2023-24 II PUC ANNUAL EXAMINATION

BASIC MATHEMATICS

PART-A

I. Answer all the multiple choice questions : **5 × 1 = 5**

1. **If A =** $\begin{bmatrix} 1 & 2 & 4 \\ -1 & 3 & -2 \end{bmatrix}$ **and B =** $\begin{bmatrix} 3 & -4 & -1 \\ 1 & 5 & -2 \end{bmatrix}$ **the (A + B) is**

a) $\begin{bmatrix} 4 & 2 & -3 \\ 0 & 8 & 4 \end{bmatrix}$ **b)** $\begin{bmatrix} 4 & -2 & -3 \\ 0 & -8 & -4 \end{bmatrix}$ **c)** $\begin{bmatrix} -4 & 2 & 3 \\ 0 & -8 & 4 \end{bmatrix}$ **d)** $\begin{bmatrix} 4 & -2 & -3 \\ 0 & -8 & -4 \end{bmatrix}$

Solution : Option : (b)

$$A + B = \begin{bmatrix} 1 & 2 & 4 \\ -1 & 3 & -2 \end{bmatrix} + \begin{bmatrix} 3 & -4 & -1 \\ 1 & 5 & -2 \end{bmatrix} = \begin{bmatrix} 4 & -2 & -3 \\ 0 & -8 & -4 \end{bmatrix}$$

2. **If $^nC_{10} = {^nC_{15}}$ then n is**

a) 25 **b) 29** **c) 24** **d) 23**

Solution : Option (a)

$^nC_{10} = {^nC_{15}} \Rightarrow n = 10 + 15 = 25$

3. **The probability of getting a black card from a pack of 52 cards is**

a) $\frac{3}{4}$ **b)** $\frac{1}{52}$ **c)** $\frac{1}{4}$ **d)** $\frac{1}{2}$

Solution : Option (d)

$$P(A) = \frac{26}{52} = \frac{1}{2}$$

4. **The value of $4\cos^3 10^0 - 3\cos 10^o$ is**

a) $\frac{\sqrt{3}}{2}$ **b)** $\frac{2}{\sqrt{3}}$ **c)** $\frac{1}{\sqrt{3}}$ **d)** $\frac{1}{2}$

Solution : Option (a)

$$4\cos^3 10^o - 3\cos 10^o = \cos(3 \times 10^o) = \cos 30^o = \frac{\sqrt{3}}{2}.$$

5. **The value of $\int 4\sec^2 x\, dx$ is**

a) 4 sec x + c **b) 4 sin x + c** **c) 4 tan x + c** **d) 4 cot x + c**

Solution : Option (c)

$$\int 4\sec^2 x\,dx = 4\tan x + c$$

II. Match the following

6. i) The value of $\begin{vmatrix} 3200 & 3201 \\ 3202 & 3203 \end{vmatrix}$ is — a) 27

ii) If ${}^5P_r = 60$, then r is — b) 12

iii) If 5 : 20 = 3 : x then the value of x is — c) $\frac{y}{x}$

iv) The value of $\lim_{x\to 3}\left(\frac{x^3-27}{x-3}\right)$ is — d) $\frac{x}{y}$

v) If $x^2 - y^2 = a^2$ then $\frac{dy}{dx}$ is — e) –2

f) 3

Solution :

i) $\begin{vmatrix} 3200 & 3201 \\ 3202 & 3203 \end{vmatrix} = \begin{vmatrix} 3200 & 1 \\ 3202 & 1 \end{vmatrix} = 3200 - 3202 = -2$

ii) ${}^5P_r = 60 \Rightarrow$ for r = 3, 5 × 4 × 3 = 60. $\therefore$ r = 3.

iii) 5 : 20 = 3 : x

$$\frac{5}{20} = \frac{3}{x} \Rightarrow x = 12$$

iv) $\lim_{x\to 3}\left(\frac{x^3-27}{x-3}\right) = \mathop{\mathrm{lt}}_{x\to 3}\left(\frac{x^3-3^3}{x-3}\right) = 3\times 3^2 = 27$

v) $x^2 - y^2 = a^2$ then $\frac{dy}{dx}$ is

$$2x - 2y\,.\,\frac{dy}{dx} = 0 \Rightarrow \frac{2x}{2y} = \frac{dy}{dx} \Rightarrow \frac{dy}{dx} = \frac{x}{y}$$

III. For question numbers 7 to 11 choose the appropriate answer from the brackets given below : (5 × 1 = 5)

(56, 9, $\frac{-3}{4}$, 1, 2, 4)

7. If [2 x 2] $\begin{bmatrix} 1 \\ 4 \\ 2 \end{bmatrix}$ = [3] then the value of x is ……………

8. The number of triangles that can be formed from the 8 non collinear points is …………

9. The third proportional of 4 and 6 is …………

10. The value of $\lim\limits_{x\to 0}\left(\dfrac{\sin 4x}{\sin 2x}\right)$ is ……………

11. The value of $\int_0^{\pi/2} \sin\ 2x\ dx$ is …………………

Solution :

7. $\begin{bmatrix}2 & x & 2\end{bmatrix}\begin{bmatrix}1\\4\\2\end{bmatrix}=\begin{bmatrix}3\end{bmatrix}$

$2 + 4x + 4 = 3$

$4x = -3$

$x = \dfrac{-3}{4}$

8. Number of triangles = ${}^8C_3 = \dfrac{8\times 7\times 6}{3\times 2\times 1}=56$

9. 4 : 6 : : 6 : x

$4x = 36 \Rightarrow x = 9.$

10. $\underset{x\to 0}{\text{lt}}\dfrac{\sin 4x}{\sin 2x}=\underset{x\to 0}{\text{lt}}\dfrac{4x}{2x}=2$

11. $\int_0^{\pi/2}\sin\ 2x = -\dfrac{\cos 2x}{2}\Big]_0^{\frac{\pi}{2}} = -\dfrac{1}{2}\left[\cos x-\cos 0\right]=\dfrac{-1}{2}\left[-1-1\right]=1$

IV. Answer the following questions : **5 × 1 = 5**

12. Negate : $\sim p \to q$

Solution : $\sim(\sim p \to q) = \sim p \wedge \sim q$

$\left(\because \sim\left(a\to b\right)=a\wedge \sim b\right)$

13. If a : b = 2 : 3, b : c = 5 : 7 and c : d = 3 : then find a : d.

Solution : $\dfrac{a}{d}=\dfrac{a}{b}\times\dfrac{b}{c}\times\dfrac{c}{d}\Rightarrow\dfrac{a}{d}=\dfrac{2}{3}\times\dfrac{5}{7}\times\dfrac{3}{1}=\dfrac{10}{7}$

a : d = 10 : 7

14. If tan A = $\frac{1}{\sqrt{3}}$ the find tan 2A.

Solution : tan A = $y\sqrt{3} \Rightarrow$ A = 300

tan 2A = tan60^o = $\sqrt{3}$

15. Differentiate $3x^2 + 4y^2 = 10$ w.r.t.x.

Solution : $3x^2 + 4y^2 = 10$

Diff w.r.t.'x'

$$6x + 8y\,.\,\frac{dy}{dx} = 10 \Rightarrow \Rightarrow 8y\frac{dy}{dx} = -6x \Rightarrow \frac{dy}{dx} = \frac{-6x}{8y} = \frac{-3x}{4y}$$

16. Evaluate $\int\left(x^2 - \frac{6}{x} + 5e^x\right)dx$

Solution : $\int\left(x^2 - \frac{6}{x} + 5e^x\right)dx = \frac{x^3}{3} - 6\log x + 5e^x + c$

PART – B

V)Answer any SIX questions

17. **In how many ways can the letters of the word "HOPPER" be arranged ?**

Solution : HOPPER

n = 6 p = 2

No. of ways = $\frac{6!}{2!} = \frac{720}{2} = 360$

18. **Find the number of parallelograms that can be formed from the set of 6 parallel lines intersecting another set of 4 parallel lines.**

Solution : m = 6 n = 4

Name of parallelograms = ${}^mC_2 \times {}^nC_2 = {}^6C_2 \times {}^4C_2 = \frac{6\times 5}{2\times 1}\times\frac{4\times 3}{2\times 1} = 15\times 6 = 90$

19. **Two coins are tossed simultaneously. What is the probability of getting**

a) Atleast one tail **b) Atmost one tail**

Solution : S = {HH, HT, TH, TT}

a) p(atleast one tail) = $\frac{3}{4}$

b) P(atymost one tail) = $\frac{3}{4}$

20. **Divide Rs. 6,000 in the ratio 3 : 4 : 5.**

Solution : given ratio 3 : 4 : 5

Let the parts are 3x, 4x, 5x.

Given, $3x + 4x + 5x = 6,000$

$12x = 6000 \Rightarrow x = 500$

1^{st} part = $3 \times 500 = 1500$

2^{nd} part = $4 \times 500 = 2000$

3^{rd} part = $5 \times 500 = 2500$

21. **500 workers can finish a work in 8 days. How many workers will finish the same work in 5 days ?**

Solution :

Workers	Days
500 $\uparrow$	8 $\downarrow$
X	5

Workers and days are in inverse proportion

$\therefore \frac{500}{x} = \frac{5}{8}$

$5x = 500 \times 8$

$x = 800$ $\therefore$ No. of workers = 800

22. **For Rs. 512.50 due 6 months at 15% p.a. Find the true present value and discounted value of the bill.**

Solution :

F = Rs. 512.50

t = 6 months = 0.5 years

r = 0.15%

Present value P = $\frac{F}{1+tr} = \frac{512.50}{1+0.075}$ = Rs.476.74

DV = F(1 – tr)

DV = 512.50 (1–0.075) = Rs. 474.06

23. **Find the equation of the parabola given that its focus is (–4, 0) and directrix is x = 4.**

Solution : Focus =(– 4, 0) $\Rightarrow$ a = 4

Equation is $y^2 = -4ax \Rightarrow y^2 = -16x$

24. **Find the axis and length of the latus rectum of the parabola $x^2 = 16$ y.**

Solution : $x^2 = 16y$

4a = 16 ; a = 4

Axis = y – axis

LLR = 4a = 4 × 4 = 16 units

25. $\int \frac{4x+3}{2x^2+3x+5}\,dx$

Solution : $\int \frac{4x+3}{2x^2+3x+5}\,dx$

$f(x) = 2x^2 + 3x + 5$

$f'(x) = 4x + 3$

$\int \frac{f'(x)}{f(x)}\,dx = \log(f(x)) + c$

$= \log(2x^2 + 2x + 5) + c$

26. **Evaluate** $\int_0^3 \left(\frac{x+3}{x+2}\right)dx.$

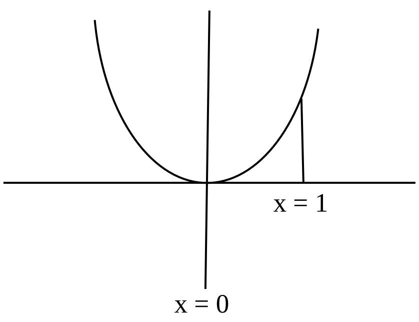
Solution : $\int_0^3 \frac{x+3}{x+2}\,dx = \int_0^3 \frac{x+2+1}{x+2}\,dx \Rightarrow \int_0^3 \left(1+\frac{1}{x+2}\right)dx$

$= x + \log(x+2)\big]_0^3 = 3 + \log 5 - (0 + \log 2)$

$= 3 + \log 5 - \log 2$

27. **Find the area enclosed by the curve $y = x^2$. x – axis and the ordinates x = 0 and x = 1.**

Solution :



$y = x^2$, x = 0, x = 1

$A = \int_0^1 y\,dx \Rightarrow A = \int_0^1 x^2\,dx$

$\Rightarrow \frac{x^3}{3}\Big]_0^1 \Rightarrow A = \frac{1}{3}$

PART – C

VI. Answer any FIVE of the following questions : 5 ×3 = 15

28. **Solve :**

3x + 2y = 8 and 4x – 3y = 5 by Cramer's rule.

Solution :

$3x + 2y = 8$

$4x - 3y = 5$

$$A = \begin{vmatrix} 3 & 2 \\ 4 & -3 \end{vmatrix} = -17$$

$$\Delta x = \begin{vmatrix} 8 & 2 \\ 5 & -3 \end{vmatrix} = -34$$

$$\Delta y = \begin{vmatrix} 3 & 8 \\ 4 & 5 \end{vmatrix} = -17$$

$$x = \frac{\Delta x}{\Delta} = \frac{-34}{-17} = 2$$

$$y = \frac{\Delta y}{\Delta} = \frac{-17}{-17} = 1$$

29. **The difference between BD and TD on a certain sum of money due in 6 months is Rs. 27. Find the amount of the bill if the rate of interest is 6% p.a.**

Solution : BD – TD = 27

BG = 27

t = 6 months = 0.05 years

r = 0.06

BG = TD . tr

27 = TD . 0.5 × 0.06

TD = 900

BD – 900 = 27

BD = 927

$$F = \frac{BD \times TD}{BG} = \frac{927 \times 900}{27} \Rightarrow F = Rs.30,900$$

30. **A person invests Rs. 15,000 partly in 3% stock at 75 and partly in 6% stock at 125. If the income from both is Rs. 675. Find his investment in 2 types of stocks.**

Solution : Money invested in 3% stock = x

Money invested in 6% stock = 15,000 – x

Income $I_1 = \dfrac{x \times 3}{75} = 0.04x$

Income $I_2 = \dfrac{(15,000 - x) \times 6}{125}$

$I_2 = 720 - 0.048x$

$I_1 + I_2 = 675$

$0.04x + 720 - 0.048x = 675$

$0.008x = 45$

x = Rs. 5625

$\therefore$ Money invested in 3% stock = Rs. 5625

Money invested in 6% stock = 1500 – 5625 = Rs. 9375

31. **The price of a T.V. set inclusive of sales tax of 9% is Rs. 13,407. Find its marked price. If the sales tax is increased to 13%, how much more does the customer pay for the T.V. ?**

Solution : SP of T.V. = Rs. 13,407

SP = MP + ST% MP

$13,407 = x + \dfrac{9}{100} x$

13,407 = 1.09x

MP = Rs. 12,300

If sales tax is 13%

Then SP = MP + ST% MP

$SP = 12,300 + \dfrac{13}{100}(12,300)$

SP = **Rs. 13,899/-**

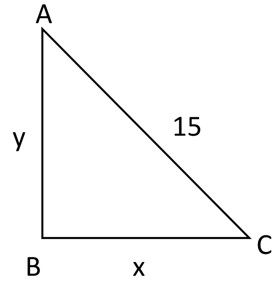
32. **Find $\dfrac{dy}{dx}$, given that $x = a\cos^4\theta$, $y = a\sin^4\theta$.**

Solution : $a\cos^4\theta$ $\qquad$ $y = a\sin^4\theta$

$$\frac{dx}{d\theta} = -4a\cos^3\theta \cdot \sin\theta \qquad \frac{dy}{d\theta} = 4a\sin^3\theta\cos\theta$$

$$\frac{dy}{d\theta} = \frac{4a\sin^3\theta\cos\theta}{-4a\cos^3\theta\sin\theta} = \frac{-\sin^2\theta}{\cos^2\theta} = -\tan^2\theta$$

33. **A ladder of 15 feet long leans against a smooth vertical wall. If the top slides downwards at the rate of 2 ft/sec. Find how fast the lower end is moving when the lower end is 12fet away from the wall.**



Solution : $\frac{dy}{dt} = -2\text{ft}/\sec \quad \frac{dx}{dt} = ? \quad x = 12$

$x^2 + y^2 = 15^2$

$y^2 = 15^2 - 12^2$

$y = 9$

$x^2 + y^2 = 15$

$2x\frac{dx}{dt} + 2y.\frac{dy}{dt} = 0 \Rightarrow 2 \times 12 \times \frac{dx}{dt} + 2 \times 9 \times (-2) = 0$

$\frac{dx}{dt} = \frac{+36}{24} = \frac{3}{2}\text{ft}/\sec$

34. **Evaluate** $\int \frac{x+2}{(2x-1)(x-3)}dx.$

Solution : $\int \frac{x+2}{(2x-1)(x-3)}dx = \int \frac{A}{(2x-1)} + \frac{B}{(x-3)}dx$

$x + 2 = A(x - 3) + B(2x - 1)$

$x = 3, B = 1$

$x = \frac{1}{2}, A = -1$

$\therefore \int \frac{x+2}{(2x-1)\,(x-2)} = \int \frac{x+2}{(25-1)(x-2)} = \int \frac{-1}{2x-1} + \frac{1}{x-3}dx$

$= -\frac{\log(2x-1)}{2} + \log(x-3) + c$

PART – D

VII. Answer any five questions : **5 × 5 = 25**

35. **Solve the linear equations by matrix method.**

x + y – z = 1

$3x + y - 2z = 3$

$x - y - z = -1$

Solution :

$x + y - z = 1$

$3x + y - 2z = 3$

$x - y - z = -1$

$Ax = B \Rightarrow X = A^{-1}B$

Where $A = \begin{bmatrix} 1 & 1 & -1 \\ 3 & 1 & -2 \\ 1 & -1 & -1 \end{bmatrix}$, $x = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$, $B = \begin{bmatrix} 1 \\ 3 \\ -1 \end{bmatrix}$

$$|A| = \begin{vmatrix} 1 & 1 & -1 \\ 3 & 1 & -2 \\ 1 & -1 & -1 \end{vmatrix} = 2 \neq 0$$

$\Rightarrow C_{11} = -3, C_{12} = 1, C_{13} = 4, C_{21} = 2, C_{22} = 0, C_{23} = 2, C_{31} = 1, C_{32} = 1, C_{33} = 2$

$$C = \begin{bmatrix} -3 & 1 & -4 \\ 2 & 0 & 2 \\ -1 & -1 & -2 \end{bmatrix}$$

$$\text{Adj}(A) = \begin{bmatrix} -3 & 2 & -1 \\ 1 & 0 & -1 \\ -4 & 2 & -2 \end{bmatrix}$$

$$x = \frac{1}{2}\begin{bmatrix} -3 & 2 & -1 \\ 1 & 0 & -1 \\ -4 & 2 & -2 \end{bmatrix}\begin{bmatrix} 1 \\ 3 \\ -1 \end{bmatrix}$$

$x = 2, y = 1, z = 2.$

36. **Find the coefficient x^8 in $\left(3x^2 - \frac{1}{2x}\right)^{10}$.**

Solution : Given $\left(3x^2 - \frac{1}{24}\right)^{10}$

$T_{r+1} = {}^nC_r\, x^{4-r}\, a^r$

$T_{r+1} = {}^{10}C_r\, (3x^2)^{10-r} \left(\frac{1}{2x}\right)^r$

$T_{r+1} = {}^{10}C_r\, (3)^{10-r} \left(\frac{1}{2}\right)^r\ (x)^{2(10-r)-r}$

Take $2(10-r)-r=8$

$20 - 3r = 8 \Rightarrow 3r = 12 \Rightarrow r = 4$

Co-eff of x^8 is $= {}^{10}C_4\, (3)^{10-4} \left(\frac{1}{2}\right)^4 = {}^{10}C_4\, (3)^6 \left(\frac{1}{2}\right)^4$

37. **Resolve $\frac{2x^2+10x-3}{(x+1)(x-3)(x+3)}$ into partial fractions.**

Solution : Given $\frac{2x^2+10x-3}{(x+1)(x-3)(x+3)}$

$$\frac{2x^2+10x-3}{(x+1)(x-3)(x+3)} = \frac{A}{(x+1)} + \frac{B}{(x-3)} + \frac{C}{(x+3)}$$

$2x^2 + 10x - 3 = A(x - 3)(x + 3) + B(x + 1)(x + 3) + C(x + 1)$

Put $x = 3$, $2(3)^2 + 10(3) - 3 = B(4)(6)$

$18 + 30 - 3 = 24B$

$\boxed{\frac{45}{24} = B}$

Put $x = -3$, $18 - 30 - 3 = C(-2)(-6)$

$\frac{15}{12} = C \Rightarrow C = \frac{-15}{12}$

Put $x = -1$, $2 - 10 - 3 = A(-8)$

$$\frac{-11}{-8} = A \Rightarrow A = \frac{11}{8}$$

$$\frac{2x2+10x-3}{(x+1)(x-3)(x+3)} = \frac{\frac{11}{8}}{(x+1)} + \frac{\frac{45}{24}}{(x-3)} + \frac{\frac{-15}{12}}{x+3}$$

38. **Show that ~ (p ∨ q) → (~ p ∧ –q) is a Tautology.**

Solution :

			(a)			(b)	a→b
p	**q**	**p∨q**	**~(p∨q)**	**~p**	**~q**	**~p∩~q**	**T**
T	T	T	F	F	F	F	T
T	F	T	F	F	T	F	T
F	T	T	F	T	F	F	T
F	F	F	T	T	T	T	T

∴ Given proposition is a tautology.

39. **ABC company required 1000 hours to produce 1st 30 engines. If the learning effect is 90%. Find the total labour cost at Rs. 20/ hour to produce a total of 120 engines.**

Solution : 1 lot = 30 engine

120 engine = 4 logs

Unit produced	Total output time per unit	Cumulative average time per unit	Total labours
1	1	1000	1000
1	2	90% of 1000 = 900	1800
2	4	90% of 900 = 810	3240

Total hours = 3240

Total labour cost = 20 × 3240 = Rs. 64,800/-

40. **Solve the following LPP graphically**

Mmaximize : Z = 5x + 3y

Subject to the constraints :

3x + 5y ≤ 15,

5x + 2y ≤ 10,

x ≥ 0,

y ≥ 0.

Solution : max Z = 5x + 3y

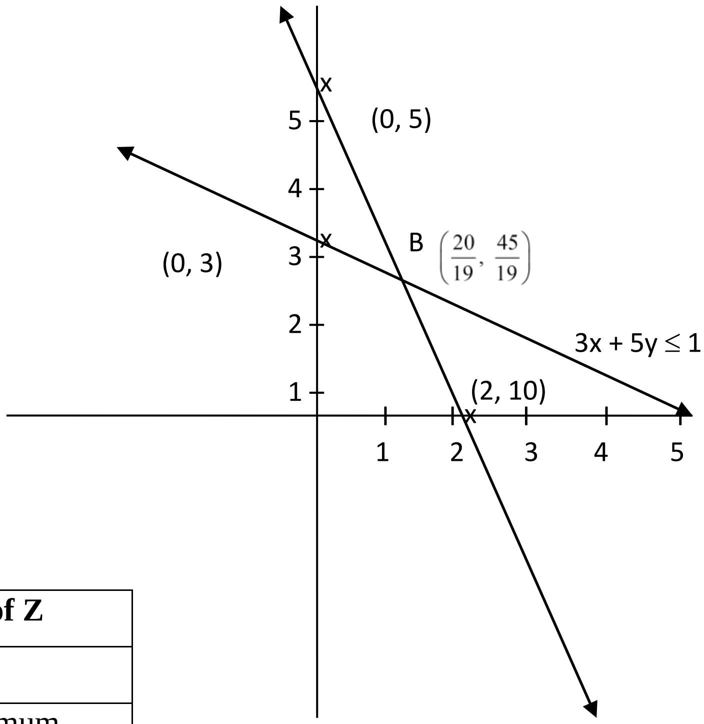
3x + 5y = 15

Put

x	0	5
y	3	0

5x + 2y = 10

x	0	2
y	5	0



We set 3x + 5y = 15

5x + 2y = 10

Corner points	Value of Z
(0, 3)	9
$\left(\frac{20}{19}, \frac{45}{19}\right)$	12.36 – maximum
(2, 0)	10

Hence $Z = \frac{235}{19}$ is maximum at $\left(\frac{20}{19}, \frac{45}{19}\right)$

41. **Prove that :** $\frac{\sin 6A + \sin 2A + 2\sin 4A}{\sin 7A + \sin 3A + 2\sin 5A} = \frac{\sin 4A}{\sin 5A}$.

Solution : $\frac{\sin 6A + \sin 2A + 2\sin 4A}{\sin 7A + \sin 3A + 2\sin 5A} = \frac{2\sin\left(\frac{8A}{2}\right).\cos\left(\frac{4A}{2}\right) + 2\sin 4A}{2\sin\left(\frac{10A}{2}\right).\cos\left(\frac{4A}{2}\right) + 2\sin 5A}$

$$= \frac{2\sin 4A\ \cos 2A + 2\sin 4A}{2\sin 5A \cos 2A + 2\sin 50} = \frac{2\sin 4A(\cos 2A + 1)}{2\sin 5A(\cos 2A + 1)} = \frac{\sin 4A}{\sin 5A}$$

42.**Find the equation of the circle passing through the points (1,-4) ,(5,2) and having its centre on the line x-2y+9=0 .**

Solution : General equation of the circle is $x^2+y^2+2gx+2fy+c=0$

$(1,-4)\rightarrow 2g-8f+c=-17$……………..(1)

$(5,2)\rightarrow 10g+4f+c=-29$…………….(2)

Centre (-g,-f) on x-2y+9=0 → $-g+2f=-9$ … …. . (3)

Solving (1)and(2), -2g -3f=3 ……(4)

Solving (3) and (4) f=-3 ,g=3 and c=-47

Then the equation of circle is $x^2+y^2+6x-6y-47=0$

43.**Evaluate** $\lim\limits_{x\to 2}\left(\dfrac{x^2-4}{\sqrt{x+2}-\sqrt{3x-2}}\right)$

Solution: $\lim\limits_{x\to 2}\left(\dfrac{x^2-4}{\sqrt{x+2}-\sqrt{3x-2}}\right)\times\lim\limits_{x\to 2}\left(\dfrac{\sqrt{x+2}+\sqrt{3x-2}}{\sqrt{x+2}+\sqrt{3x-2}}\right)$

$$=\lim_{x\to 2}\left(\frac{(x+2)(x-2)}{\sqrt{x+2}-\sqrt{3x-2}}\right)\times\lim_{x\to 2}\left(\frac{\sqrt{x+2}+\sqrt{3x-2}}{\sqrt{x+2}+\sqrt{3x-2}}\right)$$

$$=\lim_{x\to 2}\left(\frac{(x+2)(x-2)}{(x+2)-(3x-2)}\right)\times\lim_{x\to 2}\left(\sqrt{x+2}+\sqrt{3x-2}\right)$$

$$=\lim_{x\to 2}\left(\frac{(x+2)(x-2)}{-(x-2)}\right)\times\lim_{x\to 2}\left(\sqrt{x+2}+\sqrt{3x-2}\right)$$

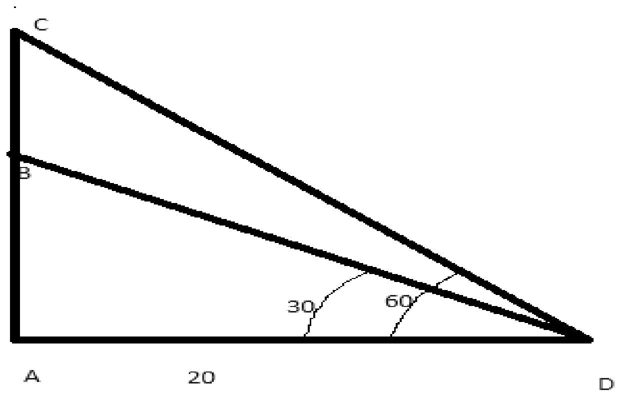
$$=\left(\frac{(2+2)(2+2)}{-2}\right)=-8$$

PART-E

VIII. Answer any TWO of the following questions :

44) A flag staff stands upon the top of a building at a distance of 20mts .The angles of elevation of the top of the flag staff and the building are 60° and 30° respectively .Find the height of the flag staff .

Solution:



Let the height of the flag staff BC=h

From triangle BAD, tan30°=— then AB=$\frac{}{\sqrt{}}$

From triangle CAD , tan60°=—— then h+AB=$20\sqrt{3}$ h=$\frac{}{\sqrt{3}}$=$\frac{40\sqrt{3}}{}$m

45)If y=acos(logx)+bsin(logx) .Show that $x^2y_2+xy_1+y=0$

Solution: y=acos(logx)+bsin(logx)

Differentiating w.r.t x,

y_1=—— ——

xy_1=-asin(logx)+bcos(logx)

Again differentiating w.r.t x,

xy_2+y_1=—— ——

$x^2y_2+xy_1+y=0$

46) **The total revenue function is given by R=400x-2x^2 and the total cost function is given by C=2x^2+40x+4000.Find**

a)The marginal revenue and marginal cost function

b)the output at which marginal revenue =marginal cost

Solution: Marginal revenue =—

Marginal cost=—

Output when MR=MC, i.e, 400-4x=4x+40

8x=360

X=45 units

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