DEPARTMENT OF PRE-UNIVERSITY EDUCATION

MODEL QUESTION PAPER FOR ANNUAL EXAMINATION MARCH-2022

I PUC

SUB: MATHEMATICS (35)

TIME: 3 Hours 15 Minutes **MAX. MARKS: 100**

Instructions :

(i) The question paper has five parts namely A, B, C, D and E. Answer all the parts.

***(ii)* Use the graph sheet for the question on Linear Inequalities in PART D.**

PART – A

Answer any TEN questions **10 X 1=10**

1. Write the solution set of the equation $x^2 + x - 2 = 0$ in roaster form.

2. If the set A has 3 elements and the set B = {3, 4, 5} , then find the number of elements in A×B.

3. Express the angle $\frac{7\pi}{6}$ in degree measure.

4. If $4x + i(3x - y) = 3 + i(-6)$, where x and y are real numbers, then find the values of x

5. Solve 24x < 100, when x is a natural numbers.

6. Evaluate 7!

7. Find the fourth term in the expansion of $(x - 2y)^{12}$.

8.If the nth term of a sequence is $a_n = 4n - 3$; find a_{17} .

9. Find the slope of the line passing through the points (3,-2) and (-1,4).

10. Find the coordinates of the focus of the parabola $y^2 = 12x$.

11.If a point is in the XZ-plane, what is its y-coordinate?

12.Evaluate $\lim_{x \to 4} \frac{4x+3}{x-2}$

13.Write the negation of the statement " Both the diagonals of a rectangle have the same length"

14.Find the mean of first n natural numbers.

15.Define the sample space of a random experiment.

PART- B

Answer any TEN questions **10 X 2=20**

16. Write down all the subsets of the set A = {1, 2, 3}.

17.If A = {1, 2, 3, 4, 5, 6} , B = {2, 4, 6, 8} , find A–B and B – A.

18.If A = {–1, 1}, find A×A×A.

19. Let A = {1, 2} and B = {3, 4}, Find the number of relations from A to B.

20. In a circle of diameter 40cm, the length of a chord is 20cm. Find the length of minor arc of the chord.

21.Find the value of sin75°.

22. Find the value of cos(–1710°).

23. Express $(-5i).\frac{1}{8}i$ in the form a+ ib.

24. Solve $7x + 3 < 5x + 9$. Show the graph of the solutions on number line.

25.How many 3-digit even numbers can be formed from the digits 1, 2, 3, 4, 5,6 if the digits can be repeated?

26.If the equation of a line is 3x – 4y + 10 = 0, find its slope and y-intercept.

27. Find the distance between the parallel lines 3x-4y+7=0 and 3x-4y+5=0

28.Find the distance between the points (2,3,5) and (4,3,1).

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

30.Find the derivative of sinx . cosx with respect to x.

31.Write the components of the statem[illegible] s intersect at a point or they are parallel"

32.The coefficient of variation of a distribution is 70 and standard deviation is 16. Find the arithmetic mean.

33.Given P(A) = $\frac{3}{5}$ and P(B) = $\frac{1}{5}$. Find P(A or B), if A and B are mutually exclusive events.

PART – C

Answer any TEN questions **10 X 3=30**

34. If U = {1, 2, 3, 4, 5, 6, 7, 8, 9 } , A = {2, 4, 6, 8} and B = {2, 3, 5, 7}. Verify that

$(A \cup B)' = A' \cap B'$.

35.In a class of 35 students , 24 like to play cricket and16 like to play football . Also , each student likes to play at least one of the two games. How many students like to play both cricket and football ?

35. Let A = {1, 2, 3, ….14}. Define a relation R from A to A by R = {(x, y): 3x–y =0, where x, y ∈A}. Write down its domain and range.

37. If $cosx = \frac{-3}{5}$, x lies in the third quadrant. Find the values of other five trigonometric functions.

38. Find the multiplicative inverse of the complex number 4-3i.

39. Solve $x^2 + x + \frac{1}{\sqrt{2}} = 0$.

40.Find the value of n such that ${}^nP_5 = 42\ {}^nP_3$, n >4

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

42.Insert 6 numbers between 3 and 24 such that the resulting sequence is an A.P.

43.The sum of first three terms of a G.P. is $\frac{13}{12}$ and their product is -1. Find the common ratio and the terms.

.

44.Find the equation of the hyperbola whose foci are $(\pm 5, 0)$, the transverse axis is of length 8.

45.Find the centre and radius of the circle $x^2 + y^2 - 4x - 8y - 45 = 0$.

46.Evaluate $\lim_{x \to 0} f(x)$ if it exists, where $f(x) = \begin{cases} \frac{|x|}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$.

47.Find the derivative of y = sinx with respect to x, from the first principle.

48. Verify by the method of contradiction that " $\sqrt{7}$ is irrational".

49. Find the mean deviation about the median for the following data:
3,9,5,3,12,10,18,4,7,19,21.

50. A die is thrown. Describe the events A : 'a number less than 7'.
B: ' a number greater than 7'. Find (i) AUB (ii) A∩B

51. In class XI of a school 40% of the students study Mathematics and 30% study Biology. 10% of the class study both Mathematics and Biology. If a student is selected at random from the class, find the probability that he will be studying Mathematics or Biology.

PART –D

Answer any SIX questions **6X 5=30**

52. Define Modulus function. Draw the graph of it. Also write its domain and range.

53. Prove that $\frac{cos4x+cos3x+cos2x}{sin4x+sin3x+sin2x} = cot3x$

54. Prove that $1^2 + 2^2 + 3^2 + ... + n^2 = \frac{n(n+1)(n+2)}{6}$ by principle of mathematical induction.

55. Convert the complex number $\frac{-16}{1+i\sqrt{3}}$ into polar form.

56.Solve the following system of linear inequalities graphically

$$x + 2y \leq 8 \ , 2x + y \leq 2 \ , x \geq 0 \ , y \geq 0$$

57. 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

(i) at least one boy and one girl?

(ii) at least 3 girls?

58.Prove that for any positive integer n

$(a+b)^n = {}^nC_0a^n + {}^nC_1a^{n-1}b + {}^nC_2a^{n-2}b^2 + \ldots + {}^nC_nb^n$.

59. If arithmetic mean (A.M.) and Geometric mean(G.M.) of two positive numbers a and b are 10 and 8, respectively, find the numbers.

60.Derive the formula to find the distance of a point (x_1, y_1) from the line Ax+By+C = 0.

61.Derive the formula to find the co-ordinates of the point that divides the line joining the points (x_1 , y_1, z_1) and (x_2 , y_2, z_2) internally in the ratio m : n.

62.Prove geometrically that $\lim_{x \to 0} \frac{sinx}{x} = 1$, where x is measured in radians.

63Find the mean deviation about the mean for the following data.

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

Answer any ONE question **1 X 10=10**

64. a) Prove that $\cos(x+y) = cosxcosy - sinxsiny$ and hence prove that

$cos\left(\frac{\pi}{2} - x\right) = sinx.$

(b) Find the sum to n terms of the series 1x2x3 + 2x3x4 + 3x4x5 + ……

65.

(a) Derive the formula to find the angle between two non-vertical lines with slopes m_1 and m_2, respectively. Hence find the angle between the lines y - $\sqrt{3}$x – 5 = 0 and $\sqrt{3}y$ - x + 6 = 0.

b) Prove that $tan3x = \frac{3tanx - tan^3x}{1-3tan^2x}$.

66. (a) Define an Ellipse and derive its equation in the standard form $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.

(b) Find the derivative of $\frac{x^5 - cosx}{sinx}$ with respect to x.

****