Reg.No. : ☐☐☐☐☐☐

Exam Time : 03:00:00 Hrs

Total Marks : 90

II. ANSWER ANY SEVEN   7 x 2 = 14

1) Find the rank of the word 'CHAT' in dictionary.

2) Find how many four letter words can be formed from the letters of the word "LOGARITHMS" (words are with or without meanings)

3) Find the length of the tangent from (1,2) to the circle $x^2 + y^2 - 2x + 4y + 9 = 0$

4) Find the values of the following. cos 70° cos 10° - sin 70° sin 10°

5) Find the parametric equations of the circle $x^2 + y^2 = 25$

6) Find the principal value of the following $\sec^{-1}(-\sqrt{2})$

7) Differentiate the following with respect to x. $(x^2 - 3x + 2)(x + 1)$

8) Find $\frac{dy}{dx}$ if x = at², y = 2at

III. ANSWER ANY SEVEN   7 x 3 = 21

9) If $A = \begin{bmatrix} 2 & 3 \\ 1 & -6 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 4 \\ 1 & -2 \end{bmatrix}$, then verify $\mathrm{adj}(AB) = (\mathrm{adj}\, B)(\mathrm{adj}\, A)$

10) Solve by using matrix inversion method:
   2x + 5y = 1
   3x + 2y = 7

11) Find the middle terms in the expansion of $\left(x + \frac{1}{x}\right)^{11}$

12) Solve tan⁻¹(x + 2) + tan⁻¹(2 - x) = tan⁻¹$\left(\frac{2}{3}\right)$

13) How many triangles can be formed by joining the vertices of a hexagon?

14) Find the center and radius of the circle $x^2 + y^2 - 22x - 4y + 25 = 0$

15) If (4,1) is one extremity of a diameter of the circle $x^2 + y^2 - 2x + 6y - 15 = 0$, find the other extremity.

16) Prove that: $\cos 510^o \cos 330^o + \sin 390^o \cos 120^o = -1$

17) Evaluate the following $\lim_{x \to 0} \frac{\sqrt{1+x}-\sqrt{1-x}}{x}$

18) Differentiate the following with respect to x. sin x cos x

IV. ANSWER ANY SEVEN   7 x 5 = 35

19) The cost of 2 Kg of Wheat and 1 Kg of Sugar is Rs.70. The cost of 1 Kg of Wheat and 1 Kg of Rice is Rs.70 The cost of 3 Kg of Wheat, 2 Kg of Sugar and 1 Kg of rice is Rs.170. Find the cost of per kg each item using matrix inversion method.

20) In an economy there are two industries P_1 and P_2 and the following table gives the supply and the demand position in crores of rupees.

| Production sector | Consumption sector | | Final demand | Gross output |
	P_1	P_2		
P_1	10	25	15	50
P_2	20	30	10	60

Determine the outputs when the final demand changes to 35 for P_1 and 42 for P_2.

21) Prove that the term independent of x in the expansion of $\left(x + \frac{1}{x}\right)^{2n}$ is $\frac{1.3.5.....,(2n-1)2^n}{n!}$

22) By Mathematical Induction, prove that 1² + 2² + 3² + ………. + n² = $\frac{n(n+1)(2n+1)}{6}$, for all $n \in N$.

23) Find the equation of the circle passing through the points (0, 1) , (4 ,3) and (1, -1)

24) A private company appointed a clerk in the year 2012, his salary was fixed as Rs.20,000. In 2017 his salary raised to Rs.25,000.

(i) Express the above information as a linear function in x and y where y represent the salary of the clerk and x-represent the year.

(ii) What will be his salary in 2020?

25) If cosec A + sec A = cosec B + sec B, prove that $\cot\left(\frac{A+B}{2}\right)$ = tanA tanB

26) Solve $tan^{-1}\left(\frac{x-1}{x-2}\right) + tan^{-1}\left(\frac{x+1}{x+2}\right) = \frac{\pi}{4}$