

**Model Question Paper – 1**  
**I P.U.C MATHEMATICS (35)**

**Time : 3 hours 15 minute**

**Max. Marks : 100**

**Instructions :**

- (i) The question paper has five parts namely A, B, C, D and E. Answer all the parts.
- (ii) Use the graph sheet for the question on inequalities in PART E.

**PART – A**

**Answer ALL the questions**

**10 × 1=10**

1. If  $A = \{1, 2\}$ ,  $B = \{x : x \in N \text{ and } x^2 - 9 = 0\}$ . Find  $A \times B$ .
2. Define subset of a set.
3. Convert  $\frac{2\pi}{3}$  radians into degree measure
4. Express  $\frac{5+i\sqrt{2}}{2i}$  in the form  $x + iy$
5. Find n if  $(n - 1)p_3 : np_4 = 1 : 9$
6. Find the tenth term of G.P : 5, 25, 125, .....
7. Find the slope of the line joining the points  $(3, -2)$  and  $(-1, 4)$
8. Evaluate :  $\lim_{x \rightarrow 0} \left( \frac{\cos x}{\pi - x} \right)$
9. Write the contrapositive of “ if a number is divisible by 9 then it is divisible by 3”.
10. Write the sample space for the experiment “ a coin is tossed repeatedly three times”.

**PART-B**

**ANSWER ANY TEN QUESTIONS**

**10 X 2 = 20**

11. If the universal set  $U = \{1, 2, 3, 4, 5, 6, 7\}$   $A = \{1, 2, 5, 7\}$ ,  $B = \{3, 4, 5, 6\}$ . Verify  $(A \cup B)' = A' \cap B'$
12. In a class of 35 students, 24 likes to play cricket, 5 likes to play both cricket and football. Find how many students like to play football ?
13. If  $A = \{1, 2, 3\}$ ,  $B = \{3, 4\}$ ,  $C = \{4, 5, 6\}$ . Find  $A \times (B \cup C)$
14. A wheel makes 360 revolutions in one minute, through how many radians does it turn in one second ?
15. Find the value of  $\sin(15^\circ)$
16. Find the value of  $x$  and  $y$ , if  $(x + 2y) + i(2x - 3y)$  is the conjugate of  $5 + 4i$ .
17. Solve  $7x + 1 \leq 4x + 5$  and represent the solution graphically on the number line.
18. Find the equation of the line passing through  $(-1, 1)$  and  $(2, -4)$
19. Find the equation of the line passing through  $(-4, 3)$  with slope  $\left(\frac{1}{2}\right)$
20. Find the ratio in which the line segment joining the points  $(4, 8, 10)$  and  $(6, 10, -8)$  is divided by YZ-Plane.
21. Evaluate :  $\lim_{x \rightarrow 0} \frac{1 - \cos x}{x}$
22. Write the component statement of the following compound statement and check whether the compound statement is true or false ; “ Zero is less than every positive integer and every negative integer”.
23. The co-efficient of variation and standard deviation are 60 and 21 respectively. What is the arithmetic mean of the distribution.

24. One card is drawn from a well-shuffled deck of 52 cards. Calculate the probability that the card will be “not an ace”.

### PART -C

#### ANSWER ANY TEN QUESTIONS

10 x 3 = 30

25. Let  $A = \{1,2,3,\dots,14\}$  Define a relation  $R$  from  $A$  to  $A$  by  $R = \{(x,y): 3x-y=0, x,y \in A\}$  write its domain and range.
26. Find the general solution of  $2\cos^2x + 3\sin x = 0$
27. Express  $\sqrt{3} + i$  in the polar form.
28. Solve :  $3x^2 - 4x + \frac{20}{3} = 0$
29. How many numbers greater than 10,00000 can be formed by using the digits **1, 2, 0, 2, 4, 2, 4**.
30. Using Binomial theorem, which number is among  $(1.1)^{10000}$  and **1000**.
31. In an A.P, if  $m^{\text{th}}$  term is  $n$  and  $n^{\text{th}}$  term is  $m$ . Then find  $p^{\text{th}}$  term ( $m \neq n$ )
32. Find the sum of  $n$  terms of an A.P whose  $k^{\text{th}}$  term is  $(5k + 1)$
33. Find the co-ordinates of the foci and latus rectum of the hyperbola  $3x^2 - y^2 = 3$
34. Find the derivative of  $\sin x$  from first principle.
35. Given  $p:25$  is a multiple of 5;  $q:25$  is a multiple of 8. Write the compound statement connecting these two statements with “and”, “or”. In 60<sup>th</sup> cases check the validity of the statement.
36. The student Anil and Ashima appeared in the examination, the probability that Anil will qualify the examination is 0.05 and that Ashima will qualify the examination 0.10. The probability that the both will qualify the examination is 0.02. Find the probability that only one of them qualify the examination.
37. A letter is chosen at random from the word ‘ASSASSINATION’, Find the probability that the letter is (i) an vowel (ii) consonant.
38. In a survey of 600 students in a school, 150 students were found to be taking tea and 250 taking coffee, 100 were taking both tea and coffee. Find how many student were taking neither tea nor coffee.

### PART - D

#### Answer any SIX questions

6 x 5 = 30

39. Define a polynomial function. If the function from  $f:R \rightarrow R$  is defined as  $f(x) = x^2$  then draw the graph of  $f$  and find the domain and range.
40. Prove that  $\frac{\sin 5x - 2\sin 3x + \sin x}{\cos 5x - \cos x} = \tan x$
41. Prove by mathematical induction that  $1^3 + 2^3 + \dots + n^3 = \left[\frac{n(n+1)}{2}\right]^2$
42. Solve graphically  $2x + y \geq 4, x + y \leq 3, 2x - 3y \leq 6$
43. A group consists of 4 girls and 7 boys, In how many ways can a team of 5 members be selected if the team has
- (i) No girl
  - (ii) At least one boy and one girl
  - (iii) At least three girls
44. State and prove Binomial theorem for all natural numbers.

45. Derive the formula for the angle between two straight lines with slopes  $m_1$  and  $m_2$  hence find the slope of the line which makes an angle  $\frac{\pi}{4}$  with the line  $x - 2y + 5$

46. Derive the formula for the distance between two points  $x - 2y + 5$  and  $x - 2y + 5$  And hence find the distance between  $(2, -1, 3)$  and  $(-2, 1, 3)$

47. Prove geometrically:  $\lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} = 1$  where  $\theta$  is in radian and hence deduce that

$$\lim_{\theta \rightarrow 0} \frac{\tan \theta}{\theta} = 1.$$

48. Find the mean deviation about the mean for the following data

Marks Obtained	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Number of Students	2	3	8	14	8	3	2

### PART-E

**Answer any ONE**

**1x10= 10**

49. a). Prove geometrically that  $\cos(x + y) = \cos x \cos y - \sin x \sin y$  and hence prove that  $\cos(x - y) = \cos x \cos y + \sin x \sin y$  6

b). Find the sum of first n terms of the series  $1^2 + 2^2 + \dots + n^2$  4

50. a). Define ellipse and derive the equation of the ellipse in standard form as  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  ( $a > b$ ) 6

b). Find the derivation of  $\frac{x^5 - \cos x}{\sin x}$  with respect to x. 4