MODEL QUESTION PAPER - 2
I PU MATHEMATICS

PART-A

Answer All the Multiple choice Questions: $\qquad$ 10×1=10

1. If A={1,2,3} .Then the number of proper subsets of A are
   a) 0   b)7   c)8   d)9

2. If $A \times B = \{(a,x),(a,y),(b,x),(b,y)\}$ then the set A is
   a)$\{a,x\}$ b) $\{b,y\}$ c) $\{a,b\}$ d) $\{x,y\}$

3. If cosx=3/5 , x lies in 3rd quadrant then find the Value of sinx.
   a)4/5   b)-4/5   c)3/4   d)-3/5

4. If $\left(\frac{1+i}{1-i}\right)^4 = 1$, then the smallest value of n.
   a)2   b)3   c)4   d)6

5. The number of ways of rearranging the letters of the word ROOT is
   a)24   b)12   c)6   d)4

6. What is the 20th term of the sequence defined by an=(n-1)(2-n)(3+n)?
   a)7856   b)7866   c)-7866   d)-7856

7. Find the slope of the line passing through the points (3,2) and (-1,4).
   a)-2   b)1/2   c)-1/2   d)-3/4

8. Evaluate : $\lim_{x \to 3} [x(x+1)]$.
   a)12   b)9   c)6   d)3

9. Negation of the statement "The sum of 3 and 4 is 9" ia
   a) The sum of 3 and 4 is 7
   b) The sum of 3 and 4 is not equal to 9
   c) The sum of 3 and 4 may be equal to 9
   d) The sum of 3 or 4 is 9

10. If A and B are mutually exclusive events, given that P(A)=3/5 , P(B)=1/5 , then P(Aor B)is
    a)0.8   b)0.6   c)0.4   d)0.2

II. Fill in the blanks by choosing the appropriate answer from those given in the bracket.$(16, 20, 2.5, 8, 10,)$
5X1=5

1. Mean of the given data: 4,7,8,9,10,12,13,17 is _____
2. _____ octant in which the point (2,-4,-7) lie.
3. Find the derivative of $x^2 - 2$ $at\ x = 10$.
4. Length of latus rectum of $x^2 = 4y$ is _____
5. Y -intercept of the line 3x-4y+10=0 is _____

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III. Answer All the following Questions   **5X1=5**

6. Define power set of a set.
7. Find the degree measure of $\frac{5\pi}{3}$
8. Solve 24x<100 when 'x' is a natural number.
9. How many 3-digit numbers can be formed from the digits1,2,3,4 and 5 assuming that repetition of the digits is allowed?
10. Write the sample space for the experiment "a coin is tossed repeatedly 3 times".

PART-B

Answer Any Nine Questions: **9×2=18**

21. If V = {a,e,i,o,u} and B = {a, i,x,u} find V –B and B – V.
22. If X and Y are two sets such that X ∪ Y has 18 elements and Y itself has 15 elements while X has 8 elements. How many elements does X ∩ Y have?
23. Let f(x) =$\sqrt{x}$, g(x) = x then find (i) (f+g) x, (ii) (fg) x
24. A minute hand of a clock is 1.5cm long. How far does its tip move in 40 Minute? (use π=3.142)

25. Prove that $sin2x = \frac{2tanx}{1+tan^2x}$
26. Solve $\sqrt{2}x^2 + x + \sqrt{2} = 0$.
27. Solve the inequality (2x – 5) > (1 – 5x) and represent the solutions graphically on the number line.
28. Find the distance between the lines 3x + 4y + 5 = 0 and 6x + 8y + 2 = 0.
29. Find the equation of line passing through (2,3) & cutting off equal intercept on co-ordinate axes
30. Find the equation of the set of points P such that its distances from the points A(3,4,-5) and B (-2, 1,4) are equal.

31.   Evaluate: $\lim\limits_{x\to1}\dfrac{x^{15}-1}{x^{10}-1}$

32. Write the converse & contrapositive for the statement. "If a number is divisible by 9, then it is divisible by 3"
33. The coefficient of variation for a distribution is 70 and standard deviation is 16. Find the Mean.
34. One card is drawn from the well shuffled deck of 52 cards. If each out come is equally likely, Calculate the probability that the card will be "not an ace".

PART-C

Answer Any Nine Questions: **9×3=27**

35. In a survey of 600 students in a school. 150 students were found to be taking tea, 225 taking coffee and 100 were taking both tea and coffee. How many students were taking neither tea nor coffee?

36. Let A={1,2,⋯,14}.Define a relation R from A to A by R={(x,y):3x−y=0,wherex,y∈A}.
    Write down its domain, codomain and range.
37. Find the general solution of sin2x+cosx=0
38. If x+iy =$\frac{a+ib}{a-ib}$, then prove that x²+y² =1.
39. Convert the complex number$\frac{-16}{1+\sqrt{3}i}$ in polar form.
40. In how many ways can one select a cricket team of eleven from 17 players in which only 5 playerscan bowl. If each cricket team of 11 players must include exactly 4 bowlers
41. Findthemiddletermintheexpansionof $\left(3 - \frac{x^3}{6}\right)^7$.

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

43. Insert 3 arithmetic mean between 8 and 24.
44. Find the co-ordinates of the foci, the vertices , the length of major axis of the ellipse.
45. Find the derivative of $sinx$ with respect to x by using first principles.
46. Prove by method of contradiction "$\sqrt{7}$ is irrational" "
47. A letter is chosen at random from the word 'ASSASSINATION' , Find the probability that the letter is
    (i) an vowel (ii)consonant
48. If A and B are events S.t. P(A) = 0.42 P(B) = 0.48 and P(A &B) = 0.16. Determine
    1. P(not A)   2. P(not B)   3. P(A or B)

PART-D

Answer Any Five Questions: 5×5=25
49. Define Greatest integer function. Draw the graph of it. Also write its domain and range.
50. Prove that $\cos^2 x + \cos^2\left(x + \frac{\pi}{3}\right) + \cos^2\left(x - \frac{\pi}{3}\right) = \frac{3}{2}$

51. $1^2 + 2^2 + 3^2 + \ldots\ldots\ldots + n^2 = \dfrac{n(n+1)(2n+1)}{6} \; \forall n \in N$

52. Solve the following system of inequalities graphically, $x + 2y \le 10$, $x + y \ge 1$, $x - y \le 0$, $x , y \ge 0$.
53. A committee of 7 is to be formed from 9 boys and 4 girls . In how any ways can this be done when the committee consists of : i)exactly 3 girls ? (ii) atleast 3 girls? (iii) atmost 3 girls?
54. State and prove Binomial Theorem for any positive integer n
55. Derive an expression for the acute angle between two lines having slopes m_1 and m_2
56. Derive the formula to find the coordinates of the point which divides the line segment joining the points (x_1,y_1,z_1) and (x_2,y_2,z_2) in the ratio m:n internally.
57. Prove that $\displaystyle\lim_{x \to 0}\frac{sinx}{x} = 1$, where x is in radian and hence deduce that $\displaystyle\lim_{x \to 0}\frac{tanx}{x} = 1$.
58. Calculate the mean deviation about median for the following data:

Class	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	6	7	15	16	4	2

PART-E

Answer the following Questions:
59. Prove geometrically that $cos(x + y) = cosx.cosy - sinx.siny$ and hence show that
$$cos\left(\frac{\pi}{2} + x\right) = -sinx$$
OR

Define hyperbola as a set of points in the plane. Derive its equation in the form $\dfrac{x^2}{a^2} - \dfrac{y^2}{b^2} = -1$.

60. Find the sum to n terms of the series . $1^2 + (1^2 + 2^2) + (1^2 + 2^2 + 3^2) + \ldots\ldots$
OR

Find the derivative of $f(x) = \dfrac{x^5 - cosx}{sinx}$

*****GOOD LUCK******

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