

## 18. PROBLEMS ON TRAINS

### IMPORTANT FACTS AND FORMULAE

1.  $a \text{ km/hr} = (a * \frac{5}{18}) \text{ m/s}$ .
2.  $a \text{ m/s} = (\frac{a * 18}{5}) \text{ km/hr}$ .
- 3 Time taken by a train of length  $l$  metres to pass a pole or a standing man or a signal post is equal to the time taken by the train to cover  $l$  metres.
4. Time taken by a train of length  $l$  metres to pass a stationary object of length  $b$  metres is the time taken by the train to cover  $(l + b)$  metres.
5. Suppose two trains or two bodies are moving in the same direction at  $u \text{ m/s}$  and  $v \text{ m/s}$ , where  $u > v$ , then their relative speed =  $(u - v) \text{ m/s}$ .
6. Suppose two trains or two bodies are moving in opposite directions at  $u \text{ m/s}$  and  $v \text{ m/s}$ , then their relative speed is  $= (u + v) \text{ m/s}$ .
7. If two trains of length  $a$  metres and  $b$  metres are moving in opposite directions at  $u \text{ m/s}$  and  $v \text{ m/s}$ , then time taken by the trains to cross each other =  $\frac{(a + b)}{(u + v)}$  sec.
8. If two trains of length  $a$  metres and  $b$  metres are moving in the same direction at  $u \text{ m/s}$  and  $v \text{ m/s}$ , then the time taken by the faster train to cross the slower train =  $\frac{(a + b)}{(u - v)}$  sec.
9. If two trains (or bodies) start at the same time from points A and B towards each other and after crossing they take  $a$  and  $b$  sec in reaching B and A respectively, then  
 $(A's \text{ speed}) : (B's \text{ speed}) = (b^{1/2} : a^{1/2})$ .