

Assignment - I

Q.1. Write minors and co-factors of each element of the following determinants and also evaluate the determinant. (10)

(9.)

$$\begin{vmatrix} 4 & 2 & 1 & 6 \\ 2 & 8 & 7 & 4 \\ 1 & 4 & 3 & 2 \end{vmatrix}$$

$$\Rightarrow 4(2) - 0(1) + 6(-14) = 8 - 0 - 84 = -76$$

(6.)

$$\begin{vmatrix} 5 & 0 & 7 \\ 8 & -6 & -4 \\ 2 & 3 & 9 \end{vmatrix}$$

$$\Rightarrow$$

$$5(-42) - 0(80) + 7(13) = -210 + 252 = 42$$

Ans. 1. (9.)

$M_{11} = 14 - 12 = 2$	$M_{12} = 28 \times 2 - 14 \times 4 = 56 - 56 = 0$
$M_{13} = 84 - 98 = -14$	$M_{21} = 2 - 18 = -16$
$M_{22} = 84 - 84 = 0$	$M_{23} = 126 - 184 = -58$

$$m_{31} = 4 - 42 = -38$$

$$m_{32} = 168 - 168 = 0 \quad (3)$$

$$m_{33} = 294 - 28 = 266$$

$$c_{11} = 9,$$

$$c_{12} = 0,$$

$$c_{13} = 14$$

$$c_{21} = 16,$$

$$c_{22} = 0,$$

$$c_{23} = -42$$

$$c_{31} = -38,$$

$$c_{32} = 0,$$

$$c_{33} = 266$$

(6.)

5 0 7

$$\begin{array}{r|rrr} & 5 & 0 & 7 \\ \hline 8 & 0 & -6 & -4 \\ 1 & - & 2 & 8 \end{array}$$

$$\begin{array}{r|rrr} & 2 & 3 & 9 \\ \hline 1 & 0 & 5 & 6 \end{array}$$

$$m_{11} = -54 + 12 = -42$$

$$c_{11} = 32$$

$$m_{12} = 72 + 8 = 80$$

$$c_{12} = -80$$

$$m_{13} = 24 + 12 = 36$$

$$c_{13} = 36$$

$$m_{21} = 0 + 21 = -21$$

$$c_{21} = 21$$

$$m_{22} = 45 - 14 = 31$$

$$c_{22} = 31$$

$$m_{23} = 15 - 0 = 15$$

$$c_{23} = -15$$

$$m_{31} = 0 + 42 = 42$$

$$c_{31} = 42$$

$$m_{32} = -20 + 56 = 36$$

$$c_{32} = +36$$

$$m_{33} = -30 + 0 = -30$$

$$c_{33} = -30$$

Q.2: Using Cramer's rule solve the system of equations:-

$$x + y + z = 1$$

$$3x + 5y + 6z = 4$$

$$9x + 2y - 36z = 17$$

Ans:

$$D = \begin{vmatrix} 1 & 1 & 1 \\ 3 & 5 & 6 \\ 9 & 2 & -36 \end{vmatrix}$$

$$D = -69$$

$$D_1 = \begin{vmatrix} 0 & 1 & 1 \\ 1 & 0 & 6 \\ 4 & 5 & 6 \\ 17 & 2 & -36 \end{vmatrix}$$

$$D_1 = -23$$

$$D_2 = \begin{vmatrix} 1 & 1 & 1 \\ 3 & 4 & 6 \\ 9 & 17 & -36 \end{vmatrix}$$

$$D_2 = -69$$

$$D_3 = \begin{vmatrix} 1 & 2 & 3 \\ 3 & 5 & 4 \\ 9 & 2 & 17 \end{vmatrix} = D_3 = 93$$

$$x = \frac{D_1}{D} = \frac{-23}{-69} = \frac{1}{3}$$

$$y = \frac{D_2}{D} = \frac{+69}{-69} = 1$$

$$z = \frac{D_3}{D} = \frac{23}{-69} = -\frac{1}{3}$$

Q3

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

$$B = \begin{vmatrix} 3 & -1 & 1 \\ 0 & 0 & 2 \\ 4 & -3 & 2 \end{vmatrix}$$

Prove that :-

$$(A+B)^2 = A^2 + AB + BA + B^2$$

Ans.

$$\left(\begin{array}{ccc|c} 1 & 2 & -1 & \\ 2 & 0 & 3 & \\ 0 & 1 & 2 & \end{array} \right) + \left(\begin{array}{ccc|c} 3 & -1 & 1 & \\ 0 & 0 & 2 & \\ 4 & 3 & 2 & \end{array} \right) = \left(\begin{array}{ccc|c} 1 & 2 & -1 & \\ 2 & 0 & 3 & \\ 0 & 1 & 2 & \end{array} \right)$$

$$\left(\begin{array}{ccc|c} 1 & 2 & -1 & \\ 2 & 0 & 3 & \\ 0 & 1 & 2 & \end{array} \right) + \left(\begin{array}{ccc|c} 1 & 2 & -1 & \\ 2 & 0 & 3 & \\ 0 & 1 & 2 & \end{array} \right) \times \left(\begin{array}{ccc|c} 3 & -1 & 1 & \\ 0 & 0 & 2 & \\ 4 & 3 & 2 & \end{array} \right) +$$

$$\left(\begin{array}{ccc|c} 3 & -1 & 1 & \\ 0 & 0 & 2 & \\ 4 & -3 & 2 & \end{array} \right) \times \left(\begin{array}{ccc|c} 3 & -1 & 1 & \\ 0 & 0 & 2 & \\ 4 & -3 & 2 & \end{array} \right) + \left(\begin{array}{ccc|c} 3 & -1 & 1 & \\ 0 & 0 & 2 & \\ 4 & -3 & 2 & \end{array} \right) \times$$

$$\begin{aligned} 1 &= 1 - 6 = -5 \\ 2 &= 2 - 1 = 1 \\ 3 &= 2 - 6 = -4 \\ 4 &= 6 - 1 = 5 \end{aligned}$$

$$2. L.H.S. = \left(\begin{array}{ccc|c} 4 & 1 & 0 & \\ 2 & 0 & 5 & \\ 4 & 4 & 4 & \end{array} \right) \times \left(\begin{array}{ccc|c} 4 & 1 & 0 & \\ 2 & 0 & 5 & \\ 4 & 5 & 4 & \end{array} \right)$$

$$\Rightarrow \left(\begin{array}{ccc|c} 16+2+0 & 4+0+0 & 0+5+0 & \\ 8+0+20 & 2+0+25 & 0+20+20 & \\ 16+8+16 & 4+0+20 & 0+20+16 & \end{array} \right)$$

$$\left(\begin{array}{ccc|c} 18 & 4 & 5 & \\ 28 & 27 & 20 & \\ 40 & 24 & 36 & \end{array} \right) = \left(\begin{array}{ccc|c} 18 & 4 & 5 & \\ 28 & 27 & 20 & \\ 40 & 24 & 36 & \end{array} \right)$$

Q.4 Find the adjoint of the matrix:

$$A = \begin{bmatrix} 1 & 2 & 5 & 1 \\ 3 & 1 & 4 & 6 \\ 1 & 1 & 2 & 0 \end{bmatrix}$$

Ans.

$$\begin{bmatrix} 0 & 1 & 2 & 5 \\ 3 & 1 & 0 & 4 \\ 1 & 1 & 2 & 0 \end{bmatrix}$$

$$\begin{array}{l}
 C_{11} = -2 \quad m_{11} = 2 - 4 = -2 \\
 C_{12} = -2 \quad m_{12} = 6 - 4 = 2 \\
 C_{13} = 2 \quad m_{13} = 3 - 1 = 2 \\
 C_{21} = +1 \quad m_{21} = 4 - 5 = -1 \\
 C_{22} = -3 \quad m_{22} = 2 - 5 = -3 \\
 C_{23} = +1 \quad m_{23} = 1 - 2 = -1 \\
 C_{31} = 3 \quad m_{31} = 8 - 5 = 3 \\
 C_{32} = 11 \quad m_{32} = 4 - 5 = -1 \\
 C_{33} = -5 \quad m_{33} = 1 - 6 = -5
 \end{array}$$

Q.5

$$\begin{bmatrix} -2 & 1 & 2 \\ 1 & 8 & -3 \\ 3 & 1 & 11 \end{bmatrix}^T = \begin{bmatrix} -2 & 1 & 3 \\ -2 & -3 & 11 \\ 2 & 1 & -5 \end{bmatrix}$$

Q.5. Find the inverse of the matrix.

$$A = \begin{vmatrix} 2 & 5 & 3 \\ 3 & 1 & 2 \\ 1 & 2 & 1 \end{vmatrix}$$

Ans.

$$A = \begin{vmatrix} 2 & 5 & 3 \\ 3 & 1 & 2 \\ 1 & 2 & 1 \end{vmatrix}$$

$$|A| = 4$$

$$C_{11} = -3$$

$$C_{21} = 1$$

$$C_{31} = 7$$

$$C_{12} = -1$$

$$C_{22} = -1$$

$$C_{32} = 5$$

$$C_{13} = 5$$

$$C_{23} = 1$$

$$C_{33} = -13$$

$$A^{-1} = \frac{1}{4} \text{adj} \cdot A$$

$$\text{adj} \cdot A = \begin{vmatrix} -3 & 1 & 2 \\ -1 & -1 & 0 \\ 5 & 1 & -13 \end{vmatrix}$$

$$A^{-1} = \begin{bmatrix} -\frac{3}{4} & \frac{1}{4} & \frac{7}{4} \\ -\frac{1}{4} & -\frac{1}{4} & \frac{5}{4} \\ \frac{5}{4} & \frac{7}{4} & -\frac{13}{4} \end{bmatrix} = \frac{1}{4} \begin{bmatrix} -3 & 1 & 7 \\ -1 & -1 & 5 \\ 5 & 1 & -13 \end{bmatrix}$$

Assignment-II

(Q.1) Find the H.C.F. of 108, 288 and 360.

Ans.

2	108	2	288	2	360
2	54	2	144	2	180
3	27	2	72	2	90
3	9	2	36	3	45
3	3	2	18	3	15
	1	3	9	5	5
		3	3		1
		2	1		

= A

$$108 = \cancel{2} \times \cancel{2} \times 3 \times \cancel{3} \times \cancel{3}$$

$$288 = \cancel{2} \times \cancel{2} \times \cancel{2} \times \cancel{2} \times \cancel{2} \times 3 \times 3$$

$$360 = \cancel{2} \times \cancel{2} \times \cancel{2} \times (3 \times 3 \times 5)$$

$$\text{H.C.F.} = 2 \times 2 \times 3 \times 3 = 36$$

(Q.2) Find the H.C.F. of 513, 1134, 1915.

Ans.

3	513	3	1134	2	1134
3	171	3	378	3	567
3	57	3	126	3	189
19	19	3	16	3	63
	1	1	1	3	21
				7	7
					1

5	1015	3	1215
7	903	3	905
29	29	3	135
	1	3	45
		3	15
		5	5
		1	

$$513 = 3 \times 3 \times 3 \times 19$$

$$1134 = 2 \times 3 \times 3 \times 3 \times 3 \times 7$$

$$1215 = 3 \times 3 \times 3 \times 3 \times 3 \times 5$$

$$\therefore \text{H.C.F.} = 3 \times 3 \times 3 = 27$$

Q.3. Find the LCM of 16, 24, 36 and 54.

Ans.

2	16, 24, 36, 54	1	1
2	8, 12, 18, 27	2	2
2	4, 6, 9, 27	1	1
2	2, 3, 9, 27	2	8
3	1, 3, 9, 27	= 2^4 \times 3^3	1
3	1, 1, 3, 9	= 16 \times 27 =	1
1	1, 1, 1, 3	+ 11 \times 2	1
1	1, 1, 1, 1	3 \times 9 \times	1
1	1, 1, 1, 1	43 \times 9	1
1	1, 1, 1, 1	1	1

$$2^4 \times 2^4 \times 3^3 \times 5 = 2016$$

Q.4. Two numbers are in the ratio of 15:11. If their HCF is 13, find the numbers.

$$\text{Ans.} \quad \text{one number} = 15 \times 13 = 195$$

$$\text{Two number} = 11 \times 13 = 143$$

Q.5. Find the greatest possible length which can be used to measure exactly the 4m. 95cm, 9m and 16m 65cm.

$$\text{Ans.} \quad 495 \text{ cm} + 900 \text{ cm} = 16.6 \text{ cm}$$

$$\begin{array}{r}
 3 | 495 & 2 | 900 \\
 3 | 165 & 9 | 450 \\
 5 | 55 & 3 | 225 \\
 11 | 11 & 3 | 75 \\
 1 | 1 & 5 | 25 \\
 & 5 | 25 \\
 & 5 | 25 \\
 & 1 | 1 & 5 | 25 \\
 & 1 | 1 & 5 | 25 \\
 \end{array}$$

$$\begin{array}{r}
 3 | 1665 & 5 | 185 \\
 5 | 555 & 1 | 185 \\
 1 | 185 & 1 | 185 \\
 37 | 37 & 1 | 37 \\
 \end{array}$$

$495 = (3 \times 3 \times 5 \times 11)$
 $900 = (2 \times 2 \times 3) \times 3 \times 5 \times 5$
 $1665 = (3 \times 3 \times 5 \times 37)$

$$\text{HCF} = 3 \times 3 \times 5 = 45$$

Q. 6. Shabha mathematics test had 75 problems i.e. 10 arithmetic, 30 Algebra and 35 geometry problems. Although she answered 70% of arithmetic, 40% of the algebra and 60% of the geometry problems correctly. She did not pass the test because she goes less than 60% of the problems right. How many more questions she would have needed to answer correctly to earn a 60% passing grade.

Ans.

$$\text{Total} = 10 + 30 + 35 = 75$$

$$\text{Algebra} = 30 \times 0.4 = 12$$

$$\text{Geometry} = 35$$

$$\text{Arithmetic} = 10$$

$$10 \times 0.7 = 7$$

$$\text{Arithmetic} = \frac{10 \times 0.7}{100} = 0.7$$

$$\text{Algebra} = \frac{30 \times 0.3}{100} = 0.9$$

$$\text{Geometry} = \frac{35 \times 0.3}{100} = 1.05$$

$$\text{Total question she attempt} = 40$$

$$\begin{array}{r} 15 \quad 3 \\ 75 \times 69 = 45 \\ \hline 100 \\ 2 \end{array}$$

$$45 - 40 = 5$$

Q.7. In an examination 80% of the students passed in English, 85% in mathematics, 75% in both English and mathematics.

~~Q.8.~~ If 40 students failed in both the subjects find the total no. of numbers of students.

Ans.

Let the total = x

$$80\% \text{ English} = \frac{80x}{100} = \frac{8x}{10}$$

or $\frac{8x}{10} = 8$ students

$$85\% \text{ math} = \frac{85x}{100} = \frac{17x}{20}$$

$$75\% \text{ both} = \frac{75x}{100} = \frac{3x}{4}$$

$$\frac{8x}{10} + \frac{17x}{20} - \frac{3x}{4} = \frac{9x}{10}$$

or $\frac{8x}{10} + \frac{17x}{20} - \frac{3x}{4} = \frac{9x}{10}$

1181

III - Normalized

$$\text{failed} = \frac{\alpha e + 9x}{10} = \frac{2e}{10} + 1.0$$

$$\frac{\alpha e}{10} = 40 \quad \text{or} \quad \alpha e = 400$$

$$\alpha e = 400$$

A single program will need 2500 bytes of memory.

Two programs will need 5000 bytes of memory.

Three programs will need 7500 bytes of memory.

$$= \text{ext} \times 96 + 2500 \quad 40 \cdot T \cdot 2$$

$$= 96 \times 96 + 2500 \quad 40 \cdot T \cdot 2$$

$$= 9216 + 2500 \quad 11404$$

$$= 11716 \quad 11404$$

$$11404 = 11716$$

$$11404 = 11716$$

Assignment - III

Q.1 Adam borrowed some money at the rate of 6% p.a. for the first two years, at the rate of 9% p.a. for next 3 years, at the rate of 14% p.a. for the ~~next~~ period beyond 5 years, if he pays a total interest of Rs. 11,400 at the end of nine years how much money did he borrow?

Let borrowed amount = x

Ans. S.T. of 2 years = $\frac{x \times 9 \times 6}{100} = \frac{12x}{100}$

S.T. of 3 years = $\frac{x \times 9 \times 3}{100} = \frac{27x}{100}$

S.T. of next 4 years = $\frac{x \times 4 \times 14}{100} = \frac{56x}{100}$

Total Interest = 11400 -

$$\frac{12x}{100} + \frac{27x}{100} + \frac{56x}{100} = 11400$$

$$95x = 1140000$$

$$x = \frac{1140000}{95} = 12000$$

Q.2. David invested certain amount in three different Schemes A, B, C at rate of interest 10% p.a., 12% p.a. and 15% p.a. If total interest accrued in one year is Rs. 3200/- and amount invested in Scheme C was 150% of the amount invested in A and 240% of the amount invested in Scheme B, what was the amount invested in Scheme B.

~~Amount invested in scheme A + amount invested in scheme B + amount invested in scheme C = 32000~~

$$\text{Ans. Let } x \text{ be the amount invested in Scheme A}$$

$$\text{In C} = z \text{ p.a. } 150\% \text{ of } x = 2.25x$$

$$\frac{x \times 10 \times 1}{100} + \frac{y \times 12 \times 1}{100} + \frac{z \times 15 \times 1}{100} = 3200$$

$$10x + 12y + 15z = 320000 - (1.)$$

$$z = \frac{240y}{100} = \frac{12y}{5} - (2.)$$

$$10x + 12y + 15 \left(\frac{12y}{5} \right) = 320000$$

$$10x + 12y + 36y = 320000$$

$$\frac{12y + 36y}{8} = \frac{320000}{2}$$

$$24y = 5x$$

$$24y - 15x = 0 - (2.)$$

$$x = \frac{24y}{15} = \frac{8y}{5}$$

from (1) and (2)

$$10x + 12y + 15z = 320000$$

$$10\left(\frac{8y}{5}\right) + 12y + 15\left(\frac{12y}{5}\right) = 320000$$

$$y = 5000$$

- (Q.3) The difference between the compound interest and the simple interest accrued on an amount of RS. 18000/- in 2 years was RS. 405. What is the rate of interest p.a.

Ans.

$$P = 18000$$

$$n = 2 \text{ years} = 1 \times 01 \times 2$$

$$(CI - SI) = 405$$

$$18000 \times R \times T = 821 + 141 + 96.01$$

$$P \left(1 + \frac{R}{100}\right)^n - P - \frac{P \times R \times T}{100} = 405$$

$$18000 \left(1 + \frac{R}{100}\right)^2 - 18000 - \frac{18000 \times R \times T}{100} = 405$$

$$18000 \left[\left(1 + \frac{R}{100}\right)^2 - 1 - \frac{R}{100} \right] = 405$$

$$\frac{18000}{10000} \left[\frac{(100+R)^2 - 10000 - 200R}{10000} \right] = 405$$

$$\frac{18000}{10000} \left[\frac{10000 + R^2 - 10000 - (200R + 200R)}{10000} \right] = 405$$

$$\left[\frac{R^2 - 400R}{10000} \right] = 405$$

$$\frac{18R^2}{10} = 405$$

$$18R^2 = 4050$$

$$R^2 = \frac{4050}{18} = 225$$

$$R = \sqrt{225} = 15\%$$

$$R^2 = 225$$

$$R = \sqrt{225} = 15\%$$

Q.4. The difference between compound interest and simple interest on a sum for 2 years at 10% per annum, when the interest is compounded annually is 15. if the interest were compounded Half-Yearly the difference between two interest would be.

$$15 = 0.1 \cdot S.P. \cdot \frac{1}{2}$$

$$0.1 \cdot S.P. = 30$$

Ans. $C.I - S.I = 16$

$$A - P - S.I = 16$$

$$P \left(1 + \frac{R}{100}\right)^n - P - \frac{PRT}{100} = 16$$

$$P \left[\left(1 + \frac{10}{100}\right)^2 - 1 - \frac{10 \times 2}{160}\right] = 16$$

$$P \left[\frac{121}{100} - 1 - \frac{1}{5} \right] = 16$$

$$\frac{121 - 100 - 20}{100} \div 16 = 9$$

$$P \left[\frac{121 - 100 - 20}{100} \right] \div 16 = 9$$

$$P \left[\frac{121 - 120}{100} \right] = 16$$

$$P = 1600$$

$$C.I - S.I = P \left(1 + \frac{R}{2}\right)^{2n} - P - \frac{PRT}{100}$$

$$1600 \left(1 + \frac{8}{20}\right)^4 - 1600 - \frac{1600 \times 10 \times 2}{100}$$

$$= 1600 \left(\frac{21 \times 21 \times 21 \times 21}{20 \times 20 \times 20 \times 20} \right) - 1600 - 320$$

$$= \frac{(21)^4 - 1600 - 320}{100}$$

$$= \frac{194481 - 1920}{100} = 24.81$$

Assignment - IV

Q.1 A grocer purchased 80 kg of sugar at ₹ 13.50 per kg and mixed it with 120 kg sugar at ₹ 16 per kg. At what rate should he sell the mixture to gain 16%?

$$\text{Ans. } 80 \text{ kg sugar} = 13.50 \text{ per kg}$$

$$120 \text{ kg sugar} = 16 \text{ per kg}$$

$$CP \text{ of } 200 \text{ kg sugar} = 80 \times 13.50 + 120 \times 16$$

$$= 1080 + 1920 = 3000$$

$$16\% \text{ gain} = 3000 \times 16 = 480$$

$$16\% \text{ gain} = \frac{3000 \times 16}{100} = 480$$

$$100\% \text{ profit} = 3000 + 480 = 3480$$

$$100\% \text{ profit} = 3480$$

$$\text{Rate} = \frac{3480}{200} = 17.40 \text{ per kg}$$

Q.2 When a producer allows 36% commission on the retail price of his product, he earns a profit of 80%. What would be his profit percent, if commission is reduced by 24%.

Ans. Let product price = 100
 $\text{commission} = \frac{100 \times 36}{100} = 36$

$$\text{S.P.} = 100 - 36 = 64$$

$$\text{C.P.} = \frac{100}{100 + 8.8} \times 64 = 58.82$$

$$\text{new commission} = 36 - 24 = 12$$

$$\text{new S.P.} = 100 - 12 = 88$$

$$\text{Profit \%} = \frac{\text{S.P.} - \text{C.P.}}{\text{C.P.}} \times 100$$

$$\text{Profit \%} = \frac{88 - 58.82}{58.82} \times 100$$

Q.3. A man bought a horse and a carriage for Rs. 3000. He sold the horse at a gain of 20% and carriage at a loss of 10%, thereby gaining 2% on the whole find the cost of the horse.

Ans. let the CP of horse = x

$$\text{carriage} = (3000 - x)$$

$$20\% \text{ of } x - 10\% \text{ of } (3000 - x) = 2\% \text{ of } 3000$$

$$\frac{20x}{100} - \frac{10(3000 - x)}{100} = \frac{3000 \times 2}{100}$$

$$20x - 30000 + 10x = 6000$$

$$30x - 30000 = 6000$$

$$30x = 36000$$

$$x = \frac{36000}{30}$$

$$x = 1200$$

Q.4. A and B working separately can do a piece of work in 9 and 12 days respectively. If they work for a day alternately, starting from A, in how many days, the work will be completed?

Ans. 1 day work of A = $\frac{1}{9}$ and $\frac{1}{12}$

$$B = \frac{1}{12}$$

$$(A+B) \text{ to } +91 \text{ work (2 day work)} = \frac{7}{36}$$

$$(A+B) 10 \text{ days work} = \frac{7 \times 5}{36} = \frac{35}{36}$$

$$\text{remaining work} = 1 - \frac{35}{36} = \frac{1}{36}$$

$$\frac{1}{36} < \frac{1}{9}$$

$$\therefore \frac{1}{36} \text{ work will be in } 9 \times \frac{1}{9} = \frac{1}{4}$$

$$\therefore \text{Total days} = 10 + \frac{1}{4} = 10\frac{1}{4}$$

Q.5. 2 men and 3 boys ----- + the work.

Ans: 1 men 1 day work = x

1 boy 1 day work = y

$$3 \times 2x + 3y = \frac{1}{10} - (1)$$

$$2 \times 3x + 4y = \frac{1}{8} - (2)$$

$$- \quad - \quad 8$$

$$0 + 5y = \frac{3}{10} - \frac{2}{8}$$

$$5y = \frac{2}{40}$$

$$y = \frac{1}{100}$$

$$3x + 2 \times \frac{1}{100} = \frac{1}{8}$$

$$x = \frac{7}{200}$$

$$\therefore 2x + y = ?$$

$$2 \times \frac{7}{200} + \frac{1}{100}$$

$$= \frac{2}{25} = 12\frac{1}{2} \text{ min.}$$

$$\frac{1}{25} + \frac{1}{8} = 12\frac{1}{2} \text{ min.}$$

Q.5) A can do a piece of work in 10 days to finish the work.

Ans. A's efficiency = $\frac{1}{80}$

10 day work = $\frac{1}{80} \times 10 = \frac{1}{8}$

Remaining work = $1 - \frac{1}{8} = \frac{7}{8}$

B complete remaining job in 42 days

Therefore B alone can complete work:

$$\frac{7}{8} = 42 \quad \text{or} \quad 1 = 48$$

$$\frac{7}{8} = 42$$

$$6 = \frac{42 \times 8}{7} = 48$$

B's efficiency = $\frac{1}{48}$

$$\text{Total} = \frac{1}{80} + \frac{1}{48} = \frac{1}{30}$$

30 days

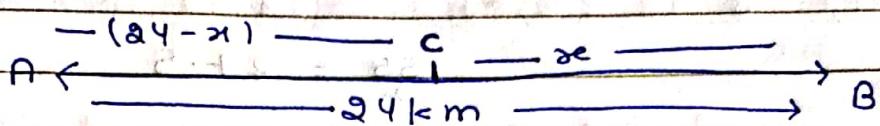
Q.1:

Ans.

Assignment - 5

Q.1: While covering a distance of ~~20 km~~ per second.

Ans:



$$\text{time} = 1 \text{ hr } 40 \text{ min} =$$

$$= 2 \times 60 + 40 = 3600 + 2400 = 6000 \text{ sec}$$

$$(24 - x) = \frac{24 - 5x}{7}$$

$$24 \times 7 - 7x = 5x$$

$$24 \times 7 = 112 \text{ km}$$

$$7x = 112 - 24 = 88 \text{ km}$$

$$AC = (24 - x)$$

$$AC = 24 - 14 = 10 \text{ km} = 10000 \text{ m}$$

$$D = S \times T$$

$$10000 = S \times 6000$$

$$\frac{10000}{6000} = \frac{S}{1 \text{ min}}$$

$$\frac{5}{3} \text{ m/sec} = \text{Speed}$$

Q.2. I walk a certain distance in 55 minutes to walk both ways.

Ans. 55 minute to walk both ways

$$55 = 27.5 \text{ min}$$

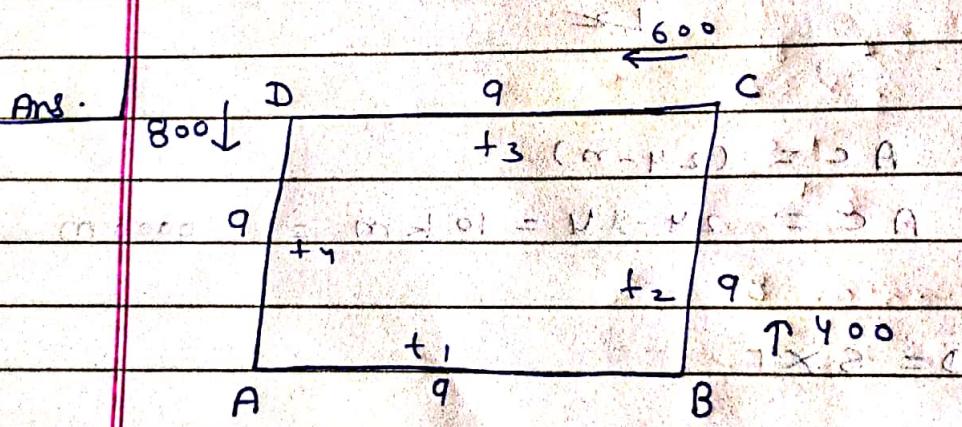
one way side = 37.5 minutes

$$37.5 - 27.5 = 10 \text{ minutes}$$

Both ways side = $10 \times 2 = 20 \text{ minutes}$

Q.3. An Aeroplane flies along

- the field -



Total distance = $400 \times 2 = 800$ km

Total time = $t_1 + t_2 + t_3 + t_4$

$t_3 + t_4 = 0.9 \text{ min.}$

$$\text{time} = \frac{\text{distance}}{\text{speed}}$$

$$\begin{array}{r}
 9 + 9 + 9 + 9 \\
 200 \quad 400 \quad 600 \quad 800 \\
 \hline
 161 + 129 + 89 + 69 \\
 \hline
 480
 \end{array}$$

$$T = \frac{50.9}{4800} \times 2.0$$

$$\text{avg. speed} = \frac{49}{50.9} = \frac{4800 \times 4}{50} = \frac{2^2 \times 4}{384}$$

384 km.

Q.4. Two pipes can fill a tank in 14 hrs. If one pipe is closed due to leakage it takes 16 hrs to fill the tank. Find the time taken by the leak to empty the tank.

Ans. Work done by the two pipes in 1 hr = $\frac{1}{14} + \frac{1}{16} = \frac{15}{112}$

Time taken = $\frac{112}{15}$ hrs = (7 hrs 28 min)

Due to leakage = 7 hrs 28 + 32 min = 8 hrs

Work done by two pipes with leakage =

~~(15/112) - (1/8)~~ $\frac{1}{8}$

Work done by the leak in 1 hr =

$$\frac{15}{112} - \frac{1}{8} = \frac{1}{112}$$

Leak will empty the cistern in 112 hrs.

Q.5. Two pipes A and B can fill ---
--- 18 minutes.

Ans. Let B is closed after x minute

x min \rightarrow (A+B) worked together

and B

(18-x) min \rightarrow A worked

$$x \left(\frac{1}{24} + \frac{1}{32} \right) + \frac{(18-x)}{24} = 1$$

$$\frac{x}{24} + \frac{x}{32} + \frac{18-x}{24} = 1$$

$$\frac{x}{32} = 1 - \frac{18}{24}$$

$$x = \frac{4 \times 2}{32 \times 6}$$

$$\times 3$$

$$x = 1.8 \text{ min.}$$

Q.6. A water tank in ---
--- tank completely.

Ans:-

In one minute:-

$$\text{Amount filled} = \frac{1}{10}$$

$$\text{Amount emptied} = \frac{1}{6}$$

Total amount retained one minute:

$$\frac{1}{10} - \frac{1}{6} = -\frac{1}{15}$$

That every 1 minute:-

$$\frac{1}{15} \text{ is removed}$$

→ if the tank is $\frac{2}{5}$ full, how long will it take to empty it.

In 1 minute $\frac{1}{15}$ is emptiedHow about $\frac{2}{5}$:

$$\frac{2}{5} \times \frac{15}{1} = 6 \text{ minutes.}$$