Jain College, Jayanagar
MOCK PAPER
I PUC Mathematics (35)

Duration: 3.15 minutes   **Max.Marks**: 100

Section – A

I.   Answer all the following: **10×1=10**

1. Given that the number of subsets of a set A is 16. Find the number of elements in A.

2. If $\sec x = \dfrac{4}{3}$ and x lies in fourth quadrant, find sin x.

3. Express (-5i) $\dfrac{1}{8}i$ in the form of a + ib.

4. Write the 2nd term of the sequence $a_n = (-1)^{n-1} 5^{n+1}$.

5. Write the equation of the line passing through (-4, 3) with slope $\dfrac{1}{2}$.

6. Which plane (4, 2, 0) lies in?

7. Evaluate $\lim\limits_{x \to 0} \dfrac{(x+1)^5 - 1}{x}$.

8. Solve $7x + 3 < 5x+9$, $x \in N$.

9. Write the negation of 'For all a, $b \in I$, $a-b \in I$'

10. Write the mean of given data 6,7,10,12,13,4,8,12.

Section – B

II. Answer any ten of the following: **10×2=20**

11. If A and B are two disjoint sets and n(A) = 15 and n(B) = 10, find $n(A \cap B), n(A \cup B)$

12. If A = {1,2,3,4,5,6} and R is a relation on A defined by $\{(a,b): a,b \in A$ and 'b' is exactly divisible by 'a'}, then find domain and range of R.

13. Find the radius of the circle in which a central angle of 60° intercepts an arc of length 37.4 cm.

14. The difference between two acute angles of a right angled triangle is $\dfrac{3\pi}{10}$ radians. Express the angles in degrees.

15. If $x + iy = \sqrt{\dfrac{a+ib}{c+id}}$, prove that $x^2 + y^2 = \sqrt{\dfrac{a^2+b^2}{c^2+d^2}}$

16. Solve graphically $3x + 2y > 6$

17. Find the term independent of x in the expansion of $\left(x^2 + \dfrac{1}{x} \right)^9$

18. In a triangle ABC with vertices A(2,3), B(4, -1) and C(1,2), find the length of altitude from the vertex A.

19. Find the equation of the line perpendicular to the line $x - 7y + 5 = 0$ and having x-intercept 3.

20. Find the number of permutations of the letters of the word MISSISSIPPI in which 4 S's are together and 2P's are together.

21. Evaluate $\lim\limits_{x \to 0} \left(\dfrac{1 - \cos x}{x} \right)$

22. Find the mean deviation about the mean for the data 4,7,8,9,10,12,13,17

23. Write the contrapositive and converse of 'x is an even number implies that x is divisible by 4'.

24. A die is thrown, what is the probability of the event 'a multiple of 3'.

Section – C

III. Answer any ten of the following: $\qquad$ **10×3=30**

25. In a survey of 400 students in a school, 100 were listed as taking apple juice, 150 as taking orange juice and 75 were listed as taking both apple as well as orange juice. Find how many students were taking neither apple juice nor orange juice.

26. Let A ={1,2}, B ={1,2,3,4} and C = {5, 6}. Verify that $A \times (B \cap C) = (A \times B) \cap (A \times C)$

27. Prove that $\cos 4x = 1 - 8\sin^2 x \cos^2 x$

28. Find the general solution of $2\cos^2 x + 3\sin x = 0$

29. Find the polar form of the complex number $\sqrt{3} + i$

30. A committee of 3 persons is to be constituted from a group of 2 men and 3 women. In how many ways can this be done? How many of these committees would consist of 1 man and 2 women?

31. Find the middle terms in the expansion of $\left(3 - \dfrac{x^3}{6} \right)^7$

32. Insert 3 arithmetic means between 8 and 24.

33. If a,b,c are in GP and $a^{\frac{1}{x}} = b^{\frac{1}{y}} = c^{\frac{1}{z}}$, then prove that x,y,z are in AP.

34. Find the equation of the hyperbola where foci are $(0, \pm 12)$ and the length of the latus rectum is 36 units.

35. Find the derivative of tanx from first principle.

36. Verify by method of contradiction that $\sqrt{7}$ is irrational number.

37. If E and F are events such that p(E) = ¼, P(F)1/2, P(E and F) = 1/8,
    find : i) P(E or F)   ii) P(not E and not F)

38. A bag contains 9 discs of which 4 are red, 3 are blue and 2 are yellow. A disc is drawn at random from the bag. Calculate the probability that it will be (i) not blue   (ii) either red or blue.

Section – D

IV. Answer any Six of the following: $\qquad$ **6×5=30**

39. Define modulus function. Draw the graph of the function. Write the domain and range.

40. Prove that $\cos^2 x + \cos^2 \left(x + \dfrac{\pi}{3} \right) + \cos^2 \left(x - \dfrac{\pi}{3} \right) = \dfrac{3}{2}$

41. Prove by mathematical induction that $1.2 + 2.3 + 3.4 + \ldots\ldots + n(n+1) = \dfrac{n(n+1)(n+2)}{3}$

42. What is the number of ways of choosing 4 cards from a pack of 52 playing cards? In how many of these
    i)   Two are red cards and two are black cards.
    ii)   Four cards belong to four different suits.

43. Solve the following system of inequalities graphically $2x + y \geq 4,\ x + y \leq 3, 2x - 3y \leq 6$

44. State and prove binomial theorem for positive integer 'n'

45. Derive the equation of straight line in the intercept form, and hence find the equation of the line passing through the point (2,2) and cutting off intercepts on the axes whose sum is 9.

46. Derive section formula in 3D for internal division. Also find co-ordinates of midpoints of line joining the points (1, -2, 3) and (3,4,8)

47. Prove geometrically that $\lim\limits_{x \to 0} \dfrac{\sin x}{x} = 1$, where x is measured in radians and hence find $\lim\limits_{x \to 0} \dfrac{\sin 5x}{x}$.

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

Marks	0-10	10-20	20-30	30-40	40-50	50-60
No. of girls	6	7	15	16	4	2

Section – E

V. Answer any one of the following: $\qquad$ **10×1=10**

49. a) Prove geometrically that cos(x+y) = cosxcosy − sinxsiny and hence show that $\cos 2x = \cos^2 x - \sin^2 x$

b) Find the sum of the sequence 7, 77, 777,…. to n terms.

50. a) Define ellipse as set of all points in the plane and derive its equation as $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$

b) Find the derivative of $\dfrac{x + \sin x}{\tan x}$ with respect to x using rule of differentiation.

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