I   Answer all the following questions: 10×1=10

1. If $A = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$ and $A = \begin{bmatrix} -2 \\ 5 \end{bmatrix}$ find AB.

2. In how many ways can 10 different precious stones be set to form necklace.

3. Negate the proposition ~p→~q.

4. Find the value of x if 5:20= 3:x.

5. Define learning curve.

6. Express as the product of two trigonometric functions $\cos 2\theta + \cos 6\theta$

7. Find the equation of the circle with centre C(-1, -2) & diameter Rs 25units.

8. Evaluate $\lim\limits_{x \to 0} \dfrac{Sin\, ax}{Sin bx}, ab \neq 0,$

9. $X^e + e^x + e^{e,}$ differentiate with respect to x :

10. Integrate $(7x-3)^4$.

PART - B

II   Answer any Ten of the following   10× 2 = 20

11. If $A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$ show that $A^2 - 4A + 3I = 0$.

12. Find the number of ways in which a committee of 4 students & 2 lecturers can be chooses out of 10 students and 8 lecturers.

13. If A and B are two events with probability 0.4 and 0.8 corresponding to A and A∪B find P(B) if A and B are mutually exclusive.

14. If (~p ∨ q) ∧ ~r is a false proposition, then find the truth values of p,q and r.

15. The angles of a triangle in the ratio 2:3:4. Find the angles

16. A Banker discounts a bill for a certain amount having 73 days to sum before it matures at 15% p.a. The discounted value of the bill is Rs 970. What is the face value of the bill? Also find the bankers discount.

17. Prove that $\dfrac{1 - \cos 2A + \sin 2A}{1 + Cos 2A + Sin 2A} = \tan A$

18. S.T $Cos\left(\dfrac{\pi}{3} + A\right).Cos\left(\dfrac{\pi}{3} - A\right) - Sin\left(\dfrac{\pi}{3} + A\right).Sin\left(\dfrac{\pi}{3} - A\right) = \dfrac{-1}{2}$

19. Find the equation of the parabola with focus(0,-3) & directrix y=3

20. Evaluate $\lim\limits_{x \to \infty} \dfrac{(3x+4)(4x+3)}{(2x-7)(x+4)}$.

21. Differentiate $\dfrac{2^x \log .x}{\sqrt{x}}$.

22. If the displacement 's' at any time 't' is giving by S= $\sqrt{1-t}$. Show that the velocity is inversely proportional to the displacement.

23. Evaluate Cosec x $\sqrt{Co\sec^2 x - 1}$

24. Integrate $\dfrac{3}{\sqrt{2x} + \sqrt{2x+3}}$

PART-C

III.   **Answer any Ten of the following:** $10 \times 3 = 30$

25. Solve. $\begin{vmatrix} 3x-8 & 3 & 3 \\ 3 & 3x-8 & 3 \\ 3 & 3 & 3x-8 \end{vmatrix} = 0$

26. Solve by using Cramer's rule: 2x+5y+z=1, x+7y-6z=-18, y+2z=3

27. A man has 10 relatives, 4 of them are ladies, 3 gentlemen and 3 children. In how many ways can he invite 7 relatives to a dinner party so that there are exactly 2 gentlemen and atleast 3 ladies.

28. A box contains 8 white chalks & 9 pink chalks. Two chalks are taken at random from the box. Find the probability that both of them are pink, if
    a)   the two chalks are taken out together.
    b)   the chalks are taken one after the other, without replacement.
    c)   the chalks are taken out one after the other with replacement.

29. In a fort, there was ration for 560 soldiers that would last the soldiers for 70 days. After 20 days 60 soldiers left the fort. For how many days the remaining ration can support the remaining soldiers?

30. A bill for Rs 2920was drawn on September 11 for 3 months after date and was discounted at 16% p.a. for Rs 2875.20 On what date was the bill discounted.

31. Sanjana invests Rs 3,240 in a stock at 108 and sells when the price falls to 104. How much stock at 130 Can Sanjana by now?

 a) A shopkeeper purchased an item of Rs 100 at 8% VAT and sell it at Rs 120 to a customer and the customer also pay 8% VAT to the shopkeeper. How much amount did the shopkeeper deposit to the government as VAT?

32. Find the coordinates of the focus, Equation to the directrix and coordinates of the ends of the latus rectum of the parabola $y^2 = 16x$.

33. If $(xe)^y = e^x$. Show that $\dfrac{dy}{dx} = \dfrac{\log x}{(1+\log x)^2}$

34. A spherical balloon is being inflated so that its volume is increasing at the rate of 30C.C/min. How fast its surface area increasing when its volume is 36πC.C.

35. Show that x^x is maximum at $x = \dfrac{1}{e}$

36. Integrate $\displaystyle\int \dfrac{1}{x[(\log x)^2 - 3\log x + 2]}dx$

37. Integrate $\displaystyle\int \dfrac{Co\sec^2 x - \cos ecx \cot x}{(Co\sec x - Cotx)^{1/4}}dx$

PART-D

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

38. Solve by matrix method: x+y+z=6000, x+3z=11000, x+z=2y.

39. Find the middle terms in the expansion of $\left(2x^2 - \dfrac{1}{\sqrt{x}}\right)^{11}$

40. Resolve into partial fraction : $\dfrac{3x+5}{(x+2)^2(x-3)}$

41. Examine whether the proposition $[\sim(p\to\sim q)] \vee (\sim p \leftrightarrow q)$ are Tautology or a contradiction

42. If 8 men and 16 boys can do a work in 6 days and 12 men and 24 boys can do the same work in 8 days. In how many days can 16 men and 20 boys do it?

43. A Company requires 100 hours to produce the first 10 units at Rs 15 per hour. The learning curve effect is 80%. Find the total labour cost to produce a total of 160 units.

44. Solve the LPP graphically: Maximum : Z=5x+3y subject to the constraints $4x+ 2y \leq 20, 2x+5y \leq 24,$ and $x \geq 0, y \geq 0.$

45. If A+B+C=π.prove that $\tan\left(\dfrac{A}{2}\right)\tan\left(\dfrac{B}{2}\right)+\tan\left(\dfrac{B}{2}\right)\tan\left(\dfrac{C}{2}\right)+\left(\tan\dfrac{C}{2}\right)\tan\left(\dfrac{A}{2}\right)=1$

46. If Y = $(a^2+x^2)^6$. Show that $(x^2+a^2)y_2- 10xy_1-12y=0$.

47. 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: **1×10=10**

48. a) Show that the points (2,0) (-1,3), (-2,0) and (1,-1) are Concyclic.   **(6)**

    b) The angle of elevation of a   tower from a point on the ground is 30^0. At a point on the horizontal line passing through the foot of the tower and 100 meters nearer it, the angle of elevation is found to be 60^0. Find the height of the tower & the distance of the first point from the tower.   **(4)**

49. a) If angle θ is measured in radians, then prove that $\lim\limits_{\theta \to 0}\left(\dfrac{Sin\theta}{\theta}\right)=1.$ **(6)**

    b) A Company produces two types of leather belts A & B. A is of superior quality and B is of inferior quality. The respective profits are Rs 10 and Rs 5 per belt. The supply of raw material is sufficient for making 850 belts per day. For belt A, a special type of buckle is required and 500 are available per day. There are 700 buckles available for belt B per day. Belt A needs twice as much time as that required for belt B and the company can produce 500 belts if all of them were of the type A. Formulate a LPP model for the above problem.   **(4)**

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