



# JAIN COLLEGE

463/465, 18th Main Road, SS Royal, 80 Feet Road, Rajarajeshwari Nagar,  
Bangalore - 560 098

Date:

**SUBJECT: BASIC MATHS**

**I PUC  
Mock paper**

**Timings Allowed: 3 Hrs 15 Minutes.**

**Total Marks: 100**

## PART A

**I Answer any TEN questions :**

**1 x 10 = 10**

1. Define an imaginary number.
2. If  $A = \{1,2\}$  and  $B = \{a,b\}$  then find  $B \times A$ .
3. If  $f: \mathbb{R} \rightarrow \mathbb{R}$  is defined by  $f(x) = 3x + 5$  then  $f(-1)$
4. Simplify  $(5)^0 + 5^{2^0}$
5. Find the value of  $\log \log_{10} 0.1$
6. Find the 6<sup>th</sup> term of the GP 3,6, 12.....
7. Solve for x if  $(x+2)(x+3) = (x-2)(x-4) + 20$
8. What percent is 64Km of 12 km?
9. Define an annuity.
10. Express  $\frac{3\pi}{4}$  in degrees
11. Find the slope of a line parallel to the line  $3x + 5y - 9 = 0$
12. The average age of 10 students is 6 years. The sum of the ages of 9 of them is 52 years. Find the age of the 10<sup>th</sup> student.

## PART B

**II. Answer any TEN questions :**

**2 x 10 = 20**

13. Find the number of positive divisors of 960
14. Find the sum of all positive divisors of 1200
15. Find the number which when divided by 36, 40 and 48 leaves the same remainder 5
16. If  $A = \{1,2,3,4\}$  and  $B = \{3,4,5,6\}$  and  $U = \{1,2,3,4,5,6,7,8\}$  Verify that  $(A \cup B)' = A' \cap B'$
17. If a, b, c are in GP and  $a^x = b^y = c^z$  then prove that x, y and z are in H.P.
18. If  $\alpha$  and  $\beta$  are the roots of the equation  $x^2 - x + 2 = 0$  then prove that  $\alpha^2\beta + \beta^2\alpha = 2$
19. The sum of two numbers is 107 and their difference is 17. Find the numbers.
20. Solve  $3x - 2 < 2x + 1$  when x is an integer and x is a real number. Also represent on a number line.
21. Determine the Principal which will amount to Rs. 15000 in 8 years at 11% per annum simple interest.
22. If the cost price of 10 articles is equal to the selling price of 9 articles, find the gain %.
23. The average score of 20 boys is 60% and the average score of 30 girls is 70%. Find the combined average.
24. Find the value of  $\sin^2 \frac{\pi}{6} \cos^2 \frac{\pi}{6} - \tan^2 \frac{\pi}{4} + \cot^2 \frac{\pi}{3}$
25. Find the equation of the straight line passing through (2, 3) and (3, 4)

## PART C

**III. Answer any TEN questions:**

**3 x 10 = 30**

26. Prove that  $\sqrt{2}$  is an irrational number.
27. Define an equivalence relation with an example. Also give an example of a relation which is only symmetric.

28. If  $a^x = b^y = c^z$  and  $b^2 = ac$  show that  $\frac{1}{x} + \frac{1}{z} = \frac{2}{y}$
29. In what time will a sum of Rs.500 will earn Rs.975 at the rate of 6% per annum if the compound interest is payable half yearly.
30. By how many percent should the use of tea be increased if the price of tea is decreased by 10 % so that the expenditure remains unchanged.
31. Solve the Linear Inequalities graphically.  $5x + 4y \geq 40$ ,  $x \geq 2$ ,  $y \geq 3$  and  $x, y \geq 0$
32. Find the difference between the compound interest and the simple interest on Rs. 5000 invested for 4 years at 8 % per annum.
33. A father is 28 years older than the son. After 5 years the father's age will be 7 years more than twice that of the son. Find their present ages.
34. If  $\tan A = \frac{12}{13}$  and  $180 < A < 270$ , find the value of  $\frac{3 \sin A - 2 \cos A}{9 \cos A + 4 \sin A}$
35. Show that the straight lines  $2x - 3y = 7$ ,  $3x - 4y = 13$  and  $8x - 11y = 33$  are concurrent. Also find the point of concurrency.
36. Find the distance between two parallel lines  $3x + 4y + 5 = 0$  and  $6x + 8y + 20 = 0$
37. If  $\cot A = \frac{5}{12}$  and A is acute, show that  $2 \operatorname{Cosec} A - 4 \operatorname{Sec} A = -\frac{247}{50}$
38. If a train travels 15 Kmph faster it would take 1 hour less to travel 180 Kms. Find its original speed.

#### PART D

#### IV. Answer any SIX questions

**5 X 6 = 30**

39. Let  $f = \{(1,1), (2,3), (0, -1)\}$  be a function from  $Z \rightarrow Z$  defined by  $f(x) = ax + b$  and a and b are some integers. Determine 'a' and 'b'. Also If  $f(x) = 2x + 1$  and  $g(x) = x^2 + 2x + 1$  find  $f \circ g(2)$  and  $g \circ f(3)$
40. Evaluate using Log tables  $\frac{42.15 \times 0.2713^2}{0.8932}$
41. Find the sum of the series  $4 + 44 + 444 + \dots$  To n terms.
42. The age of father is 5 times that of son. 3 years ago the age of the father was 8 times that of his son. Find their present ages.
43. A machine depreciates at 10% of its value at the beginning of a year. The cost and scrap value realized at the time of sale being 23240 and 9000 respectively. For how many years the machine was put to use.
44. Calculate the future value of the annuity immediate of Rs. 1000 p.a. for 12 years at 16 % p.a. compounded quarterly.
45. Find the equation of the straight line passing through the point of intersection of  $2x + 4y = 3$  and  $x + 5y = 1$  and making equal positive intercepts on the co ordinate axes.
46. Find the sum of the following series  $1 + (1+2) + (1+2+3) + \dots$  to n terms.

47. A sum of money lent at compound interest for 2 years at 20% p.a. would fetch Rs. 482 more, if the interest was payable half yearly than if was payable annually. Find the sum.
48. If  $\sec \alpha = \frac{13}{5}$  where  $270 < \alpha < 360$  find the value of  $\frac{2\sin \alpha - 3\cos \alpha}{4\sin \alpha + 9\cos \alpha}$

### PART E

#### V. Answer any ONE of the following questions

- 49 ( a) Find the domain and range of the function given by  $f(x) = \frac{x^2+2x+1}{x^2-8x-12}$  where  $x \in R$
- (b) What is the future value of Rs. 1000 deposited annually for 12 years gathering Compound interest at 16%
- ( c ) Form the cubic equation whose roots are 3, 5 and 7
- 50 (a) Shanmukh buys every year Bank's cash certificates of value exceeding the last year's Purchase by Rs. 500. After 15 years, he finds that the total value of the certificates purchased by him is Rs. 82,500. Find the value of the certificates purchased by him.
- (b) Solve the linear inequalities  $x + 3y \geq 3, 2x + y \geq 2, x \geq 0, y \geq$
- © Find the number which when divided by 36, 40 and 48 leaves the same remainder 5.

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