

Instructions: Do not write or mark anything on the question paper.

- 1) The question paper consists of five parts A, B, C, D and E. Answer all the parts.
- 2) Part A carries 20 marks, Part B carries 12 marks, Part C carries 18 marks, Part D carries 20 marks and Part E carries 10 marks.
- 3) Write the question numbers properly as indicated in the question paper.

PART-A

I. Answer All the multiple-choice questions:

10 × 1 = 10

1. The imaginary part of $\frac{2}{3} - \frac{4i}{5}$ is
 a) $\frac{-4i}{5}$ b) $\frac{+4i}{5}$ c) $\frac{-4}{5}$ d) $\frac{4}{5}$
2. If A has 4 elements, how many elements will P(A) have?
 a) 4 b) 16 c) 2 d) 8
3. Simplify $\left[\left\{\sqrt[3]{x^2}\right\}^3\right]^{1/2}$ is
 a) 1 b) x^2 c) x^3 d) x
4. The logarithmic form of $5^{-2} = 0.04$
 a) $\log_5 -2 = 0.04$ b) $\log_5 0.04 = -2$ c) $\log_2 0.04 = -5$ d) $\log_{0.04} 5 = -2$
5. The sum to infinity of the GP $1, \frac{1}{2}, \frac{1}{4}, \dots$ is
 a) 2 b) $\frac{1}{2}$ c) $\frac{2}{3}$ d) $\frac{3}{2}$
6. Nature of the roots of the equation $x^2 + x + 4 = 0$
 a) real and equal b) real and unequal c) unequal and imaginary d) none
7. The solution of $5x - 10 \geq 0, x \in R$
 a) $(2, \infty)$ b) $(-2, \infty)$ c) $[2, \infty)$ d) $[-2, \infty)$
8. The present value of a perpetuity of 3000 to be received forever at 4% is
 a) 7500 b) 75 c) 75000 d) 750
9. If the slope of the line joining (3,a) and (4,3) is $7/2$, then the value of a is
 a) $-\frac{1}{2}$ b) $\frac{1}{2}$ c) $\frac{19}{7}$ d) $\frac{-19}{7}$
10. The value of $(1 + \tan^2 \theta) \cdot (1 - \sin^2 \theta)$ is
 a) $\sec^2 \theta$ b) 1 c) 0 d) $\cos^2 \theta$

II. Match the following:

5 × 1 = 5

11.

- (a) If $(2x, x+y) = (8,4)$, then value of y is
- (b) The simple interest on ₹650 for 14 weeks at 6% p.a is
- (c) The weight of 6 men are 90kg, 70.5 kg, 56 kg, 45.5 kg., 85 kg, and 78 kg. Then the average weight is
- (d) conversion of 75% to fraction is
- (e) y - intercept of the line $3x-2y+1=0$ is

- i) $\frac{1}{2}$
- ii) 70.83
- iii) 0
- iv) $\frac{3}{2}$
- v) 10.4712
- vi) $\frac{3}{4}$

III. Fill in the blanks by choosing appropriate answer from given options:**5 × 1 = 5** $\left(\frac{16}{5}, 6, 64, -17, 10\right)$

12. If the product of two numbers is 216 and their LCM is 36, then their HCF is _____.
13. If $A = \{2, 3, 4\}$, $B = \{3, 4\}$ Find the number of relations that can be defined from A to B is _____.
14. The first term of an AP is 3 and the common difference is -2, then the 11th term is _____.
15. The sum of 4 times a number and 3 times the number is 70, then the number is _____.
16. The length of the perpendicular drawn from the point $(-2, -1)$ to the line $4x + 3y - 5 = 0$ is _____.

PART-B**IV. Answer any SIX questions:****6 × 2 = 12**

17. Find the sum of all positive divisors of the number 825.
18. Find the domain and range of the relation $R = \{(x, y): y = x^3, x \text{ is a positive prime number less than } 10\}$.
19. If $f(x) = 2x + 1$, $g(x) = x^2 + 2x + 1$. Find $g(f(3))$ and $f(g(-1))$.
20. How many terms of AP -3, -5, -7 amount to -120?
21. Insert 4 H. M's between $\frac{1}{3}$ and $\frac{1}{13}$
22. Two numbers are in the ratio 5:6 and if 4 is subtracted from each of them, then the resulting numbers are in the ratio 3:4. Find the numbers.
23. Solve $7x + 3 < 5x + 9$, $x \in R$. Also represent the solution on the number line.
24. Prove that $\operatorname{cosec} A - \sin A = \cot A \cdot \cos A$
25. Find the equation of the line passing through $(4, 3)$ and with slope 2.

PART-C**V. Answer any SIX questions:****6 × 3 = 18**

26. Find the number which when divided by 16, 20 and 40 leaves the same remainder 4.
27. If $A = \{1, 2, 3, 4, 5\}$, $B = \{3, 4, 5, 6, 7\}$, $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$ verify $(A \cup B)' = A' \cap B'$
28. If $p^x = q^y = r^z = s^w$ and $pq = rs$. Prove that $\frac{1}{x} + \frac{1}{y} = \frac{1}{z} + \frac{1}{w}$.
29. If α and β are the roots of the equation $2x^2 - 5x + 7 = 0$. Find the values of:
 (i) $\alpha^2 + \beta^2$ (ii) $\alpha + \beta + \alpha\beta$ (iii) $\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha}$
30. Solve the following linear inequality graphically: $3x + 4y \geq 12$, $4x + y \geq 8$.
31. A rare species of tigers were kept in a wildlife sanctuary and reared. Its population increased by 10% in the 1st year and 5% in the 2nd year but decreased by 20% in the 3rd year. If the animals in the beginning were 500. Find their number at the end of third year.
32. An aeroplane flies once round a square whose side is 100km long taking the first at 100kmph, second at 200kmph, third at 300kmph and the fourth at 400kmph. Find the average speed of the plane in its flight along the square.
33. Prove that $\sqrt{\frac{\sec \theta + 1}{\sec \theta - 1}} = \operatorname{cosec} \theta + \cot \theta$
34. Find the equation of the locus of all points equidistant from the point $(2, 4)$ and y axis.

PART-D**VI. Answer FOUR questions:****4 × 5 = 20**

35. In a survey of 100 persons it was found that 28 read magazine A, 30 read magazine B, 42 read magazine C, 8 read magazine A and B, 10 read magazine A and C, 5 read magazines B and C while 3 read all the three magazines. Find: i) How many read none of the three magazines? ii) How many read only magazine C? Also show the result through Venn diagram.

36. Evaluate using logarithmic table $\frac{\sqrt{6.43} \times 0.5789}{(13.46)^{3/2}}$.
37. Find an integral root between -3 and 3 by inspection and then using synthetic division solve the equation $x^3 - 2x^2 - 5x + 6 = 0$.
38. A person borrowed ₹65,000 at 8% p.a. simple interest for 4 years and lent out the money for 10% compound interest for 4 years. How much did the person gain?
39. How much should you invest if you want to receive ₹5000 at the beginning of each year for the next 5 years if the compound interest is 16% p.a. compounded quarterly.
40. Venu gives 50% of his salary to his wife, 40% of the remaining he spends on recreation, 20% of the remaining he gives to his daughter as pocket money and still saves ₹12,000. What is Venu's income? Also find the amount he gives to his wife and daughter.
41. Find the coordinate of the foot of the perpendicular from $(-6, 2)$ on the line $3x - 4y + 1 = 0$.

PART-E

VII. Answer the following questions:

42. Find the sum to n terms of the series $0.5 + 0.55 + 0.555 + \dots$ (6 marks)

(OR)

Find the coordinates of the vertices of the triangle given the mid points of the sides as $(4, -1)$, $(7, 9)$, $(4, 11)$

43. A company sells ' x ' tins of talcum powder per day at ₹ 10/tin. The cost of manufacturing a tin is ₹6 and the distributor charge is ₹1/tin, besides the daily overhead cost is ₹600. Determine. i) Cost function ii) Revenue function iii) Profit function iv) Break-even level of production.

(4 marks)

(OR)

If $\sin \theta = -\frac{3}{5}$ and θ lies in IV quadrant then prove that $\frac{3 \tan \theta - 4 \cos \theta}{4 \tan \theta + 3 \cos \theta} = \frac{109}{12}$
