



Jain College, Jayanagar
II PUC Mock Paper – II Jan - 2020
Subject: Basic Maths (75)

Duration: 3 hours 15 minutes

Max. Marks: 100

PART-A

I. Answer all the questions:

10 × 1 = 10

1. If $\begin{vmatrix} 2x & -4 \\ -2 & x \end{vmatrix} = 0$ then find x.
2. In how many ways can 9 flowers of different colours be string together to form a garland?
3. Negate : 'He likes mathematics and he does not like logic'.
4. Find the fourth proportional of 6, 12, 15.
5. Write the formula for learning index.
6. Evaluate $\sin 75^\circ$.
7. Find the equation of latus rectum of the parabola $y^2 = -12x$.
8. Evaluate $\lim_{x \rightarrow 0} \frac{\sin 3x}{\tan 4x}$.
9. Differentiate $7^{\sin \sqrt{x}}$ w.r.t x.
10. Evaluate $\int (3e^x + 5a^x - e^{\log a}) dx$

PART-B

II. Answer any ten questions:

10 × 2 = 20

11. Find A^{-1} of $A = \begin{bmatrix} 1 & 5 \\ -2 & 3 \end{bmatrix}$.
12. Find n if ${}^n C_{10} = {}^n C_{15}$.
13. If $P(A) = 0.5$, $P(\bar{B}) = 0.7$, $P(A \cup B) = \frac{7}{12}$, find $P(B/A)$.
14. If p, q, r are propositions with truth values F,T and F respectively, then find the value of the compound proposition $\sim(p \vee r) \rightarrow \sim q$
15. If $x : y = 2:3$ find $\frac{2x^2 + 5y^2}{x^2 + y^2}$.
16. A bill drawn for 3 months was legally due on 06/07/2018. Find the date of drawing of the bill.
17. If $\tan A = \frac{1}{3}$, $\tan B = \frac{2}{7}$, then find $\cot (A-B)$.
18. Prove that $\frac{\sin 3\theta}{\sin \theta} - \frac{\cos 3\theta}{\cos \theta} = 2$.
19. Find the length of the chord of the circle $x^2 + y^2 - 6x + 4y + 5 = 0$ intercepted by the x – axis.
20. Find k for which $f(x) = \begin{cases} k+x, & x=1 \\ 4x+3, & x \neq 1 \end{cases}$ is continuous at $x = 1$.
21. Find $\frac{dy}{dx}$, if $y = \sqrt{x + \sqrt{x + \sqrt{x + \dots \infty}}}$

22. Show that $x^3 - 6x^2 + 12x - 3$ is neither maximum nor minimum at $x = 2$.

23. Evaluate $\int \cos 5x \cdot \cos 3x \, dx$.

24. Evaluate $\int_0^{\pi/2} x \cdot \sin x \, dx$.

PART-C

III. Answer any ten questions:

10 × 3 = 30

25. If $A = \begin{bmatrix} 1 & 2 \\ 1 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 4 & -3 \\ 2 & 1 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 0 \\ -2 & 4 \end{bmatrix}$ verify that $A(B+C) = AB+AC$.

26. Prove that $\begin{vmatrix} 1 & b+c & b^2+c^2 \\ 1 & c+a & c^2+a^2 \\ 1 & a+b & a^2+b^2 \end{vmatrix} = (a-b)(b-c)(c-a)$.

27. Find the numbers of permutations of the letters of the word MISSISSIPPI. In how many of these

a) the 4s's are together.

b) the 4s's are not together.

c) begin with MISS.

28. A die is thrown, if E is the event "the number appearing is a multiple of 3" and F be the event "the number appearing is even" then find whether E and F are independent.

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

30. A shopkeeper announces a discount of 10% on a T.V set. The marked price of the T.V is Rs 22,000. How much will a customer have to pay for buying the T.V set if the rate of sales tax is 8%.

31. A Banker pays Rs 4520 on a bill of Rs 5000, 146 days before the legally due date. Find the rate of discount charged by the Banker.

32. Sanjana invests Rs3240 in a stock at 108 and sells when the price falls to 104. How much stock at 130 can Sanjana buy now.

33. Find the focus, equation of directrix and length of latus rectum of $x^2 + 16y = 0$.

34. If $x^y = e^{x-y}$, prove that $\frac{dy}{dx} = \frac{\log x}{(1 + \log x)^2}$

35. An edge of a variable cube is increasing at the rate of 10cm/sec. How fast is the volume and surface area increasing when the edge is 5cm long?

36. If $S = 2t^3 - 5t^2 + 4t - 3$. Find

i) The time when the acceleration is $14\text{ft}/\text{sec}^2$

ii) The velocity and displacement at that time.

37. Evaluate $\int x^2 \log x \, dx$

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

PART-D

IV. Answer any six of the following:

6 × 5 = 30

39. Find the middle terms in the expansion of $\left(2x - \frac{1}{x}\right)^{17}$.
40. Resolve $\frac{2x^2 + 10x - 3}{(x+1)(x-3)(x+3)}$ into partial fraction.
41. Prove that $\neg(p \leftrightarrow q) \equiv (p \wedge \neg q) \vee (q \wedge \neg p)$.
42. Distribute 632 amongst A, B and C in such a way that 'B' will have 20% more than 'A' and 'C' has 20% less than B.
43. A company requires 100 hours to produce the first 10 units at Rs 15/hr. The learning effects is 80%. Find the total labour cost to produce a total of 160 units.
44. Solve the LPP graphically: Minimize, $Z = 200x + 400y$ subject to $x + y \geq 200$, $0.25x + 0.75y \geq 100$; $0.10x + 0.2y \leq 35$, $x, y \geq 0$.
45. If $A+B+C = 180^\circ$. Prove that $\cos 2A - \cos 2B + \cos 2C = 1 - 4 \sin A \cos B \sin C$.
46. Find the equation of the circle, passing through the points (1,2) and (2,1) and has its center on the y-axis.
47. If $y = \log(x - \sqrt{x^2 + 1})$, show that $(x^2 + 1)y_2 + xy_1 = 0$.
48. Find the area bounded by the parabola $y^2 = 16x$ and its latusrectum.

PART-E

V. Answer any one of the following:

10 × 1 = 10

49. a) Prove that $\lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} = 1$ and hence deduce that $\lim_{\theta \rightarrow 0} \frac{\tan \theta}{\theta} = 1$, if θ is measured in radians.
- b) A person is at the top of a tower 75 feet high from there he observes vertical pole and finds the angles of depression of the top and bottom of the pole which are 30° and 60° respectively. Find the height of the pole. **(6+4)**
50. a) A sales person has the following record of sales for the month of Jan, Feb and March 2019 for 3 products A, B and C. He has paid a commission at fixed rate per unit but at varying rates for product A, B, C

Month	Sales (units)			Commission (Rs)
	A	B	C	
Jan	9	12	2	800
Feb	15	5	4	900
March	6	10	3	950

Find the rate of commission payable on A, B and C per unit sold by using matrix method

- b) Find the total revenue obtained by raising the output from 10 to 20 units, where the marginal revenue function is given by $MR = 3\left(\frac{x^2}{20}\right) - 10x + 100$, ($x =$ output) also find average revenue obtained from an output of 60 units. **(6+4)**
