JAIN COLLEGE, Bangalore
Mock Paper January - 2017
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. Define an empty set
2. If $\left(\frac{x+1}{2}, 7\right) = (6,7)$ find x
3. Convert $\left(\frac{7\pi}{6}\right)^c$ into degrees .
4. Evaluate $i^{24}+\left(\frac{1}{i}\right)^{26}$.
5. Is 3! + 4! = 7! ?
6. What is the 20^{th} term of the sequence defined by $a_n=(n-1)(2-n)(3+n)$?
7. Find the slope of a line 3x-4y+10=0
8. Find the derivative of $2x - \frac{3}{4}$.
9. Write the negation of "Intersection of two disjoint sets is not an empty set"
10. A dice is rolled. Describe the event "a number less than 7" occurs.

PART B

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

11. Let A and B be two sets such that n(A)=3 and n(B)=2. If (5,a),(6,b),(7,a) are in AxB then find the sets A and B, where a,b are distinct elements.
12. If U={1,2,3,4,5,6,7,8,9}, A={2,4,6,8} and B={2,3,5,7} verify $(A\cap B)^1=A^1 \cup B^1$
13. If X and Y are two sets such that XUY has 50 elements , X has 28 elements and Y has 32 elements. How many elements does X∩Y have?
14. Find the value of $Sin\frac{31\pi}{3}$
15. Prove that : $\cos 3x= 4\cos^3 x -3\cos x$
16. Show that (-1,2,1), (1,-2,5), (4,-7,8) and (2,-3,4) are the vertices of a parallelogram.
17. Solve the inequality (2x-5)>(1-5x) and represent the solution graphically on the number line
18. Write the converse and contrapositive of "If a parallelogram is a square, then it is a rhombus".
19. Find the angle between the lines $y - \sqrt{3}x - 5 = 0$ and $\sqrt{3}y - x + 6 = 0$.
20. Evaluate $\lim_{x\to -2} \frac{\frac{2}{x}+\frac{1}{2}}{x+2}$
21. Represent the complex number *z=-1+i* in polar form
22. By using the concept of equation of the line prove that the three points (3,0),(-2,-2) and (8,2) are collinear.
23. Write the mean of the given data 6 , 7 , 10 , 12 , 13 , 4 , 6 , 12
24. Given 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

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

25. There are 200 individuals with a skin disorder. 120 has been exposed to the chemical A, 50 to chemical B and 30 to both chemical A and B. Find the number of individuals exposed to
i) chemical A but not to chemical B ii)Chemical A or chemical B
26. Let A={1,2} , B={1,2,3,4} , and C={5,6} . Verify that AX(B∩C)=(A X B)∩(A X C)

27. Find the general solution of $\sec^2 2x = 1 - \tan 2x$.
28. Express $\frac{-1+i}{\sqrt{2}}$ in the polar form
29. Solve the equation $x^2 + \frac{x}{\sqrt{2}} + 2 = 0$
30. In how many ways can 5 girls and 3 boys be seated in a row so that no two boys are together.
31. Find the middle term in the expansion of $\left(\frac{x}{3} + 9y\right)^{10}$
32. Find the sum of the sequence: 7,77,777,7777,……
33. The sum of first three terms of a G.P. is 13/12 and their product if -1. Find the common ratio and the terms.
34. Find the equation of parabola with vertex at the origin, axis along x-axis and passing through the point (2,3) also find its focus.
35. Differentiate: $\left(\frac{x+1}{x}\right)$ from first principle.
36. A fair coin 1 marked on one face and 6 on the other and a fair die are both tossed. Find the probability that the sum of numbers that turn up is i) 3 ii)12.
37. By the method of contradiction, check the validity of the statement: "If a, bϵ Z such that ab is odd, then both 'a' and 'b' are odd".
38. A committee of two persons is selected from two men and two women. What is the probability that the committee will have (i) no man (ii) two men

PART D

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

39. Define modulus function. Draw the graph of modulus function, write down its domain and range
40. Prove that $\frac{cos4x+cos3x+cos2x}{sin4x+sin3x+sin2x} = cot3x$
41. Prove that $10^{2n-1}+1$ is divisible by 11,$\forall n \epsilon N$ by the principle of mathematical Induction.
42. Solve the inequalities : $2x+3y<12$, $x \geq 2$, $y \geq 2$ graphically
43. Find "a" if 17th and 18th terms of the expansion $(2+a)^{50}$ are equal
44. A committee of seven has to be formed from 9 boys and 4 girls. In how many ways this can be done when the committee consists of (1) exactly 3 girls, (2) at least 3 girls and (3) at most 3 girls.
45. Derive a formula for the perpendicular distance of a point (x_1, y_1) from the line Ax+By+C=0.
46. Prove that $cos^2 x + cos^2\left(x + \frac{\pi}{3}\right) + cos^2\left(x - \frac{\pi}{3}\right) = \frac{3}{2}$
47. Prove that, $\lim_{x\to 0} \frac{Sinx}{x} = 1$ where x is an radian and hence evaluate: $\lim_{x\to 0} \frac{Sinax}{sinbx}$
48. Find the mean deviation about the median age for the age distribution of 100 persons given below

Age	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55
Number	5	6	12	14	26	12	16	9

PART E

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

49. (a) Prove geometrically that cos(A+B)=cosAcosB-sinAsinB
    (b) Find the derivative of $f(x)=2x^2+3x-5$, also prove that *f '(0)+3f '(-1)=0*
50. (a) Define parabola as a set of all points in the plane and derive its equation in the form $y^2=4ax$, a>0 and hence also find the focus and vertex.
    (b) Find the sum to 'n' terms of the series $1^2 + (1^2 + 2^2) + (1^2 + 2^2 + 3^2)$ ……