**JAIN COLLEGE, J C Road, Bangalore**
**Mock Paper, January - 2020**
**I PUC – Basic Mathematics (75)**

**NOTE: All questions must be answered without considering the choice in each part from A to E**

**PART – A**

**I. Answer any 10 of the following questions. 1 × 10 = 10**

1. Give the canonical representation of 306
2. If A= {a,b,c,d} , B= {d,e,f,g }, find $A - B$
3. If R={ (2,4) (1,2) (3,2)} find R.
4. Simplify $\sqrt[4]{x^{\frac{-4}{3}}}$
5. Find x if $log_x 625 = 4$.
6. Find the sum to infinity of the G P $3,1,\frac{1}{3},\ldots\ldots$
7. Solve for the x if $2(7+x) - 10 = 16 - 2(x - 24)$ .
8. What is the simple interest on Rs.650 for 14 weeks at 6% p.a
9. The average score of 35 girls is 80 and the average score of 25 boys is 68. Find the average score of both boys and girls together.
10. Express $\frac{3\pi}{4}$ into degrees.
11. Find the value of $sin^2 120 + cos^2 120$
12. Find the slope of the line $2x + 5y - 11 = 0$

**PART – B**

**II. Answer any 10 of the following questions. 2 × 10 =20**

13. Find the total number of positive divisors of 960.
14. Find the HCF of two numbers if their LCM is 1260 and product is 52920.
15. Simplify $\frac{2^{7a-2b}.8^{2a-b}}{16^{a+b}}$
16. Fine the domain and range of the relation
    $R = \{(x,y): y = x^2,\ x \text{ is a positive prime number less than } 10\}$
17. The third term of HP $\frac{1}{7}$ is and fifth term is $\frac{1}{11}$ then Find the seventh term.
18. The sum of two numbers is 107 and their difference is 17. Find the numbers.
19. Solve the inequality $5x - 3 > 3x + 1, x \in R$ and represent on the number line.
20. Find the present value of an annuity of 400 for 3 years at 16% p.a compound interest.
21. Ram and shyam went up a hill at a speed of 20kmph. Both of them came tumbling down the same distance at a speed of 30kmph. Find the average speed for the round trip.
22. The angle of a triangle are in the ratio$3:4:5$. Find them in degrees.
23. Find the value of $cot^2 60 + sin^2 45 + sin^2 30 + cos^2 90$.
24. The centroid of the triangle ABC is the point $(2,3)$. The co-ordinates of A are $(5,6)$ and B are$(-1,4)$. Find the co-ordinates of C.
25. Find the equation of the line passing through $(-1,-1)$ and perpendicular to the line whose slope is $\frac{-2}{5}$.

**PART – C**

**III. Answer any 10 of the following questions. 3 × 10 = 30**

26. Prove that $\sqrt{2}$ is an irrational number.
27. If $A = \{1,2,3\}$and $R = \{(1,1)(1,2)(2,1)(2,2)(3,3)\}$. Prove that R is an equivalence relation on A
28. If$A = \{1,3,5\},\ B = \{5,7\}, C = \{7\}$, verify that $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$.
29. If $a^x = b^y = c^z$ and $b^2 = ac$ .Show that $\frac{1}{x} + \frac{1}{z} = \frac{2}{y}$.

30. Find the nature of the roots of the equation $3x^2 + 2x + 1 = 0$ without solving .If $\alpha$ *and* $\beta$ are the roots of $3x^2 + 2x + 1 = 0$. Find the value of $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$.
31. The age of the 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.
32. Solve the linear inequalities $x + 3y \leq 3, 2x + y \leq 2, x, y \geq 0$ graphically.
33. In the how many years a sum of 2000 becomes 2205 at the rate of 5% p.a. compound interest?
34. Ramya sold her bag at a loss of 7%. Had she been able to sell it at a gain of 9%,it would have fetched 64 more than it did. What was the cost price of the bag?
35. The price of a pair of trousers was decreased by 22% of Rs.390.What was the original price of the trousers.
36. If $sin\theta = \frac{-8}{17}$and $\pi < \theta < \frac{3\pi}{2}$. Find the value of $\frac{tan\theta - cot\theta}{sec\theta + cosec\theta}$.
37. Derive the slope intercept form of line $y = mx + c$. Also write the equation of line passing through origin with slope m.
38. Find the equation of the line which passes through the point $(-4,5)$and whose intercepts are equal in magnitude but opposite in sign.

**PART – D**

**IV. Answer any 6 of the following questions. 5 × 6 = 30**

39. In a survey of 100 persons it was found that 25 read magazine A,30 read magazine B, 42 read magazine C ,8 read magazine A and B,10 read magazine A and C ,5 read magazine B and C, while 3 read all the three magazines. Find
    a) How many read none of the three maganizes? b) How many read only magazine C ?
    c) How many read exactly one magazine only?
40. Evaluate $\frac{1.234X0.8921}{43.43X0.0092}$ using logarithm table.
41. Find the sum of all integers between 60 and 400 which are divisible by 13.
42. Find an integral root between $-3$ and 3 by inspection and then using synthetic division solve the equation $x^3 - 10x^2 + 29x - 20 = 0$.
43. The difference between S.I and C.I on a certain sum of money invested for 3years at 6% p.a. is Rs.110. 16. Find the sum.
44. A person spent 30% of his wealth and there after 20000 and further 10% of the remainder .If Rs. 29250 is still remaining what was his total wealth.
45. Find x if $\frac{x.sin^2 300.sec240}{cos^2 225.cosec240} = Cot135 \times Tan315$
46. Find the ratio in which the line joining the points (3, 5) and (-7, 9) is divided by the point$\left(\frac{1}{2}, 6\right)$.
47. Find the equation of the locus of a point which moves such that the sum of its distances from $(0,3)$and $(0,-3)$ is 8units.
48. Find the co-ordinate of the foot of the perpendicular from $(-6,2)$ on the line $3x - 4y + 1 = 0$.

**PART – E**

**V. Answer any one 10 × 1 = 10**

49. a) Find the domain and range of the function $f(x) = \frac{x^2 - 2x + 1}{x^2 - 9x + 13}$ where $x \in N$
    b) Find the distance between the parallel lines $5x + 12y + 7 = 0$ and $5x + 12y - 19 = 0$.
    c) Using log find the number of digits in $3^{50}$.
50. a) A confectioner make and sells biscuits. He sells one pack of biscuits at 80.His cost of manufacturing is 40 pack as variable cost and 3000 as fixed cost. Find
    1) Revenue function 2) cost function 3) profit function
    4) If he limits his production to 100 packets can he make profit.
    b) Find the sum to n terms of the series $5 + 55 + 555 + \cdots$nterms
    c) The profit of a business firm for the 5years is 17598,20703,10085,25375 and 16315. Find the average profit.

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