



**Jain College, Jayanagar**  
**Mock Paper - I**  
**Subject: II PUC Basic Maths (75)**

**I Answer all the following questions:**

**10×1=10**

1. Without expanding evaluate :  $\begin{vmatrix} 500 & 503 \\ 506 & 509 \end{vmatrix}$
2. If  ${}^nC_4 = {}^nC_5$ , find the value of n.
3. Symbolise the proposition: He is neither quiet nor practical.
4. Find the third proportional to 6 and 24.
5. Define yield.
6. Find the centre of the circle  $(x+1)^2 + (y-4)^2 = 25$ .
7. Find the value of  $3 \sin 10^\circ - 4 \sin^3 10^\circ$ .
8. Evaluate  $\lim_{x \rightarrow 4} \frac{x^3 + 4}{1 - x}$ .
9. Find  $\frac{dy}{dx}$ , if  $y^2 = 4ax$ .
10. Evaluate  $\int \frac{1}{11x+5} dx$ .

**PART - B**

**II Answer any Ten of the following**

**10× 2 = 20**

11. Prove that if any two rows or columns of a determinant are interchanged then the value of the determinant changes only its sign.
12. How many 3 letter words can be formed using consonants but each only one?
13. Two pair coins are tossed simultaneously. Find the probability of :  
a) atleast one head                      b) getting 2 heads
14. Write the converse and inverse of "If x is less than 1, then it is a prime number."
15. A certain number is subtracted from each of the two terms of the ratio 21:35 to give a new ratio 3:10. Find the number which is subtracted?
16. Banker's gain on a bill due after 6 months at 4% p.a is Rs 24. Find TD and BD.
17. If  $\tan A = \frac{1}{3}$ ,  $\tan B = \frac{2}{7}$  then find  $\cot(A-B)$
18. Prove that  $\cos^4 \theta - \sin^4 \theta = 2 \cos^2 \theta - 1$
19. Find the equation of the parabola given that its focus is (0,-3) and directrix is y=3
20. Show f(x) defined by  $f(x) = \begin{cases} \frac{x^2 - 25}{x - 5}, & \text{when } x \neq 5 \\ 10, & \text{When } x = 5 \end{cases}$  is continuous at x = 5
21. If  $y = \sqrt{\frac{1 - \cos 2x}{1 + \cos 2x}}$  prove that  $\frac{dy}{dx} = \sec^2 x$ .
22. If the total cost function  $C = 9q - 3q^2 + \frac{q^3}{3}$ , find the level of output at which average cost is minimized.

23. Evaluate  $\int \frac{e^x - 1}{e^x - x} dx$ .

24. Find the area bounded by the curve  $y = x^2$ , X-axis and the lines  $x=1$  &  $x=3$ .

### PART-C

#### III. Answer any Ten of the following:

10 × 3 = 30

25. Solve by Cramer's rule :  $x+2y+3=0$ ,  $2x-3y-8=0$ .

26. If  $A = \begin{bmatrix} 5 & -3 \\ 2 & 1 \end{bmatrix}$ , verify  $A (\text{adj } A) = (\text{adj } A)A = |A| I$ .

27. A box contains 5 red, 4 black and 3 white balls. How many selections of 8 balls can be made if the selection contains.

a) Exactly 4 red, 2 black & 2 white balls

b) Atleast 3 red, atleast 3 black & atleast 1 white ball.

28. If Rs 120 maintain a family of 4 persons for 30 days. How long Rs 300 maintain a family of 6 persons?

29. A banker pays Rs 2380 on a bill of Rs 2500, 73 days before the legally due date. Find the rate of discount charged by the banker.

30. Find the interest earned on Rs 4897.50 cash invested in 15% stock at 81.50, given that brokerage is 0.125%.

31. Ananya went to the grocery shop to purchase biscuits for Rs 40, Rice for Rs 50 and wheat for Rs 50 sales tax on each item is 10%. How much should she pay to the shop keeper?

32. Find the coordinates of the vertex, focus and equation of directrix of the parabola  $5x^2+24y=0$ .

33. A card is drawn from a pack of 52 playing cards what is the probability that the card is king given that the card is red.

34. If  $x\sqrt{1+y} + y\sqrt{1+x} = 0$ , where  $x \neq y$ , show that  $\frac{dy}{dx} = \frac{-1}{(1+x)^2}$ .

35. A circular bolt of ink increases in area in such a way that the radius at the time 't' seconds is given by  $r=2t^2 - \frac{t^3}{4}$ . What rate the area of the blot increases when  $t=4$  seconds

36. Divide the number 40 into 2 parts such that their products is maximum.

37. Evaluate  $\int (1+x) \log x dx$ .

38. Evaluate  $\int \frac{4x+5}{(x-1)(x+2)} dx$ .

### PART-D

#### IV. Answer any Six of the following:

6 × 5 = 30

39. Find the co-efficient of  $x^8$  in  $\left(3x^2 - \frac{1}{2x}\right)^{10}$

40. Resolve  $\left(\frac{x+8}{2x^2-x-1}\right)$  into partial fraction.

41. Prove  $\sim(p \leftrightarrow q) \equiv (p \wedge \sim q) \vee (q \wedge \sim p)$ .

42. Two taps can separately fill a tank in 12 min and 15 min respectively. The tank when full can be emptied by a drain pipe in 20 minutes. When the tank was empty, all the three were opened simultaneously. In what time will the tank be filled up?

43. An engineering company has 80% learning effect and spends 500 hours for the prototype. Estimate the labour cost of producing 7 engines of new order if the labour cost is Rs 40 per hour.
44. Solve the L PP graphically:  
 Maximise  $Z = 400x + 150y$   
 S.T.C  $3x + y \leq 600$   
 $x \leq 150$   
 $y \leq 400$   
 $x, y \geq 0$
45. If  $A+B+C = 180$ , Prove that  $\sin^2 A + \sin^2 B + \sin^2 C = 2 + 2 \cos A \cos B \cos C$ .
46. If  $xy + 6y = 2x$ , show that  $\frac{d^2 y}{dx^2} = \frac{-24}{(x-6)^3}$
47. A Circle has its centre on x-axis and passes through (5,1) and (3,4). Find its equation.
48. Find the area bounded by the parabola  $y^2 = 4x$  and  $x^2 = 4y$ .

### PART-E

V. Answer any One of the following:

1×10=10

49. a) Prove that  $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = n.a^{n-1}$  for all n. (6)  
 b) Expand  $(0.96)^5$  using Binomial theorem upto 4 decimal. (4)
50. a) The monthly expenditure in an office for 3 months is given in the table.

Month	No of			Total Monthly salary (Rs)
	Clerks	Peons	Typists	
July	8	4	6	3750
August	9	9	6	5000
September	12	9	12	8850

- Calculate the salary for each type of staff per month (6)
- b) Two towers of height 14 m & 25 m stand on level ground. The angles of elevation of their tops from a point on the line joining their feet are  $45^\circ$  and  $60^\circ$  respectively. Find the distance between the towers. (4)

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