

**Instructions**

The question paper has five parts namely A, B, C, D, and E

Answer all parts, write question numbers correctly

Use the graph sheet wherever necessary.

**PART-A****I Answer all the questions:****10 x 1 = 10**

- 1 Write the power set of the Set  $A = \{a, b\}$
- 2 If  $(x-1, y+3) = (2, x+4)$ , find the values of  $x$  and  $y$ .
- 3 Convert  $\frac{2\pi}{3}$  into degree measure.
- 4 Find the conjugate of the complex number  $-1 - i$
- 5 If  ${}^nC_9 = {}^nC_8$  find the value of  $n$
- 6 Find the indicated term in the sequence whose  $n^{\text{th}}$  term is given by,  $a_n = 4n - 3$ ;  $a_{17}$ .
- 7 Find the distance between the points  $P = (1, -3, 4)$  and  $Q = (-4, 1, 2)$ .
- 8 Evaluate :  $\lim_{x \rightarrow 4} \frac{4x+3}{x-2}$ .
- 9 Write the negation of the statement "Intersection of two disjoint sets is not an empty set"?
- 10 If  $\frac{2}{\pi}$  is the probability of an event A. What is the probability of the event "not A"?

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

- 11 If  $V = \{a, e, i, o, u\}$  and  $B = \{a, i, x, u\}$  find  $V - B$  and  $B - V$ .
- 12 If A and B are two sets such that  $A \subset B$ , then What is  $A \cup B$  and  $A \cap B$ ?
- 13 If  $A \times B = \{(a, x), (a, y), (b, x), (b, y)\}$  find A and B.
- 14 The minute hand of a watch is 1.5 cm long. How far does its tip move in 40 minutes?
- 15 Find the value of  $\sin\left(\frac{31\pi}{3}\right)$
- 16 Find the general solution of  $\cos x = \frac{1}{2}$ .
- 17 Find the multiplicative inverse of  $2 - 3i$ .
- 18 Solve  $30 < x < 200$  when (i)  $x$  is a natural number (ii)  $x$  is a Integer.
- 19 Write the equation of the line for which  $\tan \theta = \frac{1}{2}$ , where  $\theta$  is the inclination of the line and y-intercept is  $\frac{-3}{2}$ .
- 20 Reduce the equation  $\sqrt{3}x + y - 8 = 0$  into normal form. Find the values of  $p$  and  $\omega$ .
- 21 Find the distance between the lines  $3x + 4y + 5 = 0$  and  $6x + 8y + 2 = 0$ .
- 22 Find the centre and radius of the circle  $x^2 + y^2 + 8x + 10y - 8 = 0$ .
- 23 Find the mean deviation about mean for the data, 4, 7, 8, 9, 10, 12, 13, 17.
- 24 One card is drawn from the well shuffled deck of 52 cards. If each out come is equally likely, Calculate the probability that the card will be "not an ace".

**PART-C****III Answer any TEN questions****10 x 3 = 30**

- 25 They are 200 individuals with a skin disorder, 120 had been exposed to the chemical  $C_1$ , 50 to chemical  $C_2$  and 30 to both Chemicals  $C_1$  and  $C_2$ . Find the number of individuals exposed to (i) Chemical  $C_1$  but not Chemical  $C_2$ , (ii) Chemical  $C_2$  but not Chemical  $C_1$ .
- 26 Determine the domain and range of the relation R defined by  $R = \{(x, x+5) : x \in \{0, 1, 2, 3, 4, 5\}\}$ .

- 27 Define Signum function and write its domain and range.
- 28 Show that,  $\tan 3x \cdot \tan 2x \cdot \tan x = \tan 3x - \tan 2x - \tan x$ .
- 29 Write the general solution of  $2\cos^2 x + 3\sin x = 0$ .
- 30 Convert the complex number  $\frac{-16}{1+i\sqrt{3}}$  into polar form.
- 31 Solve graphically the system of inequations:  $2x + y \geq 6$  and  $3x + 4y \leq 12$ .
- 32 How many numbers lying between 100 and 1000 can be formed with the digits 0, 1, 2, 3, 4, 5 if the repetition of the digits is not allowed?
- 33 Prove that  ${}^n C_r + {}^n C_{r-1} = {}^{n+1} C_r$ .
- 34 The sum of first three terms of a G.P is  $\frac{39}{10}$  and their product is 1. Find the common ratio and the terms.
- 35 Find the equation of set of points P such that  $PA^2 + PB^2 = 2k^2$ , Where A and B are the points (3,4,5) and (-1, 3, -7) respectively.
- 36 Find the equation of the ellipse whose foci at  $(\pm 5, 0)$  and  $x = \frac{36}{5}$  as one of the directrix.
- 37 Differentiate  $\frac{\sin x + \cos x}{\sin x - \cos x}$  with respect to 'x'.
- 38 Prove by method of contradiction " $\sqrt{7}$  is irrational"

**PART-D**

- IV Answer any SIX questions 6 x 5 = 30**
- 39 Define Greatest Integer function. Draw the graph of the greatest integer function also write its domain and range.
- 40 Prove that  $\frac{\sin 7x + \sin 5x + \sin 9x + \sin 3x}{\cos 7x + \cos 5x + \cos 9x + \cos 3x} = \tan 6x$ .
- 41 Prove by principle of Mathematical Induction, for all  $n \in \mathbb{N}$  that  $x^{2n} - y^{2n}$  is divisible by  $x + y$ .
- 42 State and prove Binomial theorem.
- 43 Find the number of arrangements of the letters of the word "EXAMINATION". In how many of these arrangements.
  - (i) do the word start with M, (ii) do all the vowels, always occur together.
- 44 Find the derivative of  $\sin x$  with respect to  $x$  from first principles.
- 45 Show that, the distance between two parallel lines  $y = mx + C_1$  and  $y = mx + C_2$  is  $d = \frac{|C_1 - C_2|}{\sqrt{1 + m^2}}$  and hence find the distance between the lines  $3x - 4y + 7 = 0$  and  $3x - 4y + 5 = 0$ .
- 46 Derive formula to find the co-ordinates of a point that divides the line joining the points A  $(x_1, y_1, z_1)$ , and B  $(x_2, y_2, z_2)$  internally in the ratio  $m:n$ .
- 47 Prove geometrically that  $\lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} = 1$  where  $\theta$  is measured in radians.
- 48 Calculate, Mean, Variance and Standard deviation for the following distribution.

<b>Classes</b>	30-40	40-50	50-60	60-70	70-80	80-90	90-100
<b>Frequency</b>	3	7	12	15	8	3	2

**PART-E**

- V Answer any ONE question 1 x 10 = 10**
- 49 a) Prove geometrically  $\cos(x+y) = \cos x \cos y - \sin x \sin y$  and hence deduce  $\cos 2x = 2\cos^2 x - 1$  (6)
- b) Find the sum of the sequence. 7, 77, 777, 7777, -----n terms. (4)
- 50 a) Define Hyperbola as a set of points. Derive its equation in the form  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$  (6)
- b) Find the derivative of  $\frac{a + b \sin x}{c + d \cos x}$  with respect to  $x$ . (4)