BRIKS ACADEMY **PADMANABHANAGAR** **CONT: 9900084667**

FIRST PUC MODEL QUESTION PAPER – 2 2023-24

MATHEMATICS (35)

TIME : 3 Hours 15 Minutes **[Total Questions : 52]** **Max Marks : 80**

Instructions : 1. The question paper has five parts namely A, B, C, D and E. Answer all the Parts.

2. Part A has 15 multiple choice questions, 5 fill in the blank questions

PART -A

I. Answer all the multiple choice questions **15 x 1 = 15**

1. The interval form of $\{ x : x \in R , -4 < x \leq 6 \}$ is

a) $[-4, 6]$ b) $(-4, 6]$ 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 $\frac{5\pi}{3}$ radians is equal to

a) 225^0 b) 300^0 c) 420^0 d) 135^0

4. The conjugate of $i - 2$ is

a) $i + 2$ b) $-2 + i$ c) $-2 - i$ d) $- i + 2$

5. $a > b$ implies

a) $- a < - b$ b) $-a > b$ c) $-a < b$ d) $a < -b$

6. If ${}^nc_9 = {}^nc_9$, then ${}^nc_{17}$ is

a) 1 b) 17 c) 7 d) 10

7. The number of terms in the expansion of $(a + b)^6$ is

a) 6 b) 5 c) 7 d) 8

8. If a sequence is defined as $a_n = 2n + 5$, then the first term is

a) 5 b) 6 c) 7 d) 8

9. The equation of x – axis is

a) x = 0 b) y = 0 c) xy = 0 d) x = y

10. The centre of the circle $(x + 2)^2 + (x - 3)^2 = 16$ is

a) (2, 3) b) (–2, 3) c) (–2, –3) d) (2, – 3)

11. The length of transverse axis of the hyperbola $\frac{x^2}{9} - \frac{y^2}{16} = 1$ is

a) 4 b) 6 c) 9 d) 16

12. The octant in which the point (–3, 1, 2) lies is

a) First b) second c) third d) fourth

13. The derivative of $2X - \frac{3}{4}$ with respect to x is

a) 2 b) $\frac{-3}{4}$ c) –2 d) 0

14. The Median of the data 3, 9,5,3,12,10,18,4,7,19,21 is

a) 18 b) 9 c) 12 d) 10

15. The probability of drawing a diamond card from a well shuffled deck of 52 cards is

a) $\frac{1}{4}$ b) $\frac{1}{52}$ c) $\frac{1}{13}$ d) 1

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

(–1, 16, 0 , 20, 42 , 1) **5 x 1= 5**

16. If A = { 1, 2 } and B = { 3, 4 }, then the number of relations from A to B is _____

17. The value of cos3π 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 **6 x 2 =12**

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 $\sin \frac{\pi}{6} . \sec \frac{\pi}{3} - 4 \sin \frac{5\pi}{6} . \cot \frac{\pi}{4} = 1$

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 events

1) a number less than 4 2) a number not less than 3

PART – C

III. Answer any six questions **6 x 3 =18**

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

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 of 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.

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

PART – D

IV. Answer any four questions **4 x 5 =20**

43. Define Greatest integer function, draw the graph . write the domain and range

44. Prove that $\frac{sin5x-2sin3x+sinx}{cos5x-cosx}=tanx$

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
$(a+b)^n = {}^nc_0a^n + {}^nc_1a^{n-1}b + {}^nc_2a^{n-2}{}^nc_0a^n + - - - - {}^nc_{n-1}a^nb^{n-1} + {}^nc_nb^n$

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 that geometrically $\lim_{x\to 0}\frac{sinx}{x}=1$, x being measured in radians

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

X	7	8	10	12	11	14
f	2	3	6	8	4	2

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

VI. Answer the following questions

51. Prove geometrically that cos (x + y) = cosx cosy – sinx siny **6**

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 **4**

OR

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

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