal monthly instalments. If the rate of interest charged under the instalment plan is 16% per annum, find the monthly instalment.

6. Two poles of height a and b metres are p metres apart. Prove that the height of the point of intersection of line joining the top of each pole to the bottom of the other is given by $\dfrac{ab}{a+b}$

   Or

   Prove any four vertices of a regular pentagon are concyclic.

7. Two coins are tossed simultaneously. Find the probability of getting (a) two heads (b) at least one head (c) exactly one head

Section B

8. Find graphically the vertices of the triangle whose sides are given by $3y = x + 18$, $x + 7y = 22$ and $y + 3x = 26$

9. Simplify $\left[\left(\dfrac{1}{x} + \dfrac{1}{y} \right) \left\{ (x-y)^2 + xy \right\} \right] + \left[\left(\dfrac{1}{x} - \dfrac{1}{y} \right) \left\{ (x+y)^2 - xy \right\} \right]$

10. Rs.1200 were divided equally among a certain number of boys. Had there been 8 more boys, each would have received Rs. 5 less. Find the number of boys.

11. Find the sum of   1 + 3 + 5 + 7 + ……..+ 999

Or

Find the sum of all 3 digit numbers each of which leaves a remainder 3 when divided by 5

12. A builder announces sale of flats for Rs.3000000 cash or for Rs.1031600 cash down payment And three equal quarterly instalments. If the rate of interest charged is 10% p.a. compounded quarterly, compute the value of each instalment. Also find the total interest.

13. Bisectors of angles A, B and C of a ΔABC intersect the circumcircle at D, E and F respectively Prove that angles of ΔDEF are 90˚ - A/2, 90˚ - B/2 and 90˚ - C/2

14. Draw a quadrilateral ABCD in which AB = 3.5 cm, AC = 4.5 cm, AD = 2.5 cm, $\angle A = 100˚$ and $\angle B = 60˚$. Construct a quadrilateral similar to ABCD with its sides equal to ¾ of the corresponding sides of quadrilateral ABCD.

15. Evaluate $\tan(55 - \alpha) - \cot(35 + \alpha) - \dfrac{\cos 55^0 \cos ec35^0}{\tan 5^0 \tan 25^0 \tan 45^0 \tan 65^0 \tan 85^0}$

Or

Show that $(\sin\theta + \cosec\theta)^2 + (\cos\theta + \sec\theta)^2 = 7 + \tan^2\theta + \cot^2\theta$

16. Find if points (1, 2), (5, 3), (18, 6) are collinear

17. The height of a cone is 30 cm. A small cone is cut off at the top by a line parallel to its base. If its volume be $\dfrac{1}{27}$ of the volume of given cone, find height above the base is section cut off?

18.

Items	wheat	pulses	jwar	groundnuts	vegetables	total
Percentage	$\dfrac{125}{3}$	$\dfrac{125}{6}$	$\dfrac{25}{2}$	$\dfrac{50}{3}$	$\dfrac{25}{3}$	100

19. Find if points (1, 2), (5, 3), (18, 6) are collinear. If not find area of triangle formed.

Section C

20. Annual income of a woman aged 66 years is Rs 500000. She donates Rs 10000 to N.D.F (100% exemption). and Rs 10000 to a charitable trust (50% exemption). She pays a premium of Rs 20000 to L.I.C. half yearly and buys N.S.C. worth Rs50000. She buys infrastructure bonds worth Rs 40000. Find tax payable at the end of the year if Rs 5000 are deducted every month from his salary as tax for the first 11 months of the year.

	Rate of Tax	Surcharge	Educational cess
Up to Rs.1,85,000	Nil	Nil	Nil
Rs1,85,001 to Rs2,50,000	20% of total Income exceedingRs.1,85,000	Nil	2 % of income tax

Rs2,50,001 to Rs10,00,000	Rs.13,000 + 30% of total income exceeding Rs.2,50,000	Nil	2% of income tax
Above Rs.10,00,000	Rs.2,38,000 + 30% of total income exceeding Rs.10,00,000	10% of income tax	2% of income tax and surcharge

21. State and prove converse of Pythagoras theorem. Using it prove
$AC^2 = AD^2 + BC^2 + 4ar\ (\Delta ABC)$ Given in $\Delta ABC,\ \angle ABC = 135^0$

Or

If two sides and a median bisecting the third side of a triangle are respectively proportional to corresponding sides and median of another triangle then two triangles are similar.

22. Prove ratio of areas of two similar triangles is equal to the ratio of squares of corresponding sides. Using it prove that equilateral triangles described on the two sides of a right triangle are together equal to the equilateral triangle on the hypotenuse in terms of area

23. At a foot of a mountain the elevation of its summit is 45°.After ascending 2 km towards its summit at a 30° inclination, the elevation becomes 60°.Find the height of mountain.

Or

The angle of elevation, θ of a vertical tower from a point A on ground is such that such that its tangent is $\dfrac{5}{12}$. On walking 192 m towards tower the tangent of the angle of elevation ϕ is found to be $\dfrac{3}{4}$. Find the height of the tower.

24. Find the missing frequencies, given mean of following data is equal to 50

x	10	30	50	70	90	Total
f	17	a	32	b	19	120

25. The difference of outer and inner surfaces of a cylindrical metallic pipe 14 cm long is 44 cm^2 and it is made of 99 cm^3 of metal. Find outer and inner radii of pipe.