JAIN COLLEGE

463/465, 18th Main Road, SS Royal, 80 Feet Road, Rajarajeshwari Nagar,
Bangalore - 560 098

Date: ***SUBJECT: MATHEMATICS***

I PUC
Mock paper

Timings Allowed: 3 Hrs15Minutes. ***Total Marks: 100***

PART A

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

1. Write the Power set of the set A $= \{a, b\}$
2. If Tan x = $\frac{3}{4}$ and x lies in the third quadrant, find Sin x .
3. Find the modulus of $\frac{1+i}{1-i}$
4. Find the range of the function f (x) = $\sqrt{9 - x^2}$
5. Find the value of $6P_3$ - $8P_2$
6. Find the 10^{th} term of the GP 5,25, 125 .....
7. Find the equation of the line through the point (-2,3) and having the slope -4
8. Evaluate $\log_{x \to 0}\left(\frac{\cos x}{\pi - x}\right)$
9. Write the negation of the statement : P : There exists a number "x " such that $0 < x < 1$
10. Write the sample space associated with the experiment " A coin is tossed repeatedly thrice ".

PART B

II.Answer any TEN of the following : **2 x 10 = 20**

11. If U = $\{x : x \leq 10, x \in N\}$, A = $\{x: x \in N, x \text{ is prime}\}$ and B = $\{x : x \in N, x \text{ is even}\}$ Write A ∩ B' in roster form.
12. If A = {1,2,3} , B = {3,4} and C = {4,5,6} Find (A X B) ∩ (A X C)
13. The minute hand of a clock is 2.1 cms long. How far does its tip move in 20 minutes?
14. If Cot x = $\frac{-5}{12}$ and x lies in the second quadrant, find the values of sec x and cosec x.
15. Solve $\sqrt{5}\, x^2$ + x + $\sqrt{5}$ = 0
16. Find the multiplicative inverse of 4 – 3i
17. Find all the pairs of consecutive odd positive integers both of which are smaller than 10 such that their sum is more than 11
18. The sum of some terms of a GP is 315. The first term and the common ratio are 5 and 2 respectively. Find the number of terms.
19. In how many ways can 4 green, 3 red and 2 yellow discs be arranged in a row if the discs of the same colour are indistinguishable.
20. Find the middle term in the expansion of $\left(x^2 + \frac{3}{x}\right)^{20}$
21. Find the equation of a line perpendicular to the line x – 2y + 3 = 0 and passing through the point (1, -2)
22. Write the converse and contrapositive of the statement " If x is a prime number the x is odd ".
23. Show that (-2, 3 , 5), (1, 2, 3) and (7,0, -1) are collinear.
24. The centroid of a triangle ABC is at the point (1,2,2). If the co –ordinates of A and B are (3,-5,7) and (-7, 7,-6) respectively, find the co ordinates of the point C.

PART C

III.Answer any TEN of the following : **3 X 10 = 30**

25. If U = {1,2,3,4,5,6} is the universal set and A ={2,3} and B = {3,4,5}
    Verify that $(A\ U\ B)'$ = A'$\cap B'$
26. Prove that Cos $\left(\frac{3\pi}{2}+x\right)$ Cos $(2\pi+x)\left[Cot\left(\frac{3\pi}{2}-x\right)+Cot\ (2\pi+x)\ \right]$ = 1
27. Find the conjugate of $\frac{(3-2i)(2+3i)}{(1+2i)(2-i)}$
28. If A = {2,3} B= {1,2,3,4} and C = {3,4,5,6} Verify that A X $(B \cap C)$ = (A X B) $\cap$ (A X C)
29. Solve : x^2 + x + $\frac{1}{\sqrt{2}}$ = 0
30. Find the number of 4 digit numbers that can be formed using the digits 1,2,3,4 and 5 if no digit is repeated. How many of these will be even?
31. Expand $(1-2x)^5$ using the Binomial theorem.
32. Find the sum of all natural numbers lying between 100 and 1000 which are multiples of 5.
33. Find the equation of the hyperbola given that foci (5,0) the transverse axis is of length 9.
34. Find the derivative of " Sinx " from first principles.
35. A committee of two persons is selected from two men and two women. What is the probability that the committee will have a) no man and b) two men
36. Find the equation of the straight line with slope 'm ' and passing through the point (x , y)
37. Verify by the method of contradiction that $\sqrt{7}$ is irrational.
38. Let f: Z $\rightarrow$ Z be a function defined by f (x) = ax + b for some integers " a " and " b". It is given that f(1) = 1, f (2) = 3, f(0) = -1 and f(-1) = -3. Find the values of a and b.

PART D

IV.Answer any SIX of the following: **5 x 6 = 30**

39. Define an identity function. Draw the graph of the same and write its domain and range.
40. Prove by the method of Mathematical Induction that $1^2 + 2^2 + 3^2 + 4^2$ ..... = $\frac{n\,(n+1)(2n+1)}{6}$
41. Prove that $\frac{\cos 4x+\cos 3x+\cos 2x}{\sin 4x+\sin 3x+\sin 2x}$ = cot 3x
42. A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has (a) one girl (b) at least 3 girls.
43. Solve the following system of inequalities graphically x + 2y $\leq$ 8 , 2x + y $\leq$ 8 and x, y $\geq$ 0
44. State and Prove the Binomial Theorem.
45. Derive a formula to find the 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 $\sqrt{3}$
46. Derive the formula to find 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

47. If p is the length of the perpendicular from the origin to the line whose intercepts on the axes are " a " and " b" then prove that $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$

48. Find the mean and variance for the following frequency distribution

C I	0 -10	10 – 20	20 – 30	30 – 40	40 – 50
f	5	8	15	16	6

PART E

V. Answer any ONE of the following : **1 x 10 = 10**

49 (a) Prove geometrically Cos (A + B) = Cos A Cos B – Sin A Sin B and hence find Cos 15^0

(b) Find the sum to n terms of the series given by 5 + 11 + 19 + 29 + 41 + ……

50 (a) Define hyperbola as a set of points and derive its equation in the standard form.

(b) Differentiate wrt x : $\frac{x^2 \, Cos\frac{\pi}{4}}{sin\, x}$

****