JAIN COLLEGE

Date: *I PUC*   *SUBJECT: MATHEMATICS*

MOCK

Timings Allowed: 3 Hrs 15 Minutes   *Total Marks: 100*

Instructions:

1. The question paper has 5 parts A, B, C, D and E. Answer all parts.

2. Part A carries 10 marks, Part-B carries 20 marks, Part-C carries 30 marks, Part-D carries 30 marks and Part-E

   carries 10   marks.

3. Write the question number properly as indicated in the question paper Part - A

Part-A

I. Answer any ten questions.   **10X1=10**

1. If set A has three elements and set B={3,4,5} find the number of elements of AXB

2. If tanX=$\frac{3}{4}$ and x lies in the third quadrant, find SinX

3. Find 'n' if $nc_7 = nc_6$

4. The arithmetic mean of 4 and another number is 10. Find the other number.

5. Find the distance between 3x+4y+5=0 and 6x+8y+2=0

6. Solve 5x-3<7, when x is a positive integer

7. Find the derivative of $2x^4$+x

8. Find the equation of the circle with radius 4 and centre (-2,3)

9. Evaluate $\lim_{x \to 0} \frac{(x+1)^5 - 1}{x}$

10. Write the negation of "every natural number is greater than zero "

Part- B

II.Answer any Ten questions.   **10X2=20**

11. If X and Y are sets such that n(X)=17, n(Y)=23 and n(X∪Y) =38find n(X∪ *Y*)

12.If A XB ={ (a,1)(a,2)(a,3)(b,1)(b,2)(b,3) } find the sets A and B and hence find BXA

13. A wheel makes 360 revolutions in one minute through how many radians does turn in one second

14. Prove that $\sin 2X = \frac{2\tan x}{1+\tan^2 x}$

15. Find the polar form of the complex number $\overline{3}+i$

16. Evaluate cosec (-1410^0)

17. Write the inverse and converse of ' if a parallelogram is a square ,then it is a rhombus"

18. Find the term independent of x in the expansion of $x^2 + \frac{1}{x}$ ^{9}

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

20. Represent the complex number Z=1+I in polar form

21, Obtain all the pairs of consecutive odd numbers such that in each pair both are more than 50 and their sum is less than 120

22 .Find the ratio in which the y-Z plane divides the line segment formed by joining the points (-2 4 7) and (3 -5 8)

23. Evaluate $\lim_{x\to 3} \frac{(x-3)}{(x^2-5x+6)}$

24. Find the equation of the line passing through the intersection of the lines

   2x+y =5 and x+3y+8=0 and parallel to the line 3x+4y=7.

Part-C

III. Answer any Ten questions.   **10x3=30**

25. if A={1,2} B={1,2,3,4} C={5,6} then verify AX(B∩C)=(AXB)∩(AXC)

26. Define signum function .write its range, also draw the graph of the function

27. In a group of 600 students in a 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.

28. Find the general solution of sinx+ sin3x+sin5X

29. Find the conjugate of $\frac{3-2i}{1+2i}$ $\frac{2+3i}{2-i}$

30. Solve the following system of inequalities graphically 5x+4y≤0 ,x≥2,y≥3

31. Insert 3 arithmetic means between 8 and 24

32. Derive an expression between two parallel lines y=mx+c_1 $and\ y = mx + c_2$

33. Find the equation of the hyperbola where foci are $(0,\pm12)$ and the length of the latus rectum is 36 units

34. Find the derivative of the function cosx w,r,t x from first principle

35. How many 6 digits number can be formed from the digits 0, 1, 3,5,7,9 which are divisible by i)10 ii)5

36. If E and F are two events such that P (E) =$\frac{1}{4}$, $P\ F\ = \frac{1}{2}$ $P\ E\ and\ F\ = \frac{1}{8}$ find P (not E and notF)

37. Verify by the method of contradiction that $\overline{2}$ is irrational

38. 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   a) a black card

b), not a diamond   c) not a black card.

Part- D

IV. Answer any Six questions. 6x5=30

39. Prove that $\lim_{\theta \to 0} \frac{sin\theta}{\theta}$=1 (θ being in radians) and hence show that $\lim_{\theta \to 0} \frac{tan\theta}{\theta}$=1

40. A group consists of 7 boys and 5 girls .find the number of ways in which a team of 5 members can be selected so as to have atleast one boy and one girl

41. Prove that $\frac{\sin 9x +\sin 7x +\sin 3x +\sin 5x}{\cos 9x +\cos 7x +\cos 3x +\cos 5x}$=$\tan 6x$

42. State and prove binomial theorem

43. Derive the section formula in 3 dimensions for internal division

44. Prove by mathematical induction 1.3+3.5+5.7+………+(2n-1)(2n+1)=$\frac{n(4n^2+6n-1)}{3}$

45 The mean and standard deviations of 100 observations were evaluated as 40 and 5.1 respectively by a student who took by mistake, 50 instead of 40 for one observation. What are the correct mean and standard deviations?

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

47. If a, b, c are three consecutive terms of an A.P. and x, y, z are three consecutive terms of a G.P. then prove that$X^{b-c} . Y^{c-a} . Z^{a-b}$ =1

48. Find the 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	8	14	16	4	2

Part-E

V. Answer any one question.   **1x10 =10**

49.a)In how many ways ,4 cards can be chosen from a pack of 52 plane cards ? in how many of them i) 4 cards of same unit ii) two are red cards and two are black cards iii) 4 cards belonging to 4 different suits

b) Find the co –ordinates of ortho-center of triangle whose vertices are (-1, 3)   (2,-1) and (0,0)

50. a)Define hyperbola and derive its equation in the form

b) Find the sum to n terms of the series 7+77+777…………….. n terms

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