M – 2024

Register Number :

Subject Code : 75

BASIC MATHEMATICS

Time : 3 Hours 15 Minutes] [Total No. of questions : 46] [Max. Marks : 80

Instructions : *1) The Question paper has **Five** Parts namely **A, B, C, D** and **E**. Answer **all** the Parts.*

*2) Part **A** carries **20** marks.*
*Part **B** carries **12** marks.*
*Part **C** carries **15** marks.*
*Part **D** carries **25** marks.*
*Part **E** carries **8** marks.*

3) Write the question number properly as indicated in the question paper.

4) Answer for the question should be continuous.

*5) Only the first written answers will be considered for Part **A**.*

*6) Use graph sheet for the question No. **31** on linear inequalities in Part **C**.*

PART – A

I. Choose the correct answer (**Each** carries **1** mark). **(5×1=5)**

1) The imaginary part of 4 – i is

a) – 1 b) 1 c) 4 d) 0

2) Let A = {a, b, c, d, e} and B = {c, d, e, f, g, h} then B – A is

a) {a, b, c} b) {c, d, e}

c) {d, e} d) {f, g, h}

3) The value of $(5)^{5^\circ} + (5^2)^\circ$ is

a) 6 b) 7 c) 2 d) 26

P.T.O.

4) The profit function p(x) is given by

a) $R(x) - C(x)$

b) $\frac{R(x)}{P(x)}$

c) $R(x) + C(x)$

d) $R(x).C(x)$

5) Slope of the line with the inclination 60° is

a) $\frac{1}{\sqrt{3}}$

b) 1

c) $\sqrt{3}$

d) -1

(5×1=5

II. 6) Match the following :

i) If $f(x) = 3x + 5$ then f(3) is

ii) The logarithmic form of $3^{-2} = \frac{1}{9}$ is

iii) The 6^{th} element of G.P. 3, 6, 12, - - - - is

iv) Priya invested ₹ 6,000 for 3 years and received ₹ 1,080 as interest then the rate of interest is

v) The perpetuity P_∞ is

a) 6%

b) 96

c) $\frac{a}{i}$

d) $\log_3^{1/9} = -2$

e) 14

f) 8%

III. For question numbers **7** to **11**, choose the appropriate answer from the answers given in the brackets. (5×1=5

$\left(34,\ 3,300, 9,\ x > \frac{11}{5},\ \pi/36, 19\pi/36\right)$

7) If A = {2, 4, 6} and B = {1, 3, 5} then the number of elements in B×A is _____

8) 12^{th} term of A.P. 1, 4, 7, . . . is _____

9) If $3x - 4 > 7 - 2x$, $x \in R$, then _____

10) Nihal bought a cycle for ₹ 3000, if his gain was 10% then his selling price was _____

11) 95° in radians is _____

IV. Answer **all** the questions. **(5×1=5)**

12) If $\frac{1}{3}$, x, $\frac{3}{2}$ are in H. P. then find x.

13) Solve for x, $5x - 3 < 3x + 1$.

14) Average age of 10 boys in a class is 13 years. What is the sum of their ages ?

15) Simplify sinA.secA.

16) Find the equation of the locus of the point which moves such that its distance from y-axis is 3 times its distance from x-axis.

PART – B

V. Answer **any six** questions. **(6×2=12)**

17) Find the H.C.F. of 55 and 210.

18) If R = {(2, 8) (3, 27) (5, 125) (7, 343) then find the domain and range of R.

19) If $f(x) = x^2$ then find the value of $\frac{f(2) - f(1)}{2 - 1}$.

20) The 3^{rd} term of an A. P. is – 11 and 14^{th} term is – 44. Find the 20^{th} term.

21) If α and β are the roots of the equation $2x^2 - 10x + 5 = 0$, then find the value of $\alpha^2 + \beta^2$.

22) Solve $5x - 10 \geq 0$, $X \in R$. Also represent the solution on the number line.

23) A certain sum of money amounts to ₹ 24,200 in 2 years at 10% compound interest. Find the sum.

24) The difference between the acute angles of a right angled triangle is $2\pi/5$. Express the angles in degrees.

25) Prove that $\sec^2 A + \text{cosec}^2 A = \sec^2 A . \text{cosec}^2 A$.

26) Find the equation of the locus of the point P which moves such that $PA^2 = 3PB^2$ where A = (5, 0) and B = (–5, 0).

27) Find the equation of the line passing through (1, 2) and parallel to the join of the points (3, 1) and (4, – 5).

PART – C

VI. Answer **any five** questions. **(5×3=15)**

28) Solve $\frac{7^{3-2x}}{7^{7-5x}} = (49)^{3x-14}$.

29) The sum of 3 numbers in A.P. is – 18 and sum of their squares is 140. Find the numbers.

30) Divide 36 into 2 parts such that the sum of the reciprocals is $\frac{1}{8}$.

31) Solve the system of linear inequalities graphically $3x + 4y \leq 12$ and $2x + y \geq 6$.

32) The average weight of a group of boys and girls is 38 kg. The average weight of boys is 42 kg and that of girls is 33 kg. If the number of boys is 25. Find the number of girls.

33) If $C(x) = 12.5x + 6400$. If each unit is sold for ₹ 25 then find the minimum number of units that should be produced and sold to ensure no loss. If the selling price is reduced by ₹ 2.5/unit. What would be the break even point ?

34) Find the equation of the straight line which passes through the point of intersection of the lines. $3x + y = 10$ and $x + 7y = 10$ and parallel to the line $4x - 3y + 1 = 0$.

PART – D

VII. Answer **any five** questions. **(5×5=25)**

35) Write the canonical representation of 306. Also find the number of positive divisors and the sum of all positive divisors of 306.

36) In a class of 150 students, it was found that 95 like burgers and 79 like pizzas. Assuming every student like at least one of the above, find the number of students who like both burgers and pizzas. Show that the result through Venn diagram.

37) Find the value of $\frac{213.781 \times 7.434}{6.321}$ using log tables.

38) Find an integral root between – 3 and 3 by inspection and then using synthetic division. Solve the equation $x^3 - 2x^2 - 5x + 6 = 0$.

39) A father wishes to divide ₹ 50,000 amongst his 2 daughters who are respectively 12 and 15 years old in such a way that the sum invested at 5% p.a. compound interest will give the same amount to both of them when they attain the age of 18 years. How is the sum divided ?

40) Find the future value of annuity of ₹ 2,000 for 6 years, if the payment is made at the beginning of each year, interest rate being 10% p.a.

41) A dealer sold 3 TV sets at ₹ 11,500 each. He sold one at a profit of 15% and other two at a loss of 8%. Find his gain or loss percentage.

42) Show that the points (2, – 2), (8, 4), (5, 7) and (–1, 1) are the vertices of a rectangle.

43) Find the coordinates of the foot of the perpendicular from (–2, –1) on the line $3x + 2y - 5 = 0$.

PART – E

VIII. Answer **any two** questions. **(2×4=8)**

44) If $f(x) = x + 1$ and $g(x) = x^2 + 1$ find

i) $f \circ g\ (3)$

ii) $g \circ f\ (2)$

45) Find the sum to n terms of the G.P.

$7 + 77 + 777 + - - - - -$

46) If $\sin\theta = \frac{-8}{17}$ and $\pi < \theta < 3\pi/2$ find the value of $\frac{\tan\theta - \cos\theta}{\sec\theta + \operatorname{cosec}\theta}$.