EXERCISE-20 (K. C. Nag, Arithmetic)

(From this exercise sum no. 17-40 will be in your syllabus)

17. In one day A can do $\frac{1}{18}$ part of the work
In one day B can do $\frac{1}{12}$ part of the work
For the last 3 days A has worked alone.
∴ In last 3 days A has done $\frac{3}{18} \times 1$ part or $\frac{1}{6}$ part
∴ A and B together have done $(1-\frac{1}{6})$ part or $\frac{5}{6}$ part of the work.

In one day A and B together can do
$(\frac{1}{18}+\frac{1}{12})$ part $= \frac{2+3}{36}$ part $= \frac{5}{36}$ part.

∴ To complete $\frac{5}{6}$ part they need $(\frac{5}{6} \div \frac{5}{36})$ days
$= \frac{\cancel{5}}{\cancel{6}} \times \frac{\cancel{36}^{6}}{\cancel{5}} = 6$ days.

∴ The number of days needed to complete the whole work is (6+3) days or 9 days.

19. In one day A and B can do $\frac{1}{10}$ part.
In one day B and C can do $\frac{1}{15}$ part
In one day A and C can do $\frac{1}{25}$ part

In one day $2 \times (A+B+C)$ can do $(\frac{1}{10}+\frac{1}{15}+\frac{1}{25})$ part
$= \frac{15+10+6}{150} = \frac{31}{150}$ part

∴ In one day A, B and C together can do $\left(\frac{31}{150} \div 2\right)$ part $= \frac{31}{150} \times \frac{1}{2} = \frac{31}{300}$ part.

∴ In 4 days A, B and C can do

$\frac{31}{300} \times 4 = \frac{31}{75}$ part of the work

In 1 day B and C can do $\frac{1}{15}$ part.

∴ In 5 days B and C can do $\frac{1}{15} \times 5 = \frac{1}{3}$ part

∴ After $(4+5)$ days or 9 days $\left\{1 - \left(\frac{31}{75} + \frac{1}{3}\right)\right\}$ part or $\left\{1 - \left(\frac{31+25}{75}\right)\right\}$ part or $\left(1 - \frac{56}{75}\right)$ part or $\frac{19}{75}$ part of the work is left.

In one day C can do $\left(\frac{31}{300} - \frac{1}{10}\right)$ part or $\frac{31-30}{300}$ part or $\frac{1}{300}$ part.

∴ The number of days needed by C to complete the work $= \left(\frac{19}{75} \div \frac{1}{300}\right) = \frac{19}{75} \times 300$ days $= 76$ days.

∴ In 76 days C will complete the work.

20. B has worked alone for last 10 days.
∴ A and B have worked together for (30-10) days or 20 days.
In 1 day A and B can do $\frac{1}{25}$ part.
∴ In 20 days A and B can do $\frac{4}{20} \times \frac{1}{25} = \frac{4}{5}$ part.
∴ In 10 days B has done $(1 - \frac{4}{5})$ part or $\frac{1}{5}$ part
∴ In one day B can do $(\frac{1}{5} \div 10)$ part $= \frac{1}{50}$ part
In 20 days B can do $20 \times \frac{1}{50} = \frac{2}{5}$ part.
∴ In 20 days A has done $(\frac{4}{5} - \frac{2}{5})$ part $= \frac{2}{5}$ part
∴ 1 day A can do $\frac{2}{5} \div 20 = \frac{1}{5} \times \frac{1}{20} = \frac{1}{50}$ part
Or $\frac{1}{50}$ part can be done by A is 1 day
1 part can be done by A is $1 \div \frac{1}{50}$ days
$= 1 \times 50 = 50$ days
∴ A alone can do the work in 50 days.

22. Let A can do the work in x days.
∴ B will be able to do it in 2x days, C in 3x days and D in 4x days.
If they work together, then in 1 day they can do $(\frac{1}{x} + \frac{1}{2x} + \frac{1}{3x} + \frac{1}{4x})$ part of the work.

$$\frac{1}{x} + \frac{1}{2x} + \frac{1}{3x} + \frac{1}{4x} = \frac{12+6+4+3}{12x} = \frac{25}{12x}$$

$\therefore \frac{25}{12x}$ part can be done together in 1 day

1 " " " " " " $1 \div \frac{25}{12x}$ days

$= \frac{12x}{25}$ days.

According to the question,

$$\frac{12x}{25} = 8$$

or $12x = 8 \times 25$

or $x = \frac{8 \times 25}{12} = \frac{50}{3}$

C can do the work in $3x$ days.

$\therefore$ The number of days required $= \frac{50}{3} \times 3 = 50$.

24. In one hour the supply pipe can fill up $\frac{1}{12}$ part of the cistern.

In one hour the other pipe can empty $\frac{1}{18}$ part of the cistern.

If both pipes remain opened, then in one hour $\left(\frac{1}{12} - \frac{1}{18}\right)$ part or $\frac{3-2}{36}$ part or $\frac{1}{36}$ part of the cistern can be filled.

$\therefore \frac{1}{36}$ part can be filled in 1 hour

1 " " " " " $1 \div \frac{1}{36} = 36$ hours.

$\therefore$ The required time is 36 hours.

26. Pipe A was opened for 2 hours and pipe B was opened for 1 hour when pipe C was opened at 5 pm.

∴ At 5 pm $\{(2 \times \frac{1}{3}) + (1 + \frac{1}{4})\}$ part

or $(\frac{2}{3} + \frac{1}{4})$ part or $\frac{8+3}{12}$ part or $\frac{11}{12}$ part of the cistern was filled up.

If 3 pipes remain opened, then $\{1 - (\frac{1}{3} + \frac{1}{4})\}$ part or $(1 - \frac{4+3}{12})$ part or $(1 - \frac{7}{12})$ part or $\frac{5}{12}$ part can be emptyed in one hour.

∴ To empty $\frac{11}{12}$ part, time needed =

$(\frac{11}{12} \div \frac{5}{12})$ hours $= (\frac{11}{\cancel{12}} \times \frac{\cancel{12}}{5})$ hours

$= \frac{11}{5}$ hours or 2 hours and 12 minutes.

∴ The cistern will be empty at (5 pm + 2 hours 12 mins) or 7·12 pm.

28. In one minute the boy can fill $\frac{4}{3}$ litres and the girl can can fill $\frac{3}{4}$ litres of water.

∴ In 1 minute both of them can fill $(\frac{4}{3} + \frac{3}{4})$ litres or $\frac{16+9}{12}$ literes or $\frac{25}{12}$ litres of water.

∴ Time needed to fill the tank is $(100 \div \frac{25}{12})$ min or $\frac{4}{\cancel{100}} \times \frac{\cancel{12}}{25}$ mins = 48 minutes.