

Instructions:

- The question paper consists of five parts. A, B, C, D and E.
- Part A carries 10 marks, Part B carries 20 marks, Part C carries 30 marks, Part D carries 30 marks and Part E carries 10 marks.
- Write the question numbers properly as indicated in the question paper.

PART - A**I Answer any TEN questions.**

10×1=10

- Write the conjugate of $2-i3$.
- If $A = \{5, 6\}$, Find power set of A.
- Simplify $\left[\left\{\sqrt[3]{x^2}\right\}^3\right]^{\frac{1}{2}}$
- Express $\log_5 0.2 = -1$ in exponential form.
- Find the 8th term of an AP $-2, -4, -6 \dots$
- Solve for $x : 2(7+x) - 10 = 16 - 2(x-24)$.
- Find the simple interest on `1500 at 4% p.a. for 145 days. *59 P.T.R*
- Define Annuity.
- Convert the 42% to decimal.
- Convert $\frac{3\pi^c}{2}$ into degree measure.
- Prove that $\sin 30^\circ \cdot \cos 60^\circ + \cos 30^\circ \cdot \sin 60^\circ = 1$.
- Find the slope of the line with the inclination $\frac{\pi}{4}$ with respect to x - axis.

PART - B**II Answer any TEN questions.**

10×2=20

- Find the LCM of 36, 40 and 48 by factorization method.
- Find the number of positive divisors of 768.
- If $A = \{1, 2, 3, 4, 5\}$, $B = \{3, 4, 5, 6, 7\}$ and $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$ verify $(A \cup B)^c = A^c \cap B^c$
- Prove that $(x^{b-c})^a \cdot (x^{c-a})^b \cdot (x^{a-b})^c = 1$.
- The third term of a HP is $\frac{1}{7}$ and Fifth term is $\frac{1}{11}$ then find the seventh term.
- The sum of four consecutive numbers is 366, find them.
- Solve $x^2 + 3x - 28 = 0$ by formula method.
- Solve : $5x - 3 > 3x + 1$; $x \in \mathbb{R}$ and represent on the number line.
- Find the present value of an annuity of `400 for 3 years at 16% p.a. compound interest.
- The angles of a triangle are in the ratio 3 : 4 : 5. Find them in degrees.
- Prove that $\sin(480^\circ) \cdot \cos(690^\circ) + \cos(780^\circ) \cdot \sin(1050^\circ) = \frac{1}{2}$
- Show that the points (1, -1), (5, 2) and (9, 5) are collinear.
- Find the equation of the locus of a point which moves such that the square of its distance from (2, 3) is 3.

PART - C**II Answer any TEN questions.**

10×3=30

- Prove that $\sqrt{2}$ is an irrational number.
- Let $f = \{(1, 1), (2, 3), (0, -1)\}$ be a function from z to z defined by $f(x) = ax + b$ some integers a and b . Determine a & b .
- If $a^x = b^y = c^z$ and $b^2 = ac$. Show that $\frac{1}{x} + \frac{1}{z} = \frac{2}{y}$.

(P.T.O.)

29) Prove that $\frac{1}{\log_2 4} + \frac{1}{\log_8 4} + \frac{1}{\log_{16} 4} = 4$

30) Find the three numbers in GP whose sum is $\frac{31}{5}$ and their product is 1.

$2 \rightarrow 2$
 $3 \rightarrow 4$
 $x \rightarrow 8$

31) If α and β are the roots of the equation $2x^2 + 5x + 5 = 0$, find the value of $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$.

32) Solve the linear inequalities $x + 2y \leq 8$, $2x + y \leq 8$, $u \geq 0$, $x \geq 0$ graphically.

33) In how many years a sum of `2000 becomes `2205 at the rate of 5% p.a. compound interest?

$A = P(1 + \frac{r}{100})^n$

34) The average weight of a group containing 25 persons is 70 kg. 5 persons with an average weight 63 kg leave the group and 4 persons with weight 72 kg, 78 kg, 70 kg and 73 kg joins the group. Find the average weight of the new group.

35) Savitha sold her bag at a loss of 7%. Had she been able to sell it at a gain of 9%, it would have fetched `64 more than it did. What was the cost price of the bag?

36) If $\sin \theta = \frac{-8}{17}$ and $\pi < \theta < \frac{3\pi}{2}$. Find the value of $\frac{\tan \theta - \cot \theta}{\sec \theta + \operatorname{cosec} \theta}$.

37) Find the third vertex of a triangle if two of its vertices are at (-2, 4) and (7, -3) and the centroid at (3, -2).

38) If the lines $2x - y = 5$, $Kx - y = 6$ and $4x - y = 7$ are concurrent, find K.

PART - D

IV Answer any SIX questions.

6x5=30

39) Out of 250 people, 160 drink coffee, 90 drink tea, 85 drink milk, 45 drink coffee and tea, 35 drink tea and milk, 20 drink all the three. i) How many will drink coffee and milk? ii) only milk iii) only coffee. Show the result through venn diagram.

40) Using logarithmic tables, find the value of $\frac{0.5634 \times 0.0635}{2.563 \times 12.5}$.

41) Find the sum of all numbers between 50 and 200 which are divisible by 11.

42) Find an integral root between -3 and 3 by inspection and then using synthetic division solve the equation $x^3 - 10x^2 + 29x - 20 = 0$.

43) 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.

44) If Poornima deposits `600 at the beginning of every year for the next 15 years. Then how much will be accumulated at the end of 15 years, if interest rate is 7% p.a.

45) A business man sells an article for `720 and earns a profit of 20% Find the a) cost price b) profit percentage at selling price.

46) If $x = r \cos A \cos B$, $y = r \cos A \sin B$ and $z = r \sin A$. then prove that $x^2 + y^2 + z^2 = r^2$.

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

48) Find the coordinate of the foot of the perpendicular from (-6, 2) on the line $3x - 4y + 1 = 0$.

PART - E

$bx + ay + k$

V Answer any ONE question.

1x10=10

49a) Find the domain and Range of the function $f(x) = \frac{x^2 - 2x + 1}{x^2 - 9x + 13}$ where $x \in \mathbb{N}$

b) Find the distance between the parallel lines $5x + 12y + 7 = 0$ and $5x + 12y - 19 = 0$.

c) What is the present value of an income of 3000 to be received forever if the interest rate is 14% p.a.

50a) Find the sum of n terms of the Series $7 + 77 + 777 + \dots$ n terms.

b) A confectioner make and sells biscuit. He sells one pack of biscuit at `80. His cost of manufacturing is `40 pack as variable cost and `3000 a fixed cost find i) Revenue function ii) Cost function iii) Profit Function iv) If he limits his production to 100 packets can he make profit.

c) The profit of a business firm for the 5 years are `17,598, `20,703, `10,085, `25,375 and `16,315. Find the average profit?