



# JAIN COLLEGE

463/465, 18th Main Road, SS Royal, 80 Feet Road

Rajarajeshwari Nagar, Bangalore - 560 098

**SUBJECT: BASIC MATHS**

*IPUC*

*MOCK - I*

*Timings Allowed: 3 Hrs 15 Minutes*

*Total Marks: 100*

## Part-A

**I. Answer any ten questions.**

**10X1=10**

1. Give the canonical representation of 156
2. If  $A=\{1,2,3,4,5\}$   $B=\{1,2,3,4,5,6,7\}$  find a relation from A to B defined by  $R=\{(x,y) / x>y\}$
3. If  $f(x)=x+1$  and  $g(x)=x^2+1$  find  $f \circ g(1)$
4. Simplify  $(\frac{81}{256})^{\frac{1}{4}}$
5. Find the value of  $\log_{0.1} 10$
6. Find the nature of the roots without solving the equation  $x^2 - x + 1 = 0$
7. Convert the ratio 3:5 into percentage
8. Define perpetuity
9. Convert  $450^\circ$  into radians
10. What percent is 64m of 12km?
11. The average of 10 boys in a class 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?
12. Find the slope of the line joining the points (1,2) and (-1,-2)?

## Part-B

**II. Answer any ten questions**

**10x2=20**

13. Find the greatest number which when divides 989 and 1327 leaves the remainder of 5 and 7 respectively
14. If  $A=\{x:x \in \mathbb{N} \text{ and } x < 3\}$  and  $B=\{x:x^2-16=0 \text{ and } x < 0\}$  find  $B \times A$

15. Find the number of positive divisors and the sum of the divisors of 825
16. Prove that  $\log_2[\log_2[\log_2 16]]=1$
17. Is -300 a term of the A.P. 10,7,4.....?
18. If  $k+9, k-6, 4$  are in G.P. then find the value of  $k$ .
19. If  $\alpha$  and  $\beta$  are the roots of the equation  $x^2-x+2=0$  then show that  $\alpha^2\beta + \beta^2\alpha=2$
20. Solve  $3x-2 < 2x+1$  when  $x$  is an integer and  $x$  is a real number. also represent on a number line .
21. The average score of 20 boys is 60% and the average score of 30 girls is 70% . find the combined average
22. If the cost price of 10 articles is equal to the selling price of 9 articles . find the gain percent?
23. Find the value of  $\cos^2 30^\circ + \cos^2 45^\circ + \cos^2 60^\circ$
24. Derive the equation of the straight line in the slope point form
25. Find the values of 'a' if the distance between  $(3, -2)$  and  $(-1, a)$  is 5 units

### Part-c

#### III. Answer any ten questions

**10x3=30**

26. Prove that  $\sqrt{5}$  is an irrational number
27. In a group of 600 students in a school ,150 students were found to be taking tea 225 taking coffee. 100 were taking both tea and coffee .find how many students were taking neither tea nor coffee.
28. if  $A=\{1,2\}$   $B=\{1,2,3,4\}$   $C=\{5,6\}$  then verify  $A \cap (B \cap C) = (A \cap B) \cap (A \cap C)$
29. Insert 3 arithmetic means between 8 and 24
30. Solve the following system of inequalities graphically  $5x+4y \leq 0$  ,  $x \geq 2$  ,  $y \geq 3$
31. Find the present value of the annuity immediate for rs.3000 for 5 years at 10% p.a.
32. The average temperature for the first four days of the week was  $39^\circ\text{C}$ . the average of the whole week was  $40^\circ\text{C}$ . what was the average temperature during the last three days of the week ?
33. find the circumcentre of the triangle with vertices  $A(-3,4)$  ,  $B(3,4)$  and  $C(-4,-3)$ . Also find the circumradius and the area of the circle.
34. By selling an article of rs825 a man loses equal to  $\frac{1}{3}$ rd of its selling price. Find the i) cost price of the article ii) the gain% or the loss% if the same article is sold for rs.1625

35. show that the points A(2,2), B(6,3) and C(4,11) form a right angled triangle

36. if a train travels 15km/hr faster it would take 1 hour less to travel 180 km, find the original speed of the train .

37. If  $\tan A = \frac{12}{13}$  and  $270^\circ < A < 360^\circ$  find the value of  $\frac{3\sin A - 2\cos A}{9\cos A + 4\sin A}$

38. Calculate the arithmetic mean for the following data

Class interval	0-10	10-20	20-30	30-40
No of items	5	6	7	2

### Part- D

**IV. Answer any six questions.**

**6x5=30**

39. Derive the section formula in 3 dimensions for internal division

40. Find the sum to n terms of the series  $7+77+777+\dots$  n terms

41. The cost of 2kgs of sugar and 5 bags of dhal is rs.90. the cost of 5kgs of sugar and 2kgs of dhal is rs.120. find the cost of sugar and dhal per kg .

42. Govind bought 51 bags in the whole sale market at an average price of rs.318 each. in which the price of 33 leather bags was rs.426 each. Find the price of the remaining cotton bags all in the increasing arithmetic progression having the price of the costliest cotton bag was rs150. Find the price of the cheapest cotton bag.

43. the daily cost of production 'C' in rs and 'x' unit of an assembly in  $c(x) = 3.5x + 1200$ . if each unit is sold for rs.6 then find the minimum number of units that should be produced and sold to ensure no loss . if the selling price is increased by half a rupee a unit then what would be the break even point.

44. Find the equation of the locus of the point which moves such that the ratio its distances (2,-3) and (4,-2) is 2:3

45. Find the equation of the line which passes through the intersection of the lines  $x - 2y + 4 = 0$  and  $4x - 3y + 1 = 0$  and is inclined at an angle  $135^\circ$  with the x-axis .

46. Calculate the future value of annuity immediate of rs1000 p.a. for 12 years at 16% p.a. compounded quarterly ?

47. The age of father is 5 times that of his son . three years ago ,the age of the father was 8 times that of his son. Find the present ages.

48. Find the reflection of the point p(2,1) in the line  $x + y = 5$

**Part-E**

**V. Answer any one question.**

**1x10 =10**

49.a) let  $f = \{(1,1), (2,3), (0,-1)\}$  be a function from  $Z$  to  $Z$  defined by  $f(x) = ax + b$  some integers  $a$  and  $b$

i) determine  $a$  and  $b$

ii) If  $f(x) = 2x + 1$ ,  $g(x) = x^2 + 2x + 1$  find i)  $f \circ g(2)$  ii)  $g \circ f(3)$

b) Evaluate using log tables  $\frac{25.36 \times 0.4569}{847.5}$

c) the h.c.f of two numbers is 16 their l.c.m is 160 .if one of the number is 64 ,then find the other number

50. a) P.T.  $\frac{\tan \theta}{\sec \theta - 1} + \frac{\tan \theta}{\sec \theta + 1} = 2 \operatorname{cosec} \theta$

b) If the difference between simple interest and compound interest for 3 years at 2.5% p.a. is rs.625 .find the sum invested.

c) Three consecutive vertices of parallelogram are  $(3,0)$   $(5,2)$  and  $(-2,6)$  find the fourth vertex.

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