



JAIN COLLEGE, Bangalore
Mock Paper January - 2016
I PUC – Basic Mathematics (75)

Time: 3 Hours 15 Minutes

Max. Marks: 100

PART – A

I. Answer any ten questions

10 × 1 = 10

1. State Fundamental theorem of arithmetic.
2. If $A = \{a,b\}$ and $B = \{a,b,c,d\}$. Find $A - B$.
3. State second law of indices.
4. Express in logarithmic form ($5^{-1} = 0.2$).
5. Find the 10th term of H.P $\frac{1}{2}, \frac{1}{4}, \frac{1}{6}, \dots$
6. Find the value for the sum of the roots if the equation given is $3x^2 - 6x + 4 = 0$.
7. What is the S.I for 245 days for Rs 6000 at 8% p.a?
8. Find the present value of perpetuity of Rs 3000 to be received forever at 4% p.a.
9. The rainfall in a week in Bangalore is 18mm, 25mm, 15 mm, 9mm. Find the average rainfall.
10. Convert $\frac{4}{5}$ into percentage.
11. Convert to 25° into radian measure.
12. Find the distance between A (5, 8) and B (9, 9).

PART – B

II. Answer any ten questions

10 × 2 = 20

13. Three vessels can hold 9, 15, 24 liters of water. Find the least quantity of water which can be filled by these vessels an exact number of times.
14. If $f(x) = 2x+1$ and $g(x) = x^2 + 2x+1$ then find the value of $\text{gof}(-1)$.
15. Simplify $\frac{2^{7b-2a} \cdot 8^{2a-b}}{16^{a+b}}$.
16. Find the sum of all even numbers from 20 to 120.
17. Prove that $(\sin A + \cos A)^2 + (\sin A - \cos A)^2 = 2$.
18. If a, b, c are in G.P and $a^x = b^y = c^z$. Show that x, y, z are in H.P.
19. The sum of two numbers is 107 and their difference is 17. Find the numbers.
20. If the lines $x - 6y + a = 0$, $2x + 3y + 4 = 0$ are perpendicular, find the value of 'a'.
21. If the cost of 10 articles is equal to the selling price of 9 articles, find the gain percentage.
22. Determine the principal which will amount to Rs 15000 in 8 years at 11% per annum simple interest.
23. Find the equation of straight line passing through (2, 3) and (3, 4).
24. Solve $5x - 2 < 2x + 1$, where x is an integer. Also represent on number line.
25. Find the number of positive divisors and the sum of divisors of 1200.

PART – C

III. Answer any ten questions

10 × 3 = 30

26. Prove $\sqrt{7}$ is an irrational number.
27. If $R^{-1} = \{(2,4), (1,2), (3,1), (3,2)\}$. Find R and also find the domain and range.
28. Prove that $\frac{1}{\log_2 4} + \frac{1}{\log_8 4} + \frac{1}{\log_{16} 4} = 4$.
29. Form the equation whose roots are 1, 2, 3.
30. Find three numbers in G.P whose sum is 13 and product is 27.
31. Find the present value of annuity due of Rs 5000 for 5 years at 10% p.a.
32. Solve the linear inequalities $3x + 2y \leq 6$ and $4x - y \leq 6$ graphically.
33. A book seller bought 228 notebooks at an average price of Rs 8.50 in which 80 books he bought at Rs 7.50 each and 84 at Rs 10.50 each. Find the price of the remaining books per unit.

34. A person gets Rs 1216 more when selling a product at a profit of 15% instead of a loss of 4%. What would be the percentage profit or loss if it is sold at Rs 7552?
35. Prove that $(1 - \sin A + \cos A)^2 = 2(1 - \sin A)(1 + \cos A)$.
36. Find the coordinates of the foot of the perpendicular from $(-6, 2)$ on the line $3x - 4y + 1 = 0$.
37. $x \cdot \sin 45^\circ \cdot \cos^2 60^\circ = \frac{\tan^2 60^\circ \operatorname{cosec} 30^\circ}{\sec 45^\circ \cot^2 30^\circ}$
38. Show that the points $(2, -2)$, $(8, 4)$, $(5, 7)$ and $(-1, 1)$ are vertices of a rectangle.

PART – D

IV. Answer any six questions

6 × 5 = 30

39. In a college with 500 students, 300 take milk and 250 take tea. Find how many take (a) milk only (b) tea only (c) both milk and tea
40. Solve $\log x + \log(x - 4) - \log(x - 6) = 0$.
41. Find the sum of the series $5 + 55 + 555 + \dots$ to 'n' terms.
42. Solve $x^3 - 2x^2 - 29x - 42 = 0$ by synthetic division given there exist an integral root between -3 and 3.
43. The age of father is 5 times that of his son. Three years ago, the age of father was 8 times that of his son. Find their present ages.
44. A sum triples itself in 4 years under compound interest at a certain rate of interest. Find the time it would take to become 9 times itself.
45. A dental clinic purchased a certain number of chairs at an average price of Rs 190 each. The average price of 30 chairs was Rs 175 and that of the remaining chair was Rs 200. Find the number of chairs the clinic purchased.
46. There is a profit of 20% when an article is sold at Rs 96. What will be the gain percentage if the article is sold for Rs 100?
47. Prove that $(1 + \cot A - \operatorname{cosec} A)(1 + \tan A + \sec A) = 2$.
48. Find the ratio in which the line joining $x + y + 1 = 0$ divides the line joining the points $(2, 3)$ and $(-1, 4)$. Also find the point of division.

PART – E

V. Answer any one of the following question

1 × 10 = 10

49. a) Find the equation of the straight line passing through the point $(3, 4)$ such that the sum of its intercepts on the axes is 14.
- b) Prerana wants to buy a house after 5 years when it is expected to cost Rs 50 lakhs. How much should she save annually if her savings earn a compound interest of 12%?
- c) Find the number of digits in 5^{100} .
50. a) Find the domain and range of the function $f(x) = \frac{x^2 + 2x + 1}{x^2 - 8x - 12}$, where $x \in R$
- b) A manufacturer has 600 liters of a 12% solution of acid. How many liters of a 30% acid solution must be added to it so that acid content in the resulting mixture will be more than 15% but less than 18%?
- c) The first and last term of the G.P is 3 and 96 respectively; sum to n terms is 189. Find the common ratio and the number of terms.