JAIN COLLEGE, Bangalore
Mock Paper December - 2018
I PUC – Mathematics (35)

Time: 3 Hours 15 Minutes **Max. Marks: 100**

PART A

I. Answer all ten of the following questions **10 × 1 = 10**

1. Write [2,6] in set builder form.
2. If A={1,2} and B={x:x^2-9=0 and x is a natural number}. Find AxB.
3. Convert 3π/4 into degrees.
4. Express $(i)^{-39}$ in a+ib form.
5. Find the value of x if $\frac{1}{8!}+\frac{1}{9!}=\frac{x}{10!}$
6. Write the fifth term of the sequence $a_n=\frac{(-1)^{n+1}}{n-1}$
7. Reduce the equation 3x+4y-12=0 into intercept form.
8. Evaluate $\lim_{x\to 1}\frac{x^3-1}{x-1}$
9. Negate "if n is prime then n is not even".
10. What is the probability of getting an odd number when a dice is rolled?

PART B

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

11. Let U={1,2,3,4,5,6,7,8,9}, A={2,4,6,8} and B={1,3,4,6}. Find (A-B)^{I}
12. If A and B are disjoint sets n(A)= 12 and n(B)=9. Find n(A∪B) and n(A∩B).
13. Find the domain and range of function $f(x)=\sqrt{9-x^2}$
14. In a circle of diameter 40cm, the length of a chord is 20cm. find the length of minor arc of the chord.
15. Find the value of cos 15^0
16. Find the multiplicative inverse of 1-2i
17. Solve the inequality $3(2-x)\geq 2(1-x)$
18. Find the equation of the line through the points (0,3) making an angle 120^0 with positive x axis.
19. Find the equation of line with x and y intercept are given by 2 and 3 respectively.
20. Write the converse and contrapositive for the statement "x is even number implies that x is divisible by 4".
21. The co-efficient of variation and standard deviation are 60 and 21 respectively. What is the arithmetic mean of the distribution.
22. Evaluate $\lim_{x\to 0}\frac{tan3x}{tan2x}$
23. Verify whether the given points P(-2,3,5), Q(1,2,3) and R(7,0,- 1) are collinear.
24. If 3/11 is the probability of an event A, what is the probability of 'not A'?

PART C

III. Answer any ten of the following questions **10 × 3 = 30**

25. In a committee 50 people speak French, 20 people speak Spanish and 10 speak both. How many speak at least one of the two languages.
26. Let f(x)=x^2 and g(x)=3x+2 be two real functions, find (i) (f+g)(x) (ii)(f-g)(x) (iii)(fg)(x)
27. Find the value of $cot^2\frac{\pi}{6}+cosec\frac{5\pi}{4}+3tan^2\frac{\pi}{4}$
28. Convert the complex number $\sqrt{3}+i$ to polar form.

29. Solve the equation $\sqrt{3}x^2 - \sqrt{2}x + 3\sqrt{3} = 0$
30. Find the number of arrangements of the word MISSISSIPPI. In how many of these

    (i)All S's are not together (ii) starts with MISS
31. Find the co-efficient of x^4 in the expansion of $(2x-3)^8$
32. Find the sum of all the numbers between 100 and 1000 which are divisible by 5.
33. Sum of three numbers in G.P is 13/ 12 and their product is -1, then find the numbers.
34. Find the co ordinates of foci, length of latusrectum and eccentricity of the ellipse $\frac{x^2}{60} + \frac{y^2}{36} = 1$
35. Find the derivative of sinx with respect to x using first principles.
36. Prove that $\sqrt{5}$ is irrational.
37. One card is drawn from a well shuffled deck of 52 cards. If each outcome is equally likely, calculate the probability that the card will be
    (i) A diamond (ii) not an ace (iii) a black card
38. A bag contains 11 discs of which 4 are red, 4 are blue and 3 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.

PART D

IV. Answer any six of the following questions 6 × 5 = 30

39. Define modulus function. Draw graph of modulus function, write domain and range of it.
40. Prove that $sin2x + 2sin4x + sin6x = 4cos^2 x sin4x$
41. Prove $3^{2n+2} - 8n - 9$ is divisible by 8 using the principle of mathematical induction.
42. Solve the system of linear inequalities graphically; $3x + 2y \leq 50, x + 4y \leq 80, x \leq 15 \; and \; x, y \geq 0$
43. A group consists of 5 girls and 6 boys. In how many ways can a team of 5 members be selected if the team has (i) no girl (ii) at least two boys and one girl (iii) at least 3 girls
44. Prove that for any positive integer n, $(a+b)^n = {}^nC_0 a^n + {}^nC_1 a^{n-1} b + \ldots\ldots\ldots + {}^nC_n b^n$
45. Derive an expression for the co-ordinates of the 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. hence the co-ordinates of that points divide externally.
46. Derive a formula to find angle between two lines with slopes m_1 and m_2. Hence find the angle between the lines $y = \sqrt{3}x + 5 \; and \; y = \frac{1}{\sqrt{3}}x - 2\sqrt{3}$
47. Prove that $\lim_{x\to 0} \frac{sinx}{x} = 1$. Hence evaluate $\lim_{x\to 0} \frac{tanx}{x}$
48. Find the mean deviation about mean

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

PART E

V. Answer any one of the following questions. 1 × 10 = 10

49. Prove geometrically $\cos(x+y) = cosx\, cosy - sinx\, siny$ and hence prove that $\cos(x-y) = cosx\, cosy + sinx\, siny$
    (b) Find the sum to n terms of 7+77+777…..
50. (a) Define an ellipse and derive equation of ellipse in standard form as $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$
    (b) find the derivative of $\frac{x+cosx}{tanx}$

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