

I PUC MID-TERM EXAMINATION, SEPT./OCT.-2026

SUBJECT : MATHEMATICS (35)

Time : 3 Hours

Max Marks : 80

Instructions :

- The question paper consists of 5 parts A, B, C, D and E. Answer all the parts.
- PART-A has 15 Multiple choice questions. 5 Fill in the blank questions of 1 mark each.
- Write the question number properly as indicated in the question paper.

PART-A

I Choose the correct answer :

15x1=15

- If U is the universal set $A \subset U$, $U' \cap A =$
A) ϕ B) A C) A' D) U
- The intervals $[-7, 12]$ in set builder form is
A) $\{x / x \in \mathbb{R}, -7 < x \leq 12\}$ B) $\{x / x \in \mathbb{R}, -7 \leq x \leq 12\}$
C) $\{x / x \in \mathbb{R}, -7 \leq x < 12\}$ D) $\{x / x \in \mathbb{R}, -7 < x < 12\}$
- If $\left(\frac{x}{3} + 1, y - \frac{2}{3}\right) = \left(\frac{5}{3}, \frac{1}{3}\right)$. Then the value of x and y are respectively
A) 1, 2 B) 2, 3 C) 2, 1 D) 3, 2
- Let $A = \{1, 2\}$ and $B = \{3, 4\}$ then
(i) $R = \{(1, 1) (1, 2) (1, 3) (1, 4)\}$ is a relation from A to B
(ii) $R = \{(1, 3) (1, 4)\}$ is a function from A to B
(iii) $R = \{(1, 3) (2, 3)\}$ is a relation and also a function from A to B . Which of the above statements are correct ?
A) (i) only B) (iii) only C) (ii) only D) all (i), (ii) and (iii)
- 6 radians in degree measure approximately
A) 333° B) 323° C) 353° D) 343°
- Assertion (A) : If $\cos(-x) = 0.34$. Then $\cos x = 0.34$
Reason (R) : $\cos(-x) = \cos x$
A) Both Assertion (A) and Reason (R) are true and Reason (R) is correct explanation of the Assertion (A)
B) Both Assertion (A) and Reason (R) are true and Reason (R) is not correct explanation of the Assertion (A)
C) Assertion (A) is true and Reason (R) is false
D) Assertion (A) is false and Reason (R) is true.
- The value of $\sin\left(-\frac{31\pi}{3}\right)$ is
A) $\frac{1}{2}$ B) $\frac{\sqrt{3}}{2}$ C) $\frac{1}{\sqrt{2}}$ D) $\frac{-\sqrt{3}}{2}$
- The value of $i + i^2 + i^3 + i^4$ is
A) 1 B) 0 C) 2 D) -1
- If $Z = x + iy$, then Match List I and List II

List I	List II
a) $Z \cdot \bar{Z}$	i) $x^2 + y^2$
b) $Z - \bar{Z}$	ii) $2x$
c) $Z + \bar{Z}$	iii) $2iy$

Choose the correct answer from options given below.

- A) a-i, b-ii, c-iii B) a-iii, b-ii, c-i C) a-i, b-iii, c-ii D) a-ii, b-i, c-iii

(P.T.O.)

- 10) If $x \geq y$. Then $\frac{1}{x} \dots \frac{1}{y}$
 A) $\leq$ B) $<$ C) $>$ D) $\geq$
- 11) Ravi obtained 70 and 75 marks in first two unit test. Then the minimum marks he should get in the third test to have an average of atleast 60 marks is
 A) 30 B) 35 C) 40 D) 45
- 12) If $\frac{1}{8!} + \frac{1}{9!} = \frac{x}{10!}$. Then $x =$
 A) 64 B) 81 C) 72 D) 100
- 13) The number of permutations of the letters of the word 'INSTITUTE' is
 A) $\frac{9!}{2!2!}$ B) $\frac{9!}{3!2!}$ C) $\frac{9!}{3!}$ D) $\frac{4!}{2!2!}$
- 14) Number of terms in the expansion $(2x-3y)^6$ is
 A) 6 B) 5 C) 7 D) 8
- 15) Equation of a line parallel to x-axis and passing through $(-2, 3)$ is
 A) $x = 3$ B) $x = -2$ C) $y = 2$ D) $y = 3$

II For the question 16 to 20. Choose the appropriate answer from the answers given below:
 5x1=5

[3, 1, 0, 6, -1, 16]

- 16) Let $A = \{1, 2\}$ $B = \{3, 4\}$. Then number of relations from set A to set B is _____.
- 17) Number of solutions of the inequality $5x + 3 < 7$, when x is a natural number is _____.
- 18) If ${}^{15}C_{3r} = {}^{15}C_{3+r}$, then r is _____.
- 19) The y-intercept of the line $8x - y + 6 = 0$ is _____.
- 20) The value of $\left| \frac{2+i}{1-2i} \right|$ is _____.

PART-B

III Answer any SIX questions :

6x2=12

- 21) If $X = \{a, b, c, d\}$ and $Y = \{b, d, g, f\}$. Then find $X - Y$ and $X \cap Y$.
- 22) Find the Domain and Range of function $f(x) = \sqrt{9 - x^2}$.
- 23) Find the radius of the circle in which central angle of 60° intercepts an arc of length 37.4 cm.
- 24) If $\tan x = \frac{3}{4}$, x lies in the third quadrant, find the value of $\sin 2x$
- 25) Express $3(7 + i7) + i(7 + i7)$ in the form of $a + ib$.
- 26) Find the multiplicative inverse of $4 - 3i$ and also find its real and imaginary part.
- 27) Which is larger $(1.01)^{1,00,000}$ or 10,000 ?
- 28) Solve the inequality $3(1 - x) < 2(x + 4)$ and show that the graph of the solution on number line.
- 29) How many three digit numbers can be formed from the digits 1, 2, 3, 4, 5 assuming that
 i) repetition of the digits is allowed ?
 ii) repetition of the digits not allowed ?

PART-C

IV Answer any SIX questions :

6x3=18

- 30) If $U = \{1, 2, 3, 4, 5, 6\}$, $A = \{2, 3\}$, $B = \{3, 4, 5\}$, then show that $(A \cup B)' = A' \cap B'$.
 (P.T.O.)

- 31) Let $A = \{1, 2, 3, \dots, 14\}$. Define a relation R from set A to itself by $R = \{(x, y) / 3x - y = 0 \ \forall x, y \in A\}$. Then write its domain and Range.
- 32) Prove that $\sin 3x = 3\sin x - 4\sin^3 x$.
- 33) Prove that $(\cos x + \cos y)^2 + (\sin x - \sin y)^2 = 4 \cos^2 \left(\frac{x+y}{2} \right)$.
- 34) If $x - iy = \sqrt{\frac{a - ib}{c - id}}$. Then prove that $(x^2 + y^2)^2 = \frac{a^2 + b^2}{c^2 + d^2}$.
- 35) Solve the following system of inequalities.
 $5(2x - 7) - 3(2x + 3) \leq 0, 2x + 19 \leq 6x + 47$
- 36) Using Binomial Theorem, evaluate $(99)^5$.
- 37) Find the value of n such that ${}^nP_5 = 42 {}^nP_3$.
- 38) Find the equation of a line perpendicular to the line $x - 2y - 3 = 0$ and passing through the point $(1, -2)$.

PART-D

V Answer any FOUR questions :

4x5=20

- 39) Define modulus function. Draw the graph of the modulus function. Also write its domain and Range.
- 40) Define greatest integer function. Draw the graph of the greatest integer function. Also write its domain and Range.
- 41) Prove that $\frac{\sin 5x - 2\sin 3x + \sin x}{\cos 5x - \cos x} = \tan x$.
- 42) Prove that $\cos 6x = 32 \cos^6 x - 48 \cos^4 x + 18 \cos^2 x - 1$.
- 43) Find the number of arrangements of the word 'INDEPENDENCE'. In how many of these arrangements
 i) Do the words start with p
 ii) Do all the vowels occur together
 iii) Do the vowels never occur together.
- 44) A group consists of 7 boys and 5 girls. Find the number of ways in which a team of 5 members can be selected so as to have atleast one boy and one girl.
- 45) Derive an expression for the acute angle between two lines m_1 and m_2 and hence find acute angle between the line $x + y - 6 = 0$ and $x - y - 5 = 0$.

PART-E

VI Answer the following questions :

(6+4=10)

- 46) Prove geometrically $\cos(x + y) = \cos x \cos y - \sin x \sin y$. Also prove that $\cos 2x = \cos^2 x - \sin^2 x$.

6M

OR

Derive an expression for the perpendicular distance from the point (x_1, y_1) to the line $Ax + By + C = 0$.

- 47) If $f(x) = x + 1$ & $g(x) = 2x - 3$ be two real functions, then find $(f + g)(x)$, $(f - g)(x)$ and $(f \cdot g)(x)$, & $\left(\frac{f}{g}\right)(x)$.

4M

OR

If $(x + iy)^3 = u + iv$. Then prove that $\frac{u}{x} + \frac{v}{y} = 4(x^2 - y^2)$.

(4)
