Jain College, Jayanagar
II PUC MOCK PAPER II - 2019
Subject: Basic Maths (75)

Duration: 3 hours 15 minutes **Max. Marks: 100**

PART-A

I. Answer all the questions: $10 \times 1 = 10$

1. If $A = [1,3,8]$ *and* $B = \begin{bmatrix} 7 \\ 3 \\ 1 \end{bmatrix}$, find AB.
2. If ${}^nC_4 = {}^nC_5$, find the value of n.
3. Write symbolically "If two numbers are equal then their squares are equal".
4. Find the fourth proportional to $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$.
5. Find the income obtained by investing Rs 3600 in 5% stock at 90.
6. Find Cos2A if Sin A= $\frac{1}{2}$
7. Find the equation of the circle with centre ≡ (-3,2) and r = 5 units.
8. Evaluate : $\lim_{x \to 0} \frac{2}{x} \log(1+x)$.
9. If y = log $(x^2 - 2)$ find $\frac{dy}{dx}$.
10. Evaluate : $\int \frac{1}{10x+3} dx$.

PART-B

II. Answer any ten questions: $10 \times 2 = 20$

11. If $A = \begin{bmatrix} 1 & 3 \\ 4 & 5 \end{bmatrix}$ show that $A^2 - 5A = 2I$.
12. In how many ways can 6 boys and 6 girls be arranged in a circle so that no two boys are together?
13. If P $(\bar{A}) = 0.65, P(A \cup B) = 0.65$ *find* $p(B)$ if A and B are mutually exclusive events.
14. If the compound proposition P → (q vr) is false, then find the truth values of P,Q and r.
15. The angles of a triangle are in the ratio 3:4:5. Find the angles.
16. TD on a bill was Rs 100 and BG was Rs 10. What is the face value of the bill?
17. Prove that $(\text{Sin A} + \cos A)^2 = 1 + \text{Sin 2A}$.
18. Prove that : $\frac{Sin\, x - Sin\, y}{Sin\, x + Sin\, y} = \tan\left(\frac{x-y}{2}\right)\cot\left(\frac{x+y}{2}\right)$
19. Find the equation of the parabola given that focus is $\left(\frac{5}{3}, 0\right)$ and vertex is (0,0).
20. Find the value of k, if the function f (x) = $\begin{cases} \frac{e^{2x-} - 1}{x}, & x \neq 0 \\ k, & x = 0 \end{cases}$ is continuous at x = 0.

21. Find $\frac{dy}{dx}$, *if* $y = \frac{e^x - 1}{e^x + 1}$.

22. If $S = 5t^2 + 4t - 8$ find the initial velocity and acceleration.

23. Evaluate $\int \frac{3x^8}{1+x^9} dx$.

24. Evaluate $\int_0^{\pi/4} Sec^2 3x\, dx$.

PART-C

III. Answer any ten questions: $10 \times 3 = 30$

25. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ show that $A + 2B = A^2$, find B .

26. Prove that the value of determinant is zero if any two of its row (or column) are identical.

27. If a convex polygon has 170 diagonals. Find the numbers of sides of the polygon.

28. Three fair coins are tossed simultaneously. Find the probability of
    a) Getting one head
    b) Getting atmost one head
    c) Getting atleast two head.

29. 5 men each working 9 hours a day can finish a work in 30 days how many men are required to finish eight times the work in 25 days, each working 8 hours a day?

30. A bill for Rs 14,600 drawn at 3 months after date was discounted on 11-11-99 for Rs 14,320. If the discount rate is 20% p.a on what date was the bill drawn?

31. Rakshith decides to invest in TCS shares which are selling at Rs 2020 per share. How much money is required to purchase 10 shares if the brokerage is 0.5%.

32. The price of washing machine, inclusive of sales tax is Rs 13530. If the sales tax is 10% find its basic price?

33. Write the focus, equation of directrix and ends of latus Rectum of the parabola $x^2 = 8y$.

34. If $x = a \sec\theta$, $y = b\tan\theta$ find $\frac{dy}{dx} at\ \theta = \frac{\pi}{4}$.

35. A circular plate of metal is heated so that its radius increases at the rate of 0.1 mm/min. At what rate is the plate's area increasing when the radius is 25 cm.

36. Show that x^x is maximum at $x = \frac{1}{e}$

37. Evaluate $\int_0^1 \frac{1+e^x}{(x+e^x)^5} dx$

38. Evaluate $\int \frac{1}{\sqrt{x}+x} dx$

PART-D

IV. Answer any six of the following: $6 \times 5 = 30$

39. Find the co-efficient of x^5 in the expansion of $\left(x + \frac{1}{x^2}\right)^{17}$.

40. Resolve into partial fractions : $\frac{x^2 - 2}{x^2 + x - 12}$.

41. Prove that : ~(p→q) ≡ p^~q.

42. A jar contains two liquids A and B in the ratio 7:5 when 9 liters of the mixture is drawn and the jar is filled with the same quantity of B, the ratio of A and B becomes 7: 9. Find the quantity of A in the jar initially.

43. A 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 LPP using graphical method , Maximize, Z = 6x + 8y subject to the constraints 4x + 2y ≤ 20, 2x+5y ≤ 24, x ≥ 0, y ≥ 0, Mark the feasible region.

45. The angle of elevation of an object from a point 100m above a lake is 30^0 and angle of depression of its image in the lake is 45^0. Find the height of the object above the lake.

46. Find the equation of the circle, passing through the (1,2) and (2,1) and has its centre on the y-axis.

47. If $y = (x^2 + a^2)^6$ prove that $(x^2 + a^2)\, y_2 - 10xy_1 - 12y = 0$.

48. Find the area bounded by the parabola $y^2 = 4x$ and the line $y = 2x - 4$.

PART-E

V. Answer any one of the following: $10 \times 1 = 10$

49. a) A sales person Samarth has the following record of sales for the month of January, February and March 1996 for three products A, B and C. He is paid a commission at fixed rate per unit but at varying rates for products A,B and C.

Months	Sales in units			Commission in Rs
	A	B	C	
January	9	15	2	800
February	15	5	4	900
March	6	10	3	850

Find the rate of commission payable on A, B and C per unit sold using matrix method.
b) Find the value of $(99)^5$ using binomial theorem.

50. a) If angle θ is measured in radians then prove that $\lim_{\theta \to 0} \frac{\sin\theta}{\theta} = 1$ and also prove that $\lim_{\theta \to 0} \frac{\tan\theta}{\theta} = 1$.

b) A company produces two products P and Q. Each requires 4 hours of grinding and 2 hrs of grinding and 2 hrs of polishing and each Q requires 2 hours of grinding and 5 hours of polishing. The total available hrs for grinding is 20 and for polishing is 24. Profit per unit of p is Rs 6 and that of q is Rs 8. Formulate the LPP. (6+4)

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