Jain College, Jayanagar
Mock Paper Jan - 2020
I PUC - Mathematics - 35

Duration: 3hr 15 min **Max.Marks: 100**

PART A

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

1. Write the set {x:x is a prime number which is divisor of 60} in roster form.
2. If set A has 3 elements and set B={3, 4, 5} find the number of elements of A x B.
3. Convert $(11/16)^c$ into degree measure.
4. Find multiplicative inverse of 2-3i.
5. Find 'n' if ${}^nc_7 = {}^nc_6$
6. Find the 17^{th} term of sequence whose n^{th} term is $a_n = 4n - 3$
7. Find the slope of line x-y+3=0.
8. Evaluate $\lim_{x\to -1} \frac{x^{10}+x^5+1}{x-1}$.
9. Write the negation of statement $\sqrt{2}$ is not a Complex Number.
10. Define simple event.

PART B

II. Answer any 10 questions: **10 × 2 = 20**

11. If X and Y are two sets such that $X \cup Y$ has 18 elements X has 8 elements and Y has 15 elements, how many elements days $X \cap Y$ have?
12. The cartesian product A x A has 9 elements among which are found (-1, 0) and (0, 1). Find set A and remaining elements of A x A.
13. Find the value of tan 15°
14. The minute hand of a clock is 2.1 cm long. How for does its tip mone is 20 minutes?
15. Evaluate $\lim_{x\to 1} \frac{x^{15}-1}{x^{10}-1}$
16. Express $\frac{1+3i}{1-2i}$ in the form of a+ib
17. Solve 3x-2 < 2x+1 show the graph of solution on number line.
18. Find the median for the following data 3, 9, 5, 3, 12, 10, 18, 4, 7, 19, 21
19. Reduce the equation 3x + 2y – 12 = 0 into intercept form and find its intercepts on the axis.
20. Show that the points P(-2, 3, 5) Q(1, 2, 3) & R(7, 0, -1) are collinear.
21. Find the roots of equation $2x^2+10x+20=0$
22. Find the equation of straight line intersecting y-axis at a distance of 2 units above the origin and making an angle 30° with the positive direction of x-axis.
23. Write the converse and contrapositive of "If a number is divisible by 9 then it is divisible by 3".
24. A die is thrown, what is probability of event "a multiple of 3".

PART C

III. Answer any 10 questions: 10 × 3 = 30

25. In a group of 600 students in school, 150 students were found to be taking tea 225 taking coffee. 100 were taking both tea and coffee. Find how many students were taking neither tea nor coffee.
26. Let A={1, 2, 3, 4, 6} let R be the relation on A defined by R={(a, b) : a, b $\in$ A, b is exactly divisible by a} write R in roster form and write its domain and Range
27. Find the general solution of equation sin 2x+cosx=0
28. Find the conjugate of $\frac{(3-2i)(2+3i)}{(1+2i)(2-i)}$.
29. If x+iy = $\sqrt{\frac{a+ib}{c+id}}$ prove that $x^2+y^2 = \sqrt{\frac{a^2+b^2}{c^2+d^2}}$.
30. Find r, if $5\ {}^4P_r = 6\ {}^5P_{r-1}$.
31. Using binomial theorem, compute $(98)^5$
32. Insert five numbers between 8 and 26 such that the resulting sequence is an AP
33. Find the sum of sequence 7, 77, 777…… to n terms.
34. Find the derivative of sinx using first principle.
35. Find the co-ordinates of focus, equation of the directrix and length of latus rectrum of parabola $y^2 = 8x$.
36. Verify by method of contradiction $\sqrt{11}$ is irrational.
37. A committee of two persons is selected from 2 men and 2 women what is the probability that the committee will have i) no man ii) 2 men.
38. A bag contains 9 discs of which 4 are Red, 3 are Blue and 2 are yellow. The discs are similar in shape and size. A disc is drawn at random from the bag calculate the probability that it will be i)Red ii)Not Blue iii) either Red or Blue.

PART D

IV. Answer any 6 questions: 6 × 5 = 30

39. Define signum function. Draw the graph of signum function, Write the domain and Range.
40. Prove by mathematical Induction that $1+3+3^2+\ldots\ldots = 3^{n-1} = \frac{3^n-1}{2}$
41. Prove that $\frac{\cos 4x+\cos 3x+\cos 2x}{\sin 4x+\sin 3x+\sin 2x} = \cot 3x$
42. State and prove Binomial theorem for positive integral index 'n'
43. Solve graphically the system of inequality $x+2y \geq 20$, $3x+y \leq 15$.
44. What is the number of ways of choosing 4 cards from a pack of 52 playing cards? In how many of these
    i) four cards are of same suit
    ii) are face cards
    iii) two are red cards and two are black cards
    iv) four cards are of same colour
45. Derive an expression for the co-ordinates of a point that divides the line joining the points A (x_1, y_1, z_1) and B(x_2, y_2, z_2) internally in the ratio m:n
46. Prove that $\lim_{\theta \to 0}\left(\frac{\sin\theta}{\theta}\right) = 1$ and hence evaluate $\lim_{\theta \to 0}\frac{\sin a\theta}{\sin b\theta}$

47. Find the co-ordinates of the foot of the perpendicular from the point (-1, 3) to the line 3x-4y-16=0.

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

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PART E

V. Answer any 1 question: **1 × 10 = 10**

49. a) Prove geometrically that cos(x+y) = cosx cosy-sinx siny.

b) find the derivative of $\frac{x^5 - \cos x}{\sin x}$ w.r.t x.

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

b) Find the sum to n terms of series 3x8 + 6x11 + 9x14 +----------

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