Jain College, Jayanagar
II PUC Mock Paper - II
Subject : Basic Maths

Duration: 3.15 minutes **Max. Marks: 100**

PART-A

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

1. Evaluate $\begin{vmatrix} 3200 & 3201 \\ 3202 & 3203 \end{vmatrix}$.
2. How many different arrangements can be made with the letters of the word "TUESDAY".
3. IF P is F and q is T then find $P \wedge \sim q$
4. Find the compound ratio of 3:4 and 4:7
5. Define learning Index.
6. If tan A = 3/4, A is acute. Find tan2A
7. If the radius of the circle. $x^2 + y^2 + 4x - 2y - k = 0$ is 4 units. Find k.
8. Evaluate $\lim_{x \to 0} (1+3x)^{1/x}$.
9. If y=sin (x^3) find dy/dx.
10. Evaluate : $\int \frac{1}{3-4x}\,dx$

PART-B

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

11. If A = $\begin{bmatrix} 1 & 3 \\ 1 & 0 \end{bmatrix}$, Prove that $A^2 - A - 3I = 0$
12. A team of 8 players has to be selected from 14 players. In how many ways the selections can be made if
    a) Two particular players are always included.
    b) Two particular players are always excluded.
13. If P(A) = $\frac{1}{2}, P(B) = \frac{1}{3}, P(AUB) = \frac{7}{12}$. Find p(B/A)
14. Write the converse and inverse of the statement "If $x^2 = y^2$ then x= y".
15. A ratio is the lowest term is 3:8. If the difference between the quantities is 25. Find the quantities.
16. BD and BG on a certain bill due after sometime are Rs 1,250 and Rs 50 respectively.
17. Prove that $\frac{Sin\ 3A}{1+2\cos 2A} = SinA$
18. Prove that Cos 3A = $4\text{Cos}^3\text{A} - 3\cos A$
19. Find the equation of the parabola with focus (0,-3) and directrix y = 3.
20. Find 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. If y = $(\sin x)^{\tan x}$ find $\frac{dy}{dx}$.
22. If $S = a t^3 + bt$, find a and b given that when t = 3 velocity is 0 and the acceleration is 14 units.
23. Evaluate : $\int \frac{1+e^x}{(x+e^x)^5}\,dx$
24. Evaluate : $\int_0^{\pi/2} Sin\,2x\,dx$

PART-C

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

25. IF $A = \begin{bmatrix} 2 & -1 \\ 1 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} -3 & 1 \\ -1 & 4 \end{bmatrix}$ show that $(AB)' = B'A'$

26. Show that $\begin{vmatrix} -a^2 & ab & ac \\ ab & -b^2 & bc \\ ac & bc & -c^2 \end{vmatrix} = 4a^2b^2c^2$

27. How many four digit numbers can be formed using digits 0, 2, 3, 5, 7, 8
    a) How many of them are even
    b) How many are divisible by 5
    c) How many are greater than 5300
28. What is the probability that a card drawn from a pack of playing cards is
    a) Diamond or a heart b) king or a club c) spade or jack d) Red colour or queen
29. If 10 men or 20 boys can do piece of work in 30 days. How long will 30 boys and 5 men take to do the same work?
30. The bankere's gain on a bill is 1/9th of the banker's discount, rate of interest being 10% p.a. Find the unexpired period of the bill.
31. What is the quoted value of 12% stock if it earns an interest of 8% after deducting the income tax of 8%
32. 'A is manufacture of electric iron. The cost price of each electric iron in Rs 1600. He sells to B and 'B' sells to 'C' and 'C' sells to 'D' the retailer. The tax rate is 12.5% and the profit is Rs 150 at each stage of the selling chain. Find
    a) The total amount of VAT and
    b) The amount that the purchased will have to pay
33. Find the focus, equation of directrix, ends of Latus rectum of the parabola $3x^2 + 4y = 0$.
34. Differentiate $\sin^3 x$ w.r.t $\cos^3 x$.
35. Find the maximum and minimum value of $x^3 - 9x^3 + 15x - 1$.
36. The volume of a sphere is increasing at the rate 4π c.c/sec. Find the rate at which the surface area increases when its radius is 10 cm.
37. Evaluate $\int \frac{x-12}{(2x-1)\,(x-3)} dx$
38. Evaluate $\int_0^{\pi/2} x \sin x \, dx$

PART-D

IV. Answer any six questions: $6 \times 5 = 30$

39. Simplify $\left(2+\sqrt{3}\right)^5 + \left(2-\sqrt{3}\right)^5$ using Binomial theorem.
40. Resolve into partial fractions: $\frac{x^2}{(x+1)(x+2)(x+3)}$
41. Verify if the proportion $(\sim P \wedge (p \vee q)) \rightarrow q$ is a tautology, contradiction or neither.
42. A railway train 100 meters long is running at the speed of 30 kmph. In what time will it pass
    a) A man standing near the line
    b) A bridge 100 meters long?
43. XYZ company supplies water tankers to the government. The first water tankers takes 20000 labour hours. The government auditors suggest that there should be a 90% learning effect rate. The Management expects an order of 8 water tankers in the next year. What will be the labour cost if the company will incur at the rate of Rs 20 per hour?

44. Solve the LPP graphically: maximize, Z = 6x +8y subject to the constraints $4x+2y \leq 20$, $2x+5y \leq 24$, $x,y \geq 0$
45. Prove that $\text{Sin } 20^0 . \sin 40^0 . \sin 60^0 . \text{Sin } 80^0 = 3/16$.
46. A sales person's sales details are given below

Month	Sales in units			Profit in Rs
	Pen	Book	Bag	
January	9	10	2	800
February	15	5	4	900
March	6	10	3	850

Find the profit for each pen, book and bag using matrix method.

47. If $y = a \cos(\log x) + b \sin(\log x)$ show that $x^2y_2 + xy_1 + y = 0$
48. Find the area bounded by the parabola $y^2 = 16x$ and its latus rectum.

PART-E

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

49. a) Show that the following points are concyclic (2, 0) (-1, 3) (-2, 0) and (1,-1)
b)Use binomial theorem to evaluate upto 4 decimal place $(1.02)^6$.

50. a) Evaluate : $\lim_{x \to a} \frac{x^n - a}{x - a} = n.a^{n-1}$ (for all rational n is positive, negative and fraction)

b)The angles of elevation of the top of a tower from two points distance a and b (a < b) from its foot and the same straight line from it are 30^0 and 60^0 Show the height of the tower is $\sqrt{ab}$

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