# FIRST PUC MODEL QUESTION PAPER 2023-24

# **MATHEMATICS (35)**

TIME : 3 Hours 15 Minutes		[ Total Questions : 52 ]			Ma	Max Marks : 80	
Instructions :	lestion paper has five parts E. Answer all the Parts.			s name	ely A, B, C, D		
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2. Part A has 15 multiple choice questions, 5 fill in the blank questions

## PART -A

I.	Answer all the mul	-	-	15 x 1 = 15
1.	The interval form of $\{x\}$			
	a) [ –4, 6]		c) (-4,6)	d) [ –4, 6 )
2.	If $(x + 1, y - 2) = (3, 1)$	) then		
	a) x =2 , y = 3	b) x =2, y = -	-3 c) x = $-2$ , y = 3	d) $x = 2, y = -1$
3.	The degree measure of	$\frac{5\pi}{2}$ radians is	equal to	
		b) 300 <sup>0</sup>	c) 420 <sup>0</sup>	d) 135 <sup>0</sup>
4.	The conjugate of $i - 2$		0, 120	a) 100
	a) i + 2		c) -2 – i	d) – i + 2
5.	a > b implies	S) <u>2</u> 1		(c) 1 · 2
0.	a) $-a < -b$	h -a > h	c) −a < b	d) a < -b
6	•		c) u (b	
6.	If $n_{c_9} = n_{c_8}$ , then $n_{c_{17}}$			1) 1.0
_	a) 1	b) 17	c) 7	d) 10
7.	The number of terms in			1) 0
•	a) 6	b) 5	c) 7	d) 8
8.	If a sequence is defined			
-	a) 5	b) 6	c) 7	d) 8
9.	The equation of $x - axis$			
	a) $x = 0$	, 5	c) $xy = 0$	d) x = y
10.	The centre of the circle	$(x+2)^2 + (x-x)^2$		
	a) ( 2, 3 )		b) ( -2, 3 )	
	c) (-2, -3)		d) (2, -3)	
11.	The length of transverse	e axis of the 1	hyperbola $\frac{x^2}{2} - \frac{y^2}{4} = 1$	is
	a) 4	b) 6	c) 9	d) 16
12	The octant in which the	,	/	a) 10
	a) First b) se		c) third	d) fourth
10			,	
13.	The derivative of $2x - \frac{1}{2}$		ct to x is	
	a) 2 b) $\frac{-3}{4}$		c) –2	d) 0
14.	The Median of the data	3, 9, 5, 3, 12, 1	0,18,4,7,19,21 is	
	a) 18 b) 9		c) 12	d) 10
15.	The probability of draw		,	,
	a) $\frac{1}{4}$ b) $\frac{1}{52}$		c) $\frac{1}{13}$	d) $\frac{1}{2}$
	<sup>4</sup> , 4 52		°, 13	~, <sub>2</sub>

II. Fill in the blanks by choosing the appropriate answer from those given in the bracket

(-1, 16, 0, 20, 42, 1)

- **16.** If  $A = \{1, 2\}$  and  $B = \{3, 4\}$ , then the number of relations from A to B is \_\_\_\_\_
- **17.** The value of  $\cos 3\pi$  is \_\_\_\_\_
- **18.** The value of  $\frac{7!}{5!}$  is \_
- **19.** The slope of the line passing through the points (3, -2) and (7, -2) is \_\_\_\_\_
- **20.** The derivative of  $x^2 2$  at x = 10 is \_\_\_\_\_\_

#### PART -B

#### Answer any six questions

- **21.** Let  $A = \{1, 2, 3, 4, 5, 6\}$ ,  $B = \{2, 4, 6, 8\}$ . Find A B and B A
- **22.** List all the the subsets of the set { a, b }
- **23.** Prove that  $3\sin\frac{\pi}{6} \cdot \sec\frac{\pi}{3} 4\sin\frac{5\pi}{6} \cdot \cot\frac{\pi}{4} = 1$
- **24.** Find the multiplicative inverse of 2 3i
- **25.** If  $x + iy = \frac{a + ib}{a ib}$ , prove that  $x^2 + y^2 = 1$
- **26.** Solve inequality 5x 3 < 3x + 1 and show the graph of the solutions on number line.
- **27.** How many 3-digit even numbers can be formed from the digits 1,2,3,4,5,6 if the digits can be repeated ?
- **28.** Expand  $(1 2x)^5$ , using Binomial theorem
- **29.** Find the equation of the line intersecting the x- axis at a distance of 3 units to the left of origin with slope -2.
- **30.** Evaluate  $\lim_{x \to 1} \frac{x^{15}-1}{x^{10}-1}$
- 31. A die is thrown. Describe the following events1) a number less than 42) a number not less than 3

## PART – C

## Answer any six questions

**32.** Let U = { 1, 2, 3, 4, 5, 6 }, A = {2, 3 } and B = { 3, 4, 5 } prove that  $(A \cup B)^1 = A^1 \cap B^1$ 

- **33.** Let  $f(x) = x^2$  and g(x) = 2x + 1 be two real functions.
  - Find (f + g)(x), (f g)(x), (f g)(x)
- **34.** Prove that  $\cos 3x = 4 \cos^3 x 3 \cos x$
- **35.** If  $\cos x = -\frac{1}{2}$ , x lies in third quadrant, find the values of other five trigonometric functions.
- **36.** Express  $\frac{5+\sqrt{2}i}{1-\sqrt{2}i}$  in the form a + ib
- **37.** Find all pairs of consecutive odd positive integers both of which are smaller than 10 such that their sum is more than 11.
- **38.** 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.
- **39.** Derive the equation a line with x-intercept 'a' and y-intercept 'b' in the form  $\frac{x}{a} + \frac{y}{b} = 1$
- **40.** Find the equation of the Parabola with vertex (0,0), passing through the point (2,-3) and symmetric about y axis.
- **41.** show that the points (0, 7, 10), (-1, 6, 6) and (-4, 9, 6) are the vertices of a right angled triangle.

6 x 2 =12

6 x 3 =18

5 x 1= 5

**42.** Find the derivative of sinx with respect to x form first principle.

#### PART – D

#### Answer any four questions

- **43.** Define Greatest integer function, draw the graph . write the domain and range **44.** Prove that  $\frac{\sin 5x - 2\sin 3x + \sin x}{\sin 5x + \sin x} = \tan x$
- cos5x cosx
- **45.** Find the number of arrangements of the letters of the word INDEPENDENCE. In how many of these arrangements, 1) do the words start with P? 2) do the words begin with I and end in P?
- **46.** Prove that for every positive integer n  $(a+b)^n = n_{c_0} a^n + n_{c_1} a^{n-1}b + n_{c_2} a^{n-2} b^2 + \dots + n_{c_{n-1}} a^{n-1} + n_{c_n} b^n$
- **47.** Derive the formula to find the distance of a point P  $(x_1, y_1)$  from the line Ax + By + C = 0
- **48.** Prove geometrically that  $\lim_{x \to 0} \frac{\sin x}{x} = 1$ , x being measured in radians
- 49. Find mean deviation about the mean for the following data

$x_i$	2	5	6	8	10	12
$f_i$	2	8	10	7	8	5

**50.** A bag contains 9 discs of which 4 are red, 3 are blue and 2 are yellow. The discs are similar in shape and size. A disc is drawn at random from the bag. Calculate the probability that it will be i) red, ii) yellow, iii) blue, iv) not blue,

## PART -E

## Answer the following questions

**51.** Prove geometrically that  $\cos(x + y) = \cos x \cos y - \sin x \sin y$ OR

Derive the equation of ellipse in the standard form  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ 

**52.** Find the sum of the sequence 7, 77, 777, 7777, ----- to n terms

OR

Find the derivative of  $\frac{x^5 - \cos x}{\sin x}$  with respect to x

#### 4 x 5 = 20

6

4