BLUE PRINT

I PUC BASIC MATHEMATICS (CODE - 75) 2021-22

[Subject code : 75]

Unit/ Chapter	Title of the chapter	No.of Teaching hrs	Part A	Part B	Part C	Part D	Part E		Total Marks
			1 Marks	2 Marks	3 Marks	5 Marks	4 Marks	2 Marks	
Unit - I	**ALGEBRA**								
1	Number theory	08	1	2	1	-	-	1	10
2.	Sets, Relations and functions	16	1	1	2	1	1	-	18
3.	Theory of indices	04	1	1	2	-	-	-	09
4.	Logarithms	06	1	-	1	1	-	1	11
5.	Progressions	12	1	2	1	1	1	-	17
6.	Theory of equations	12	2	2	1	1	-	-	14
7.	Linear inequalities	06	-	1	1	1	-	-	10
Unit - II	**COMMERCIAL ARITHMETIC**								
8.	Simple interest and compound interest	08	1	1	2	1	-	-	14
9.	Annuities	06	1	-	-	1	1	-	10
10.	Averages	04	1	1	1	-	-	1	08
11.	Percentages, profit and loss	06	1	2	1	1	-	-	13
12.	Linear functions	04	-	-	-	-	1	-	04
Unit - III	**TRIGONOMETRY**								
13.	Angles and Trigonometric rations	06	1	1	1	1	-	-	11
14.	Standard and allied angles	04	1	1	1	-	1	-	10
Unit - IV	**ANALYTICAL GEOMETRY**								
15.	Coordinate system in a plane	05	1	1	1	1	-	-	11
16.	Locus and its equation	03	-	0	1	-	-	-	03
17.	Straight lines	10	1	2	1	2	1	-	22
	Total No. of Teaching hrs / Marks	120hrs	15	18	18	12	06	03	195

I PUC BASIC MATHEMATICS MODEL QUESTION PAPER (ENGLISH VERSION)
(FOR THE YEAR 2021-22)

Time : 3:15 hrs **Subject: Basic Mathematics (code:75)** **Marks: 100**

Instructions:

(1) The question paper has 5 parts -A, B, C, D and E.

(2) Part A carries 10 marks; Part B carries 20 marks; Part C carries 30 marks;Part D carries 30 marks and Part E carries 10 marks;

(3) Write the question number properly as indicated in the question paper.

PART – A

I. Answer any TEN questions **10 × 1 = 10**

1. Write the imaginary part of the complex number –3–4i
2. Write A = {4, 8, 12 .....} in rule from
3. Simplify $\left(\frac{81}{256}\right)^{1/4}$
4. Solve for x : $\log_x 625 = 4$
5. Find the 5th element of a H.P : $\frac{1}{3}, \frac{1}{5}, \frac{1}{7}$.....
6. Solve: $3(x + 5) – 25 = 9 + 2 (x – 7)$.
7. Find the nature of roots without solving the equation $2x^2 + 6x + 3 = 0$.
8. What is the simple interest on ₹650 for 14 weeks at 6% p.a?
9. Define perpetuity?
10. The profit of a business firm for 5 years are ₹17,598, ₹20,703, ₹10,085, ₹25,375 and ₹16,315. Find the average profit?
11. Convert the ratio 3 : 5 into percentage.
12. Express 135º in radian measure.
13. If A = 60º, verify $\cos 2A = co^2A – \sin^2A$
14. Find the distance between the points (5, 8) and (9, 9)
15. Find the slope of the line $3x – 2y + 1 = 0$.

PART – B

II. Answer any TEN questions **10 × 2 = 10**

16. Find the number of divisors of 672.
17. Find the numbers which when divided by 36, 40 and 48 leaves the same remainder 5.
18. If A × B = {(–1, a), (–1, b), (–2, a), (–2, b)} Find A and B.
19. Simplify : $\frac{2^{n+1}+2^{n-1}}{2^n+2^{n+2}}$
20. If the second term of an AP is 4 and tenth term is 20, find the 15th term.
21. Insert 3 GM's between –4 and –64.
22. Solve: $\frac{x+19}{5}-3=\frac{x}{4}$
23. Solve by Formula method: $3x^2 - x - 10 = 0$.
24. Solve $3x - 2 < 2x + 1$ ($x \in$ R). Represent on the number line.
25. What sum will amount to ₹6525 at 10% p.a. compounded annually for 13 years?
26. The average score of 20 boys is 60% and the average score of 30 girls is 70%. Find the combined average.
27. If the cost price of 10 articles is equal to the selling price of 9 articles, find the gain percent?
28. A shopkeeper buys 50 pencils for ₹80 and sells them at 40 pencils for ₹90. Find his gain or loss percent?
29. Prove that $\sqrt{\frac{\sec A+\tan A}{\sec A-\tan A}}=\frac{1+\sin A}{\cos A}$
30. Find the value of cos 1125º.
31. Find the co-ordinates of the centroid of the triangle whose vertices are (2, 3), (–5, 2) and (1, 7).
32. Find the equation of the line passing through (4, 3) and with slope 2.
33. Find the equation of the line joining the points (–1, –2) and (–5, –2).

PART - C

III. Answer any TEN questions **10 × 3 = 30**

34. Prove that $\sqrt{2}$ is an irrational number.
35. If A = {4, 6}, B = {6, 8, 10}, C = {8, 10, 12} then verify A × (B – C) = (A × B) – (A × C).
36. A relation R is defined on set of integers by R = {(x, y) : x – y is a multiple of 5}. Show that R is an equivalence relation on Z.
37. If $a^x = b^y = c^z$ and $b^2 = ac$.
    Show that $\frac{1}{x}+\frac{1}{z}=\frac{2}{y}$

38. Solve : $3^{2x} + 10.3^{x} + 9 = 0$

39. If $x = \log_2 9,\ y = \log_9 7,\ z = \log_7 4$, show that $xyz = 2$.

40. Find the three numbers in GP whose sum is 39 and their product is 729.

41. The age of the father is four times that of the son. 5 years ago, the age of the father was 7 times that of his son. Find their present ages.

42. Find all pair of consecutive even integers which are greater than 5 and their sum must be less than 23.

43. Samarth bought a walkman for ₹1800. If it depreciates at the rate of 15% per year, how much is it worth after 3 years?

44. In what time 800 will amount to ₹ 882 at 10% p.a. interest compounded half yearly.

45. The average weight of a group containing 25 persons is 70 kg. 5 persons with an average weight 63 kg leave the group and 4 persons with weight 72 kg, 78kg, 70kg and 73 kg joins the group. Find the average weight of the new group.

46. The cost of T.V increased by 20% and then decreased by 5% find the percentage increase in the original cost.

47. If $\cot A = \frac{5}{12}$ and θ is acute, show that $2\text{cosec}\theta - 4\sec\theta = \frac{247}{30}$

48. Find x if, $x \sin 45^\circ \tan 60^\circ = \frac{\sin 30^\circ \cot 30^\circ}{3\cos 60^\circ \text{cosec} 45^\circ}$

49. If the area of the triangle whose vertices are A(x, y), B(1, 2) and C(2, 1) is 6.

    Show that $x + y = 15$.

50. Find the equation of the locus of the point which moves such that it lies on the perpendicular bisector of the line joining the points (–1, 5) and (2, 4).

51. Derive equation of the line in the intercept form.

PART - D

IV. Answer any Six questions **6 × 5 = 30**

52. In a class of 50 students, 15 do not participate in any games, 25 play cricket and 20 play foot ball. Find the number of students who play both. Also show result with the help of Venn diagram.

53. Evaluate using logarithm tables: $\frac{12.567 \times 15.674}{0.5968 \times 19.78}$

54. A person buys every year Bank's cash certificate of value exceeding the last year's purchase by ₹ 500. After 15 years, he finds that the total value of the certificates bought is ₹82,500. Find the value of the certificates purchased by him in the (a) first year (b) in the 10th year.

55. By inspection, find an integral root between –3 and 3 and then using synthetic division, solve the cubic equation $x^3 + 2x^2 - 11x - 12 = 0$

56. Solve the following linear inequalities graphically:

    $x + 3y \geq 3,\ 2x + y \geq 2$ and $x \geq 0, y \geq 0$.

57. A person borrowed Rs. 65000 at 8% SI for 4 years and lent out at 10% CI for 4 years. How much did he gain in this transacton?

58. Find the present value of an annuity due of ₹1000 for 3 years if the rate of interest is 4% p.a.

59. A radio is sold at a profit of 25% cost price and selling price both are increased by ₹100. If the new profit is at the rate of 20% find the original cost of the radio.

60. Prove that $\frac{\tan A}{\sec A - 1} + \frac{\tan A}{\sec A + 1} = 2\text{cosec}\, A$

61. The midpoints of a triangle ABC are P(3, 1), Q (5, 6) and R(–3, 2). Find the co-ordinates of the vertices of the triangle.

62. Find the co-ordinates of the foot of the perpendicular from (–6, 2) on the line $3x - 4y + 1 = 0$.

63. Find the equation of a line whose x and y intercepts are equal and which passes through the point (2, –3).

PART - E

V. Answer any ONE questions **1 × 10 = 10**

64. (a) Find the domain and range of the function $f(x) = \frac{x^2 + 2x + 1}{x^2 - 8x - 12}$, $x \in R$. (4)

(b) For the 1st year, the fixed cost for setting up a new mobile phone showroom is ₹3,00,000. The variable cost for producing a mobile phone is ₹70, the company expects revenue from their sales to be ₹270 per unit. Find

(i) the cost function

(ii) revenue function

(iii) Profit function and

(iv) Break even output (4)

(c) Find the number of digits in the integral part of 2^{20}, given log2 = 0.3010 (2)

65. (a) Sum the series to 'n' terms:

5 + 55 + 555 + ... (4)

(b) For what value of 'K' are the lines $x - 2y + 1 = 0$, $2x - 5y + 3 = 0$ and $5x - 9y + K = 0$ are concurrent. (4)

(c) The average age of 10 students is 6 years. The sum of ages of 9 of them is 52 years. Find the age of 10th student. (2)

66. (a) Simplify: $\frac{\text{cosec}(180^\circ + \theta)\sin(360^\circ - \theta)\tan(360^\circ + \theta)}{\sin(90^\circ + \theta)\cos(180^\circ - \theta)\tan(-\theta)}$ (4)

(b) In how many years an annuity of ₹100 amounts to ₹ 3137.12 and at 4.5 % CI? (4)

(c) The HCF of two numbers is 16 and their LCM is 160. If one of the numbers is 64, find the other number (2)

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