Instructions:

i) **The question paper has five parts A, B, C, D and E. Answer all the parts.**

ii) **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.**

iii) **Write the question number properly as indicated in the question paper.**

iv) **Use graph sheet for the question number 30.**

PART -A

I. Answer ALL the multiple-choice questions: 10×1=10

1. The imaginary part of $3 + 5i$ is
   a) 5   b) 5i   c) -5i   d) -5

2. If A={2,3} , B={3,4} then the number of relations that can be defined from A to B is
   a) 8   b) 16   c) 4   d) 2

3. Simplify : $\dfrac{2^{(2^0)}+(2^0)^3}{(2^3)^2+(2^2)^0}$
   a) $\dfrac{1}{41}$ b) $\dfrac{2}{39}$ c) $\dfrac{3}{65}$ d) $\dfrac{2}{17}$

4. The logarithmic form of $2^{-1} = \dfrac{1}{2}$
   a) $\log_{\frac{1}{2}} 2 = -1$ b) $\log_{\frac{1}{2}} -1 = 2$ c) $\log_2 -1 = \dfrac{1}{2}$ d) $\log_2 \dfrac{1}{2} = -1$

5. The sum of AP $\dfrac{3}{2}$, 2, $\dfrac{5}{2}$, ……. to 18 terms is
   a) 90   b) $\dfrac{207}{2}$ c) $\dfrac{201}{2}$ d) 181

6. The value of x in 7x – 5 [x – {7 – 6 (x – 3)}] = 3x + 1 is
   a) 1   b) 2   c) 3   d) 4

7. The solution of $5x - 3 < 3x + 1, x \in R$ is
   a) $(\infty, 2)$ b) $(-\infty, 2)$ c) $(-\infty, 2]$ d) $(+\infty, 2]$

8. If R =12%, then the doubling period as per rule of 72 is
   a) 5.75   b) 6.5   c) 6   d) 6.1

9. The radian measure of $144°$ is
   a) $\dfrac{3\pi}{5}$ b) $\dfrac{4\pi}{5}$ c) $\dfrac{3\pi}{4}$ d) $\dfrac{3\pi}{8}$

10. The equation of the line parallel to y-axis and at a distance of 5 units to the left of it is
    a) $y = -5$ b) $y = 5$ c) $x = 5$ d) $x = -5$

II. Match the following: 5×1=5

11.

A	B
a) If (2x, x+y) = (8,4), then value of x is	i) 50000
b) A person endows a bed in a hospital at the cost of ₹7000 p.a. If the interest rate is 14% p.a then perpetuity is	ii) 8
c) The average age of 10 students is 6 years. The sum of the ages of 9 of them is 52 years. Then the age of 10th student is	iii) 4
d) The cost of an article is ₹80. If a profit of ₹20 is made by selling the article, then Profit percentage	iv) $\dfrac{10}{\sqrt{5}}$
e) The distance between parallel lines x+2y+3=0 and x+2y-7=0 is	v) 25
	vi) $\dfrac{-10}{\sqrt{5}}$

III. Fill in the blanks by choosing appropriate answer from the given options   5×1=5

$(\frac{-1}{3}, 12, 5, 3, \frac{8}{5}, \frac{1}{2})$

12. HCF of 55 and 210 is _____.

13. If f(x)=x^2. Then the value of $\frac{f(2)-f(1)}{(2-1)}$ is _____.

14. If $\frac{3}{5}, k, \frac{13}{5}$ are in A.P, then the value of k is _____.

15. The sum of 6 times a number and 7 times the number is 156. The number is _____.

16. The x-intercept of $3x - 2y + 1 = 0$ is _____.

PART -B

IV. Answer any SIX of the following questions: 6×2=12

17. Find the numbers which when divided by 36, 40 and 48 leaves the same remainder 5.

18. If If A={3, 5, 7} B={5, 7, 9} C={7, 9, 11}. Find $(A \cap B) \times (B - A)$.

19. If A = { 1, 2, 3, 4, 5} Find the relations from A to A
    a) R$_1$= { (x, y) : y = x + 3}   b) R$_2$ = { (x, y) : x = y }

20. How many terms of the GP 1,3,9, … will amount to 364?

21. Insert 3 H.M.'s between $\frac{1}{4}$ and $\frac{1}{12}$

22. Two numbers are in the ratio 5:8, their difference is 15, find the numbers.

23. Solve: $\frac{5-2x}{3} \leq \frac{x}{6} - 5, x \in R$. Represent the solution on the number line.

24. P.T. (1 + cot A)^2 + (1 - cot A)^2= 2 cosec ^{2}A.

25. Find the equation of the line passing through (-2, 4) and parallel to $3x - 4y + 1 = 0$.

PART -C

V. Answer any SIX of the following questions: 6×3=18

26. Find the number of positive divisors and the sum of all positive divisors of the number 825.

27. If f(x) = x + 1 and g(x) = x^2 + 1 Find i) fog (1)   ii) fog(2)   iii) gof (1).

28. If a$^{1/3}$+b$^{1/3}$+c$^{1/3}$=0 , then show that (a+b+c)^3=27abc.

29. If α & β are the roots of the equation 3x^2 – 6x + 4 = 0.
    Find the values of i) α^2 + β^2 ii) $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$ iii) α^3 + β^3

30. Solve the following linear inequality graphically: 2x + y ≥ 8, x + y ≥10.

31. The annual birth and death rate per 1500 are 30.5 and 12.5 respectively. If the present population is 2,45,000, find the population after 10 years.

32. Of several persons donating to a charity 10 persons gave ₹99 each, 25 gave ₹50 each, 33 gave ₹25 each, 46 gave ₹10 each and the rest gave ₹5 each. It was found that the average donation is ₹20/- How many donors are there?

33. Prove that $\sqrt{sec^2 A + cosec^2\ A}$= tan A+ cot A.

34. Find the equation of the locus of the point which moves such that it lies on the perpendicular bisector of the line joining the points (-1, 5) and (2,4).

PART -D

VI. Answer any FOUR following questions: 4×5=20

35. In a class of 100 students, 35 play football, 45 play basketball, 35 play indoor games ,10 play football and basketball, 15 play basketball and indoor games, 5 play football, basketball and indoor games. If 15 do not play any games then find how many play football and indoor games? Also draw the Venn diagram.

36. Evaluate using logarithmic table $\frac{\sqrt{14.5} \times \sqrt[3]{8.571}}{(16.751)^{2/3}}$.

37. Find an integral root between -3 and 3 by inspection and then using synthetic division solve the equation $x^3 - 3x^2 - 28x + 60 = 0$.

38. A person borrows a certain sum of money at 3% p.a. simple Interest and invests the same at 5% p.a. compound interest compounded annually. After 3 years he makes a profit of ₹1,082. Find the amount he borrowed.

39. Raj wants to invest a lump-sum amount in the bank so that he can get an annual income of ₹15,000 every year for the next 10 years. If the bank offers 16% p.a compound interest, what is the amount he should invest today?

40. A wholesale dealer sold a machine to a shopkeeper at 20% profit. The shopkeeper sold it to a customer so as to get 25% profit for himself. The difference between the selling price of the shopkeeper and that of the whole sale dealer was found to be ₹129. Find the initial price of the machine.

41. Find the equation of a straight line which passes through the point (3, 4) and have intercepts on the axes such that their sum is 14.

PART-E

VII. **Answer the following questions:**

(6 marks)

42. Find the sum to n terms of the series 0.3+ 0.33 + 0.333 + ……..

OR

If the mid points of the sides of the triangle are (2,6), (4,6) and (3,5) then find the vertices of the triangle.

(4 marks)

43. A shoe manufacturer is planning production of new varieties of shoes. For the first year the fixed cost of setting up the new production line are ₹1.25 lakh, Variable cost for producing each pair of shoes are ₹35. The sales department project that 1500 pair can be sold in the first year at the rate of ₹160/pair.
    i) Find the cost function
    ii) Find the Revenue function
    iii) Find the profit function for the product for the sale of 'x' pair of shoes.
    iv) Determine the BEP

OR

If $\tan A = -\dfrac{12}{5}$ and $270° < A < 360°$. Find the value of $\dfrac{3 \sin A - 2\cos A}{9\cos A + 4 \sin A}$.

***