JAIN COLLEGE

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SUBJECT: MATHEMATICS

I PUC

MOCK – I

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

Instructions: i) The question paper has 5 parts. A,B,C,D,E. Answer all the parts.

ii) Part A carries 10 marks. Part B carries 20 marks, Part C and Part D carries 30 marks

and Part E carries 10 marks.

iii) Write the question number properly as indicated in the question paper.

Part-A

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

1. if A={1,2} , B={3,4} ,C={5,6} find(A-B)xC

2. If $f(x)=x^2$;$g(x)=2x+1$ be two real valued functions then find $(f+g)(x)$

3. If $\tan x=\dfrac{3}{4}$ and x lies in third quadrant , find $\sin x$.

4. Find the multiplicative inverse of $\sqrt{5}+3i$

5. Write the first three terms of the sequence $a_n=(-1)^{n-1}5^{n+1}$

6. Find the tenth term of 5, 25,125

7. Find the slope of the line x-y+3=0

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

9. If the coefficient of variation and standard deviation are 60, 21 respectively. What is the arithmetic mean of the distribution?

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

11. Write the coordinates of any point on the x-y plane

12. Solve -12x>30, when x is an integer.

Part-B

II. Answer any ten questions   **10x2=20**

13. if A={3,5,7,9,11} B={7,9,11,13} C={15,17} find A∩(BUC)

14. if A={1,2,3,4,6} , R be a relation on A defined by { (a,b): a,b∈ A & 'b' is exactly divisible by 'a' } then find domain and range of R

15. Find the radius of the circle in which a central angle of 60^0 intercepts an arc of length 37.4 cm.

16. Prove that $\frac{cos7x+cos5x}{sin7x-sin5x}$ = cotx

17. If x+iy=$\frac{a+ib}{a-ib}$, prove that $x^2 + y^2 = 1$

18. Solve the equation $x^2 + \frac{x}{\sqrt{2}}$+1=0

19. In how many ways can a team of 3boys and 3 girls be selected from 5 boys and 4 girls?

20. Find the sum to n^{th} terms of the series whose n term is n(n+3)

21. Find the coefficient of x^5 in the expansion of (x+3)^8

22. show that points p(-2,3,5) Q(1,2,3) and R(7,0,-1) are collinear

23. Write the contra positive and converse of the statement " if x is a prime number then x is odd".

24. Draw the graph of y=sinx ,x∈R and write its range.

25. The length of a rectangle is three times its breadth. If the minimum perimeter of the rectangle is 160cm then find the minimum value of the breadth.

Part-c

III. Answer any ten questions: **10x3=30**

26. In a survey of 5000 people in town , 2250 were listed as reading English newspaper,1750 as reading Hindi newspaper and 875 were listed as reading both Hindi or English newspaper .find how many people do not read Hindi or English newspaper. Find how many people read only English newspaper

27. let A={1,2,3,4} B={1,5,9,11,15,16}and f={(1,5),(2,9),(3,1), (4,5),(2,11)}. Are the following true?

i)f is a relation from A to B

ii) f is a function from A to B. justify your answer in each case

28. Solve $\sin 2x - \sin 4x + \sin 6x = 0$

29. Convert the complex number $z = \dfrac{-16}{1+i\sqrt{3}}$ into polar form

30. Solve graphically the system of linear equations $x+2y \geq 20.3x+y \leq 15$

31. Find the image of $(2,3)$ on the line $3x+5y=4$

32. Reduce the equation $\sqrt{3}x+y-8=0$ to normal form and find the length of the perpendicular to the normal from origin and angle made by it with positive x axis values.

33. In an A.P. if m^{th} term is 'n' and the nth term is 'm' ,wherm≠n, find the pth term

34. Compute the derivative of sinx using first principle.

35. Verify by the method of contradiction given p:$\sqrt{7}$ is irrational.

36. A committee of two persons is selected from 2men and 2 women .what is the probability that the committee will have i) no man ii) 2 men

37. Differentiate $\dfrac{sinx+cosx}{sinx-cosx}$ with respect to 'x'

38. Find the equation of the ellipse whose foci are at $(\pm 5,0)$ and $x=\dfrac{36}{5}$ as one of its directrices .

Part- D

IV. Answer any six questions: 6x5=30

39. Find the number of arrangements of the letters of the word 'EXAMINATION' in how many of these arrangements

i) Do the word, start with M

ii) Do all the vowels always occur together?

40. Prove geometrically that $\lim_{\theta \to 0} \dfrac{\sin \theta}{\theta} = 1$ and hence find the value of $\lim_{\theta \to 0} \dfrac{\sin 4\theta}{\sin 5\theta}$

41. State and prove binomial theorem and hence find $(101)^4$

42. Find the distance between two points in a three dimensional plane and hence find the distance between the points p(-2,3,5) and Q(1,2,3)

43. The mean and standard deviation of 20 observations are found to be 10 and 2 respectively. On rechecking it was found that an observation 8 was incorrect .calculate the correct mean and standard deviation in each of the following cases

i) If wrong item is omitted
ii) If it is replaced by 12

44. Prove using mathematical induction $1^3 + 2^3 + 3^3 + \cdots \ldots \ldots \ldots \ldots n^3 = \dfrac{n^2(n+1)^2}{4}$

45. Define ellipse. Derive its equation in the form $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1 \ (a > b)$

46. Derive an expression for the coordinates 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 hence find the coordinates of the midpoint of A where A=(1,2,3) and B=(5,6,7)

47. Evaluate $\lim_{x \to 0} (\operatorname{cosec} x - \cot x)$

48. Compute the derivative of f(x) = sinx+cosx

Part-E

V. Answer any one question $\hspace{8cm}$ **1x10 =10**

49. A)prove that $\cos^2 x + \cos^2(x + \dfrac{\Pi}{3}) + \cos^2\left(x - \dfrac{\Pi}{3}\right)$ and hence find the value of $\sin^2 x +$

$\sin^2\left(x + \dfrac{\Pi}{3}\right) + \sin^2\left(x - \dfrac{\Pi}{3}\right)$

b) Find the sum to n terms of the series 5+11+19+29+41+...............

50. A) if p and q are the lengths of the perpendiculars from the origin to the lines xcosθ −ysinθ =kcos2θ and xsecθ+ycosecθ=k respectively,

Prove that $p^2 + 4q^2 = k^2$

b) Differentiate f(x) = $\dfrac{2}{x+1} - \dfrac{x^2}{3x-1}$ w.r.t 'x'

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