JGI JAIN COLLEGE V V Puram

I PUC Mock Paper – January. 2026

Course: I PUC
Subject: Mathematics
Max. Marks: 80
Duration: 3 Hours

PART A

I. Answer ALL the multiple-choice questions 1 x 15 = 15

1. Which of the following is not correct?
   a) Set of rational numbers is a subset of real number
   b) {x : x is an even natural number} is subset of {x: x is an integer}
   c) If A is set of all prime divisors of 56, and B is set of all divisors of 56, then B is subset of A
   d) $\{1,5,9\} \subset \{1,3,5,7,9\}$

2. If $A = \{1,2,3\}$ and $B = \{5,6\}$, then number of relations from A to B is
   a) 6   b) 36   c) 64   d) 128

3. The angle 1π in degrees is
   a) 1   b) 180   c) 360   d) 0

4. The imaginary part of $4 - 5i$ is
   a) -5 b) $-5i$ c) 5 d) $5i$

5. The solution set for $\dfrac{3-2x}{6} \le \dfrac{x}{6} + 5$ is
   a) $(9,\infty)$ b) $(-\infty,9)$ c) $[9,\infty)$ d) $(-9,\infty)$

6. If $^{n}C_{9} = {}^{n}C_{8}$, then value of n is
   a) 10   b) 15   c) 14   d) 21

7. The sum of terms in the expansion of $(x+a)^{10} + (x-a)^{10}$ is
   a) 22   b) 6   c) 21   d) 11

8. If $-\dfrac{2}{7}, x, -\dfrac{7}{2}$ are in G.P., then the common ratio is
   a) 1   b) ± 1 c) 2   d) ± 2

9. A line passes through (2,-2) and is parallel to y-axis, then the equation of the line is
   a) y=2   b) x=2   c) y=-2   d) x=-2

10. In which quadrant the parabola $x^2 = -4ay$ doesn't exist is
    a) I , II   b) II, III   c) III, IV   d) I, IV

11. The eccentricity of the ellipse $9x^2 + 25y^2 = 225$ is
    a) 3/4   b) 4/5   c) 9/16   d) 3/5

12. The octant in which the point (1,2,-5) lie is
    a) V   b) VI   c) VII   d) VIII

13. The value of $\lim\limits_{x\to 3}\dfrac{x^4 - 81}{2x^2 - 5x - 3}$
    a) $\dfrac{7}{108}$ b) ∞ c) $\dfrac{108}{7}$ d) 0

14. The median of the data 3,9,5,3,7,12,10,18,4,7,19,21 is
    a) 10   b) 8   c) 9   d) 9.5

15. The number of simple events corresponding to the sample space "two dice are rolled at once" is
    a) 6   b) 36   c) 1/18   d)12

II. Fill in the blanks by choosing the appropriate answer from those given in the bracket.   5 x 1 = 5
        (10,   3,   1,   -1,   5,   0)
16. If A={2,4,6,8}, and B={2,3,5,7} the n(A-B) is _____
17. If $3 - x > 2$, when x is a natural number. The number of values of x is _____
18. If $^n P_3 = 60$ then $^n C_3$ is _____
19. The value of y for which the points (1,y),(2,-1) and (4,5) are collinear will be _____
20. The derivative of f(x)=3-x at x=1 is _____

PART B

III. Answer any SIX questions: 6 x 2 =12
21. If A={2,4,6,8,10}, B={1,4,8} and C={4,8,12}, find A∩(B-C)
22. Find the radius of the circle in which a central angle is 60^0 intercepts an arc of length 37.4 cm.
23. Prove that $\cos\left(\frac{\pi}{4} - x\right)\cos\left(\frac{\pi}{4} - y\right) - \sin\left(\frac{\pi}{4} - x\right)\sin\left(\frac{\pi}{4} - y\right) = \sin(x + y)$
24. Express the complex number $(1 - i)^4$ in $a + ib$ form.
25. How many three digit even numbers can be made using the digits 1,2,3,4,6, and 7, if no digit is repeated?
26. Using binomial theorem evaluate $(98)^4$.
27. The sum of three terms of a G.P. is $\frac{13}{12}$ and their product is -1. Find the common ratio and the terms.
28. Find the equation of the circle with centre $(1,1)$ and radius $\sqrt{2}$
29. If $P(A) = \frac{2}{3}$ and $P(B) = \frac{1}{5}$, find P(A or B), if A and B are mutually exclusive.

PART C

IV. Answer any SIX questions: 6 x 3 = 18
30. If U={1,2,3,4,5,6,7,8}, A={2,3,5,7} and B={2,4,6,8} verify $(A \cup B)' = A' \cap B'$
31. Draw Venn diagrams for the (i) $A \cup B$ (ii) $A - B$ (iii) $(A \cap B)'$
32. Show that $\cos 2x = \frac{1 - \tan^2 x}{1 + \tan^2 x}$
33. If $(x + iy)^3 = u + iv$ then show that $\frac{u}{x} + \frac{v}{y} = 4(x^2 - y^2)$
34. Solve the inequality and show the solution on the number line $\frac{3x - 4}{2} \geq \frac{x + 1}{4} - 1$
35. Using binomial theorem, show that $9^{n+1} - 8n - 9$ is divisible by 64, whenever n is a positive integer.
36. If p is the length of perpendicular from the origin to the line whose intercepts on the axes are a and b, then show that $\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{p^2}$
37. Show that the points A(1,2,3), B(-1,-2,-1), C(2,3,2) and D(4,7,6) are vertices of parallelogram and not of rectangle.
38. Find the derivative of x^n w.r.t x from first principles.

PART D

V. Answer any FOUR questions: **4 x 5 = 20**

39. Define polynomial function. If the function $f : \square \to \square$ is defined by $f(x) = x^3$, draw the graph of it. Also write its domain and range.

40. Prove that $\dfrac{\cos 4x + \cos 3x + \cos 2x}{\sin 4x + \sin 3x + \sin 2x} = \cot 3x$

41. State and prove binomial theorem.

42. Derive the expression for the perpendicular distance between the point (x_1, y_1) and a line $Ax + By + C = 0$

43. Prove geometrically $\lim\limits_{x \to o} \dfrac{\sin x}{x} = 1$

44. Find the variance and standard deviation for the following data:

Classes	0-10	10-20	20-30	30-40	40-50
Frequencies	5	8	15	16	6

45. Find the probability that when a hand of 7 card is drawn from a well shuffled deck of 52 cards, it contains (i)all kings (ii)3 kings (iii) at least 3 kings

PART E

VI. Answer the following question.

46. Prove geometrically $\cos(x + y) = \cos x \cos y - \sin x \sin y$ and hence prove that $\cos 75^0 = \dfrac{\sqrt{3} - 1}{2\sqrt{2}}$

<div align="center">**OR**</div>   **6**

Define and derive the equation of parabola in the standard form $y^2 = 4ax$ and find the latus rectum of the parabola $y^2 = 8x$

47. Find the derivative of $f(x) = \dfrac{x + \cos x}{\tan x}$ with respect to x.

<div align="center">**OR**</div>   **4**

Find the sum of the series up to n terms 7+77+777+……..

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