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# I PUC MODEL QUESTION PAPER - 1

## (FOR THE YEAR 2020-21)

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Time : 3 Hours 15 Minutes

Sub.: Basic Mathematics (Code:75)

Max. Marks: 100

**Note:** Question Paper have five parts - A, B, C, D & E. Answer all the five parts

### PART –A

**I. Answer any TEN questions.**

**10 × 1 = 10**

1. Write the real and imaginary parts of the complex number  $z = 5 + 4i$ .
2. If  $A = \{a, b\}$ , write  $P(A)$ .
3. Simplify  $\left(\frac{5x^3}{y}\right)^2$
4. Express  $5^{-2} = 0.04$  in logarithmic form.
5. Find the sum to infinity of the G.P.  $1, \frac{1}{2}, \frac{1}{4}, \dots$
6. Find the quadratic equation whose roots are 2 and 3.
7. Solve the in equation  $5x - 3 < 3x + 1$ , ( $x \in \mathbb{R}$ ,  $\mathbb{R}$  = Real No.).
8. Express  $18^\circ$  in radian measure.
9. Prove that  $(1 - \sin^2 A) \sec^2 A = 1$ .
10. Find the value of  $\cos 480^\circ$ .
11. Find the slope of the straight line  $x + 2y = 6$ .
12. Find the equation to a line parallel to y-axis and at a distance of 5 units to the left of it.

### PART –B

**II. Answer any TEN questions.**

**10 × 2 = 20**

13. Find the number which where divided by 16, 20 & 40 leaves the same remainder 4.
14. Prove that  $\sqrt{3}$  is an irrational number.
15. If  $f(x) = 2x + 1$  &  $g(x) = x^2 + 2x + 1$ , find  $f \circ g(x)$  and  $g \circ f(x)$ .

16. Simplify  $\frac{(3^0)^3 + (3^2)^0}{(3^2)^2 + 3^{(3^0)}}$
17. Solve for  $x$  :  $\log(x) + \log(x + 1) = \log 2$ .
18. The 3<sup>rd</sup> term of an A.P is  $-11$  & its 14<sup>th</sup> term is  $-44$ . Find its 20<sup>th</sup> term.
19. Insert 3 geometric means between 4 & 64.
20. 2 numbers are in the ratio 5 : 6. If 4 is subtracted from each term, their ratio becomes 3 : 4. Find the numbers.
21. Divide 36 into two parts such that the sum of their reciprocals is  $\frac{1}{8}$ .
22. Solve the inequality  $\frac{x+1}{2} \geq \frac{2-x}{-3}$ ,  $x \in \mathbb{R}$ , ( $\mathbb{R}$  = Real No.) and represent the solution on the number line.
23. If  $\sin \theta = \frac{3}{5}$  and  $\theta$  is acute, then find the other five trigonometric ratios.
24. If  $A = 30^\circ$ , then verify :  $\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$
25. Using slopes, verify if the points (1, 1), (-2, 4) & (3, -1) are collinear.

### PART – C

#### III. Answer any TEN questions.

**10 × 3 = 30**

26. Find the LCM of  $\frac{6}{7}$ ,  $\frac{5}{14}$  and  $\frac{8}{21}$ .
27. If  $A = \{3, 5, 7\}$ ,  $B = \{5, 7, 9\}$ ,  $C = \{7, 9, 11\}$  then find  $(A \cap B) \times (B \cap C)$ .
28. If  $3^x = 5^y = 15^z$ , show that  $z(x + y) = xy$ .
29. Prove :  $\left(\frac{x^a}{x^b}\right)^{a^2+ab+b^2} \left(\frac{x^b}{x^c}\right)^{b^2+bc+c^2} \left(\frac{x^c}{x^a}\right)^{c^2+ca+a^2} = 1$
30. Prove that  $\log \frac{12}{15} + 2 \log \frac{6}{8} + \frac{1}{3} \log \frac{8}{27} = \log \frac{3}{10}$
31. If  $a, b, c$  are in GP &  $a^x = b^y = c^z$ , show that  $x, y, z$  are in HP.
32. If  $\alpha$  &  $\beta$  are the roots of the equation  $2x^2 + 5x + 5 = 0$ , then find

(i)  $\frac{1}{\alpha} + \frac{1}{\beta}$

(ii)  $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$

33. Krishna scored 70 & 75 marks in first two tests. Find the minimum marks that he should get in the 3<sup>rd</sup> test to have an average of at least 60 marks.
34. Prove that,  $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}} = \sec\theta + \tan\theta$
35. Find the values of  $\theta$  such that  $\cos\theta = \frac{-\sqrt{3}}{2}$  where  $0 \leq \theta \leq 360^\circ$ .
36. Simplify :  $\cos 570^\circ \cdot \sin 510^\circ - \sin 330^\circ \cos 390^\circ$ .
37. Find the values of 'k' if the distance of the point (2, 3) from the line  $8x + 15y + k = 0$  is 4 units.
38. Find the equation of a line passing through the point (-2, 1) and perpendicular to  $3x + 2y - 1 = 0$ .

### PART -D

#### IV. Answer any SIX questions.

**6 × 5 = 30**

39. Find the number of positive divisors & sum of positive divisors of 672.
40. If  $a^x = bc$ ,  $b^y = ca$ ,  $c^z = ab$ , then show that  $xyz = x + y + z + 2$ .
41. In a class of 150 students, it was found that 95 like burgers and 79 like pizzas. Assuming that every student like at least one of the above, find the number of students who like both burgers & pizzas. Show the result through Venn Diagram.
42. Evaluate using logarithmic tables:  $12.56 \times 10.73$
43. Find the sum of all integers between 100 & 300 which are divisible by 7.
44. Find an integral root between -3 & 3 by inspection & hence solve the cubic equation  $x^3 - 2x^2 - 29x - 42 = 0$  using synthetic division.
45. A number consists of 2 digits whose sum is 4. If 18 is added to the number the digits get interchanged. Find the numbers.
46. Prove that,  $\frac{1+\sin A}{1-\sin A} - \frac{1-\sin A}{1+\sin A} = 4 \sec A \cdot \tan A$
47. Find x if :  $x \sin 45^\circ \cdot \tan 60^\circ = \frac{\sin 30^\circ \cdot \cot 30^\circ}{3 \cos 60^\circ \cdot \operatorname{cosec} 45^\circ}$
48. If a straight line cuts the coordinate axes at A & B and if (3, 2) is the midpoint of AB, then find the equation of AB.

**PART – E**

**V. Answer any ONE question.**

**1 × 10 = 10**

49. (a) Find the domain & range of the function  $f(x) = x^2 + 2x + 1, x \in \mathbb{N}$  ( $\mathbb{N}$  = set of natural nos.) [4]
- (b) Find the sum of the series  $2 + 22 + 222 + \dots$  to ' $n$ ' terms. [4]
- (c) Find the number of digits in the integral part of  $5^{23}$ , given that  $\log 5 = 0.6990$ . [2]
50. (a) Solve the system of in equations graphically :  $x + y \leq 6, x + y \geq 4$  ( $x, y \geq 0$ ). [4]
- (b) Find ' $k$ ' for which the lines,  $2x + y = 7, x - 2y = 1$  &  $kx - 5y = 4$  are concurrent. [4]
- (c) HCF of two numbers is 16 & their LCM is 160. If one of the numbers is 64, then find the other number. [2]



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# I PUC MODEL QUESTION PAPER - 2

## (FOR THE YEAR 2020-21)

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**Time : 3 Hours 15 Minutes**

**Sub.: Basic Mathematics (Code:75)**

**Max. Marks: 100**

**Note:** Question Paper have five parts - A, B, C, D & E. Answer all the five parts

### PART –A

**I. Answer any TEN questions.**

**10 × 1 = 10**

1. Write conjugate of the complex number  $z = 5 - 4i$ .
2. Represent "Set of all prime numbers less than 10" in Roster form.
3. Simplify  $(x^{1/2} + y^{1/2})(x^{1/2} - y^{1/2})$ .
4. Express  $\log_9 81 = 2$  in the exponential form.
5. Find the 6<sup>th</sup> element of the G.P. 3, 6, 12 .....
6. Solve for  $x$ :  $3(x - 2) - (x - 1) = 7(x - 1) - 6(x - 2)$ .
7. Solve:  $7x + 3 < 5x + 9$ ,  $x \in I$  ( $I$  = set of integers).
8. Express  $720^\circ$  in radian measure.
9. Prove that,  $(1 - \cos^2 A) \operatorname{cosec}^2 A = 1$ .
10. Find the value of  $\cos 120^\circ$ .
11. Find the slope of line joining the points (3, 2) and (-1, 5).
12. Find X intercept of the line  $5x - 7y + 11 = 0$ .

### PART –B

**II. Answer any TEN questions.**

**10 × 2 = 20**

13. Find the number which when divided by 36, 40 and 48 leaves the same remainder 5.
14. Find the LCM of 48, 96 and 74.
15. If  $A = \{x : x \in \mathbb{N} \text{ and } x < 3\}$  &  $B = \{x : x^2 - 25 = 0 \text{ and } x < 0\}$ , Find  $B \times A$  ( $\mathbb{N}$  = Set of natural nos.).

16. Simplify  $\left(\frac{x^a}{x^b}\right)^{a+b} \left(\frac{x^b}{x^c}\right)^{b+c} \left(\frac{x^c}{x^a}\right)^{c+a}$ .
17. Prove that  $\log \frac{9}{5} + \log \frac{15}{9} - \log \frac{3}{2} = \log 2$ .
18. If fourth term of the HP is  $\frac{3}{4}$  and seventh term of the HP is  $\frac{2}{3}$ , find the 10<sup>th</sup> term.
19. Insert 3 GM's between  $\frac{1}{4}$  and  $\frac{1}{64}$ .
20. The sum of two numbers is 107 and their difference is 17. Find the numbers.
21. Solve by using formula method:  $2x^2 - 7x + 3 = 0$ .
22. Solve:  $\frac{3(x-2)}{5} < \frac{5(2-x)}{3}$ ,  $x \in \mathbb{R}$  ( $\mathbb{R}$  = Set of Real nos.)
23. Prove that  $\sqrt{\frac{\sec A + \tan A}{\sec A - \tan A}} = \frac{1 + \sin A}{\cos A}$ .
24. Find the value of  $\sin^2 \frac{\pi}{6} + \cos^2 \frac{\pi}{3} - \tan^2 \frac{\pi}{4} + \cot^2 \frac{\pi}{4}$ .
25. If  $(3, a)$  lies on the line joining  $(1, -4)$  and  $(-2, 5)$ . Find 'a'.

### PART –C

**III. Answer any TEN questions.**

**10 × 3 = 30**

26. Prove that  $\sqrt{2}$  is an irrational number.
27. Show that the relation "is congruent to" is an equivalence relation on a set T of triangles.
28. If  $a^x = b^x = c^z$  and  $b^2 = ac$  show that  $\frac{1}{x} + \frac{1}{z} = \frac{2}{y}$ .
29. Solve:  $2^{2x} - 6 \cdot 2^x + 8 = 0$ .
30. If  $x^2 + y^2 = 12xy$  show that  $2 \log(x - y) = \log 2 + \log 5 + \log x + \log y$ .
31. Find the three numbers in GP whose sum is 39 and their product is 729.
32. If  $\alpha$  &  $\beta$  are the roots of the equation  $3x^2 - 6x + 4 = 0$ . Find values of
- (i)  $\alpha^2 + \beta^2$                                       (ii)  $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$
33. The marks obtained by a student of class in first and second term exam are 62 and 48 respectively. Find the minimum marks he should get in the annual examination to have an average of at least 60 marks?

34. The angles of a triangle are in the ratio 1:3:5. Find them in radians and in degrees.
35. If  $\operatorname{cosec} \theta = \frac{5}{3}$  and  $90^\circ < \theta < 180^\circ$ . Show that  $\frac{4\sin\theta - 7\cos\theta}{3\sin\theta + 2\cos\theta} = 40$ .
36. Simplify:  $\frac{\tan(180 + A)\sec(180 + A)\operatorname{cosec}(90 + A)}{\sec(360 - A)\cot(90 + A)}$ .
37. Find equation of the line passing through (3, -2) and parallel to the line whose slope is  $-\frac{5}{7}$ .
38. Find the value of K such that the line  $x + (K + 3)y - 5 = 0$  is perpendicular to the line  $2x - y + 7 = 0$ .

### PART -D

#### IV. Answer any SIX questions.

**6 × 5 = 30**

39. Find the numbers of positive divisors & sum of positive divisors of 960.
40. Out of 50 people, 20 people drink tea, 10 take both tea and coffee. How many take atleast one of the two drinks. Show the result using Venn diagram.
41. Show that  $\sum \frac{1}{1 + x^{a-b} + x^{a-c}} = 1$ .
42. Evaluate  $\frac{213.781 \times 7.434}{6.321}$  using logarithmic tables.
43. Find the sum of all integers between 50 and 200 which are divisible by 11.
44. Two sisters have their monthly incomes in the ratio 7:5 and their monthly spending is in the ratio 5:3. If each saves ₹60/- per month, find their incomes.
45. Find an integral root between -3 and 3 by inspection and then using synthetic division solve the equation  $x^2 + 6x^2 + 9x + 4 = 0$ .
46. Prove that  $\frac{\tan A}{1 - \cot A} + \frac{\cot A}{1 - \tan A} = 1 + \sec A \operatorname{cosec} A$ .
47. Find x from  $x \sin 30^\circ \cos^2 45^\circ = \frac{\cot^2 30^\circ \sec 60^\circ - \tan 45^\circ}{\operatorname{cosec}^2 45^\circ \operatorname{cosec} 30^\circ \cos 60^\circ}$ .
48. Find the equation of line which passes through (5, 2) and cutting off intercepts which are equal in magnitude but opposite in sign.

**PART – E**

**V. Answer any ONE question.**

**1 × 10 = 10**

49. (a) Find the domain & range of the function  $f(x) = \frac{x^2 + 2x + 1}{x^2 - 8x - 12}$ ,  $x \in \mathbb{R}$  ( $\mathbb{R}$  = Set of Real Nos.) [4]

(b) Find the sum to  $n$  terms of the G.P  $4 + 44 + 444 + \dots$  [4]

(c) If the product of two numbers is 343 and their LCM is 49. Find their HCF. [2]

50. (a) Solve graphically :  $3x + 4y \leq 12$ ,  
 $2x + y \geq 6$  ( $x, y \geq 0$ ). [4]

(b) Show that the lines [4]

$$3x - y + 4 = 0$$

$$2x + 7y - 5 = 0$$

$$5x + 6y - 1 = 0 \text{ are concurrent.}$$

Also find the point of concurrence.

(c) If  $\log 5 = 0.6990$ , find the number of digits in the integral part of  $5^{17}$ . [2]

