

**DEPARTMENT OF PRE-UNIVERSITY EDUCATION**  
**BLUE PRINT FOR THE YEAR 2022-23**  
**I PUC MATHEMATICS (35)**

TIME: 3 hours 15 minute

Max. Mark: 100

Chapters	Number Teaching hours	Part A		Part B	Part C	Part D	Part E		Total Marks
		1 Mark		2 Mark	3 Mark	5 Mark	6 Mark	4 Mark	
		MCQ	FB/VSQ	VSA	SA	LA	LA	LA	
<b>Sets</b>	8	1	1	2	1				9
<b>Relation and function</b>	10	1		1	1	1			11
<b>Trigonometry</b>	18	1	1	2	1	1	1		20
<b>Mathematical Induction</b>	4					1			5
<b>Complex Numbers and Quadratic Equations</b>	8	1		1	2				9
<b>Linear Inequalities</b>	8		1	1		1			8
<b>Permutation and Combination</b>	9	1	1		1	1			10
<b>Binomial Theorem</b>	7		1		1	1			9
<b>Sequence and Series</b>	9	1			2			1	11
<b>Straight Lines</b>	10	1	1	2		1			11
<b>Conic Section</b>	9		1		1		1		10
<b>Three Dimensional Geometry</b>	5		1	1		1			8
<b>Limits and Derivatives</b>	14	1	1	1	1	1		1	16
<b>Mathematical Reasoning</b>	6	1		1	1				6
<b>Statistics</b>	7		1	1		1			8
<b>Probability</b>	8	1		1	2				9
<b>Total</b>	<b>140</b>	<b>10</b>	<b>10</b>	<b>14</b>	<b>14</b>	<b>10</b>	<b>2</b>	<b>2</b>	<b>160</b>

## Model Question Paper

### II P.U.C MATHEMATICS (35)

Time : 3 hours 15 minute

Max. Marks : 100

#### Instructions :

- 1) The question paper has five parts namely A, B, C, D and E. Answer all the parts.
- 2) Section A has 10 MCQ's, 5 Fill in the blanks and 5 Very Short Answer questions of 1 mark each.
- 3) The sub question I and II of Part A should be answered continuously at one or two page. Only first answer is considered for the marks in sub question I and II of Part A.
- 4) Use the graph sheet for question on linear inequality in PART D.

#### PART A

#### I. Answer ALL the Multiple Choice Questions 10 × 1 = 10

1. The number of proper subsets of the set  $\{1, 2, 3\}$  is  
(A) 8 (B) 7 (C) 6 (D) 5
2. Let  $R$  be a relation on  $N$  defined by  $x + 2y = 8$  The domain of  $R$  is  
(A)  $\{2, 4, 8\}$  (B)  $\{2, 4, 6, 8\}$  (C)  $\{2, 4, 6\}$  (D)  $\{1, 2, 3, 4\}$
3. If  $\tan x = -\frac{5}{12}$ ,  $x$  lies in second quadrant then  $\sin x$  is  
(A)  $-\frac{12}{13}$  (B)  $\frac{12}{13}$  (C)  $\frac{5}{13}$  (D)  $-\frac{5}{13}$
4. The multiplicative inverse of a complex number  $4 - 3i$ .  
(A)  $\frac{4-3i}{5}$ . (B)  $\frac{4+3i}{5}$  (C)  $\frac{-4-3i}{5}$ . (D)  $\frac{-4+3i}{5}$
5. If  ${}^nC_8 = {}^nC_7$ , then  ${}^nC_{17}$  is equal to  
(A) 8 (B) 7 (C) 17 (D) 1
6. The 4<sup>th</sup> term of the sequence defined by  $a_1 = a_2 = 1$  and  $a_n = a_{n-1} + a_{n-2}$ ,  $n > 2$ .  
(A) 1 (B) 2 (C) 3 (D) 4
7. The slope of the line which makes angle  $30^\circ$  with positive direction of y axis measured anticlockwise.  
(A)  $\sqrt{3}$  (B)  $-\sqrt{3}$  (C) 1 (D)  $\frac{1}{\sqrt{3}}$
8.  $\lim_{x \rightarrow -2} \left( \frac{\frac{1}{x} + 1}{x+2} \right)$  is equal to  
(A) -1 (B)  $\frac{1}{4}$  (C)  $\frac{-1}{4}$  (D) -4.

9. The negative of the proposition “Every natural number is an integer”
- (A) Natural number is not an integer
- (B) At least one natural number is an integer
- (C) At least one natural number is not an integer
- (D) One natural number is not an integer
10. If  $\frac{2}{5}$  is the probability of an event A, then the probability of the event ‘not A’.
- (A)  $\frac{5}{2}$                       (B)  $\frac{3}{5}$                       (C)  $\frac{1}{5}$                       (D)  $\frac{4}{5}$

**II. Fill in the blanks by choosing the appropriate answer from those given in the bracket. ( 1, 2, 4, 6, 8 )                      5×1 = 5.**

11. ....number of elements has P(A), if  $A = \{ 1 \}$ .
12. The positive value of  $m = \dots\dots$  for which the coefficient of  $x^2$  in the Expansion  $(1 + x)^m$  is 6.
13. The length of the latus rectum of the parabola  $y^2 = -8x$  is.....
14. The point  $(-3, 1, -2)$  lies in .....th . octant
15. The derivative of  $f(x) = x$  at  $x = 100$  is .....

**III. Answer all the following questions                      5×1 = 5.**

16. Find the values of  $\sin \frac{31\pi}{3}$
17. Solve  $4x + 3 < 6x + 7$ .
18. Find  $x$ , if  $\frac{1}{6!} + \frac{1}{7!} = \frac{1}{8!}$ .
19. Find distance between parallel lines  $15x + 8y - 34 = 0$  and  $15x + 8y + 31 = 0$ .
20. Find the mean for first  $n$  natural numbers.

**PART B**

**Answer any NINE questions:                      9× 2 = 18**

21. Let  $U = \{1, 2, 3, 4, 5, 6\}$ ,  $A = \{2, 3\}$ , and  $B = \{3, 4, 5\}$ . Find  $A^c \cap B^c$

22. Let  $A = \{a, b\}$  and  $B = \{a, b, c\}$ . Is  $A \subset B$ ? What is  $A \cup B$ ?
23. If  $\left(\frac{x}{3} + 1, y - \frac{2}{3}\right) = \left(\frac{5}{3}, \frac{1}{3}\right)$ , find the values of  $x$  and  $y$ .
24. A wheel makes 360 revolutions in one minute. Through how many radians it turns in one second.
25. Prove that  $\sin^2 \frac{\pi}{6} + \cos^2 \frac{\pi}{3} - \tan^2 \frac{\pi}{4} = -\frac{1}{2}$ .
26. Find the modulus and argument of the complex number  $-\sqrt{3} - i$ .
27. Solve:  $7x + 3 \leq 5x + 9$ . Show the graph of the solution on the number line.
28. Write the contrapositive and converse of the following statements.  
 "If  $x$  is a prime number, then  $x$  is odd".
29. Reduce the equation  $\sqrt{3}x + y - 8 = 0$  into normal form. Find the values of  $p$  and  $\omega$ .
30. Find the equation of the line perpendicular to the line  $x - 2y + 3 = 0$  and passing through the point  $(1, -2)$ .
31. If  $(1, 1)$  is the centroid of the triangle with  $(3, -5, 7)$  and  $(-1, 7, -6)$  as the two vertices, Find the third vertex.
32. Evaluate  $\lim_{x \rightarrow 0} \left[ \frac{(x+1)^5 - 1}{x} \right]$
33. Co-efficient of variation and their standard deviations of certain distribution is 60 and 21 respectively. Find the arithmetic mean.
34. A coin is tossed twice, what is the probability that atleast one tail occurs?

### PART C

**Answer any NINE questions:**

**9×3 = 27.**

35. In a class of 35 students, 24 likes to play cricket and 16 likes to play football, Also each student likes to play at least one of the games. How many students like to play both cricket and football?
36. Let  $A = \{1, 2, 3, \dots, 14\}$ . Define a relation  $R$  from  $A$  to  $A$  by  
 $R = \{(x, y) : 3x - y = 0 \text{ and } x, y \in A\}$ . Write down its domain and range.
37. Find the general solution of  $\sin 2x + \cos x = 0$
38. Find the conjugate of  $\frac{(3-2i)(2+3i)}{(1+2i)(2-i)}$ .

39. Solve the equation  $3x^2 - 4x + \frac{20}{3} = 0$ .
40. In how many ways can the letters of the word PERMUTATIONS be arranged if the vowels are all together.
41. Find the middle term in the expansion of  $\left(\frac{x}{3} + 9y\right)^{10}$ .
42. Find the sum of n terms of the sequence 7, 77, 777, 7777,....to n terms.
43. In an A.P., if  $m^{\text{th}}$  term is n and the  $n^{\text{th}}$  term is m, where  $m \neq n$ , find the  $p^{\text{th}}$  term.
44. Find the equation of the circle which passes through the points (2, - 2), and (3,4) and whose centre lies on the line  $x + y = 2$ .
45. Find the derivative of  $\tan x$  from first principles.
46. Show that the statement "If  $x$  is a real number such that  $x^3 + 4x = 0$ , then  $x$  is 0" is true by direct method.
47. A fair coin with 1 marked on one face and 6 on the other and a fair die are both tossed. Find the probability that the sum of numbers that turn up is ( i ) 3 ( ii ) 12.
48. A and B are events such that  $P(A) = 0.42, P(B) = 0.48$  and  $P(A \text{ and } B) = 0.16$ . Determine i)  $P(\text{not } A)$  ii)  $P(\text{not } B)$  and iii)  $P(A \text{ or } B)$ .

### PART D

**Answer any FIVE questions:**

**5 × 5 = 25**

49. Define Modulus function. Draw the graph of Modulus function and write its domain and range.
50. Prove that  $\frac{(\sin 7x + \sin 5x) + (\sin 9x + \sin 3x)}{(\cos 7x + \cos 5x) + (\cos 9x + \cos 3x)} = \tan 6x$
51. Prove by Mathematical induction that  $1^3 + 2^3 + 3^3 + \dots = \left(\frac{n(n+1)}{2}\right)^2$  or  $\frac{n^2(n+1)^2}{4}$ .  $\forall n \in \mathbb{N}$ .
52. Solve the following system of inequalities graphically:  
 $3x + 2y \leq 150$ ,  $x + 4y \leq 80$ ,  $x \leq 15$ ,  $x \geq 0$ ,  $y \geq 0$ .
53. A committee of 7 is to be formed from 9 boys and 4 girls. In how many ways can this be done when the committee consists of (i) exactly 3 girls? (ii) at least 3 girls?
54. State and prove Binomial Theorem for any positive integer n.

55. Derive a formula to find the perpendicular distance of a point  $P(x_1, y_1)$  from the line  $Ax + By + C = 0$ .
56. Derive the formula to find the coordinates of the point which divides the line segment joining the points  $(x_1, y_1, z_1)$  and  $(x_2, y_2, z_2)$  in the ratio  $m:n$  internally.
57. Prove that  $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$ , (where  $x$  is in radian measure).
58. Find the mean deviation about the mean for the following data:

Height in cm	95 -105	105-115	115-125	125-135	135-145	145-155
Number of boys	9	13	26	30	12	10

### PART E

#### Answer the following questions

59. Prove geometrically that  $\cos(x + y) = \cos x \cos y - \sin x \sin y$  and hence find  $\cos\left(\frac{\pi}{2} + x\right)$ .

OR

Define ellipse and derive its equation in the form  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ . **6**

60. Differentiate  $\frac{x + \cos x}{\tan x}$  with respect to  $x$ .

OR

Find the sum to  $n$  terms of the series  $5 + 11 + 19 + 29 + 41 + \dots$  **4**

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