

**Instructions:**

- 1) **The question paper consists of 5 parts A,B,C,D,E**
- 2) **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.**
- 3) **Write the question numbers properly as indicated in the question paper.**

**PART-A****I Answer any TEN questions****10 x 1 = 10**

- 1 Give the canonical representation of 140.
- 2 Define injective mapping. Give example.
- 3 If  $(2x + 4, 3x + y) = (8, 0)$  Find x and y.
- 4 Simplify  $(125x^{-9})^{\frac{1}{3}}$
- 5 Express  $\log_{10} 0.01 = -2$  in exponential form.
- 6 If  $\frac{5}{2}, k, 10$  are in GP then find the value of k.
- 7 Solve:  $3(x - 2) - (x - 1) = 7(x - 1) - 6(x - 2)$ .
- 8 Find the value of a house in the purchase of which the broker was paid 2% brokerage which amounted to ₹80,000.
- 9 Define Radian.
- 10 Find the value of  $\tan 225^\circ$
- 11 The average age of 10 boys in a class is 13 years. What is sum of their ages?
- 12 Find the equation of the locus of the point which moves such that its distance from the coordinate axes which is in the ratio 5:3

**PART-B****II Answer any TEN questions****10 x 2 = 20**

- 13 If the H.C.F of two numbers is 42 and their product is 52920. Find the L.C.M.  
If  $A = \{x : x^2 - 7x + 12 = 0\}$
- 14  $B = \{2, 4\}$   
 $C = \{4, 5\}$  find  $(A - B) \cap (B - C)$
- 15 Evaluate :  $\frac{7 + 3i}{52}$ .
- 16 Simplify:  $\frac{2^{7b-2a} \cdot 8^{2a-b}}{16^{a+b}}$ .
- 17 Prove that  $\log \frac{12}{15} + 2 \log \frac{6}{8} + \frac{1}{3} \log \frac{8}{27} = \log \frac{3}{10}$ .
- 18 Find x if  $\frac{1}{3}, x, \frac{3}{2}$  are in HP.
- 19 Find the nature of roots of  $2x^2 + 6x + 3 = 0$  without solving the equation.
- 20 If the simple interest on a certain sum of money after  $6\frac{1}{4}$  years is  $\frac{3}{8}$  of principal, what is the rate of interest p.a?
- 21 Solve for x if  $3x - 2 < 2x + 1$  ( $x \in \mathbb{R}$ ) represent in number line.
- 22 Shrya and Sanju scored 78% and 72% in an examination. If the difference in their marks is 36, Find the maximum marks.

- 23 Prove that  $(1 + \tan^2 \theta)(1 - \sin^2 \theta) = 1$ .
- 24 Find the value of  $3 \tan^2 \frac{\pi}{6} + \frac{4}{3} \cos^2 \frac{\pi}{6} - \frac{1}{2} \sec^2 \frac{\pi}{4} - \frac{1}{3} \sin^2 \frac{\pi}{3}$ .
- 25 Derive the equation of the line in intercept form.

**PART-C**

**III Answer any TEN questions**

**10 x 3 = 30**

- 26 Prove that  $\sqrt{5}$  is an irrational number.
- 27 Define equivalence relation with an example.
- 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 Solve  $\log_x 9 + \log_x 4 = 2$ .
- 30 Find the four numbers in AP whose sum is 20 and the product of whose extremes is 16.
- 31 Find the future value of an annuity of ₹200 payable every month at 12% p. a compound interest computed every month for the next two years.
- 32 How many litres of water will have to be added to 1125 litres of the 45% solution of acid so that the resulting mixture will contain more than 25% but less than 30% of acid content? (water contains 0% acid).
- 33 A batsman finds that by getting out for a duck (zero runs) in the 11<sup>th</sup> innings of his test matches. His average of the previous 10 innings decreased by 5 runs what is the average after the 11<sup>th</sup> innings?
- 34 Find the equation of the locus of the point which moves such that its distance from  $x - y + 1 = 0$  is twice its distance from  $x + y + 6 = 0$ .
- 35 If  $\alpha$  and  $\beta$  are the roots of  $3x^2 - 6x + 4 = 0$ . Find the value of  $\left[ \frac{\alpha}{\beta} + \frac{\beta}{\alpha} \right] + \left[ 2 \left( \frac{1}{\alpha} + \frac{1}{\beta} \right) + 3(\alpha + \beta) \right]$ .
- 36 For the 1<sup>st</sup> year the fixed cost for setting up a new electronic pocket calculator company is 3,00,000. The variable cost for producing a calculator is ₹70. The company expects the revenue from the sales of the calculator to be ₹270 calculator.
- (i) construct the revenue function,  
 (ii) construct the cost function,  
 (iii) find the break even output  
 (iv) find the numbers of calculator produced for which the company will suffer loss.
- 37 Prove that  $\frac{1 + \sin A}{1 - \sin A} - \frac{1 - \sin A}{1 + \sin A} = 4 \sec A \tan A$ .
- 38 Find the ratio in which the line segment joining (2, 3) and (4, 1) is divided by the line  $x - 3y + 5 = 0$ .

**PART-D**

**IV Answer any SIX questions**

**6 x 5 = 30**

- 39 In a college  $\left(\frac{2}{5}\right)^{\text{th}}$  of the students play basket ball and  $\left(\frac{3}{4}\right)^{\text{th}}$  play volleyball. If 50 students play none of these two games and 125 play both, use venn diagram to find the number of students in the college.
- 40 A person buys a car for ₹1,50,000 he pays ₹1,00,000 cash and agrees to pay the balance in annual instalments of ₹5000 plus 8% interest on the unpaid amount. How much will the car cost for him?
- 41 Find the integral root between -3 and 3 by inspection and then using synthetic division  $x^3 + 15x^2 - 72x + 76 = 0$ .
- 42 Using table find the value of  $\frac{12.567 \times 15.674}{0.5968 \times 19.78}$ .
- 43 The population of a town increased by 4% in the first year and diminished by 4% in the second year. If the population of the town at the end of second year is 39936, find the population of the town at the beginning of the year.
- 44 A company needs ₹1,00,000, 7 years from now, It would like to set aside an equal amount at the beginning of each year out of its profits. If the interest rate is 16% compounded semi-annually how much should be invested annually.

- 45 A person 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 his income? Also find the amount he gives his wife and daughter.
- 46 If  $\cot \theta = \frac{5}{2}$  and  $\theta$  is acute Show that  $\frac{5 \cos \theta + 2 \sin \theta}{5 \cos \theta - 2 \sin \theta} = \frac{29}{21}$ .
- 47 Find the area of the quadrilateral whose vertices are (-3, 2) (7, -6) (-5, -4) (5, 4)
- 48 In what ratio is the joining the points (2, 3) and (4, -5) is divided by the line joining (6, 8) and (-3, 2).

**PART-E**

**V Answer any ONE question**

**1 x 10 = 10**

- 49 a Find the domain and range of the function  $f(x) = \frac{x^2 + 2x + 1}{x^2 - 8x - 12}$  ;  $x \in \mathbb{R}$ . 4
- b Find the sum of n terms of the G.P  $4 + 44 + 444 + \dots$  4
- c Find the number of zeros between the decimal point and the first significant figure in  $(5.63)^{-8}$  2
- 50 a A shoe manufacturer is planning production of new varieties shoes. For the 1<sup>st</sup> 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 1<sup>st</sup> 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 pairs of shoes.
- (iv) If 1500 pairs are actually sold then what profit or loss does the company incur
- (v) Determine BEP 4
- b What is the present value of an perpetuity of ₹5000 to be received forever of the first receipt occurs at the end of the sixth year from now interest rate being 8% p.a 4
- c Insert 3 HM's between  $\frac{1}{4}$  and  $\frac{1}{12}$ . 2

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