## S.5 LINEAR MOTION DISCUSION QUESTIONS, 2020

- 1. A car travelling at 50mls accelerates uniformly to 80mls in 10 seconds. Find the acceleration and distance it travelled in 10 seconds.
- 2. Car A travelling at 35ms<sup>-1</sup> along a straight horizontal road accelerates uniformly at 0.4ms<sup>-2</sup>. At the same time, another car B moving at 44ms<sup>-1</sup> and accelerating uniformly at 0.5ms<sup>-2</sup>, B is 200m behind A, find the time taken before car B overtakes car A.
- 3. A, B and C are three points which lie in that order on a straight road with **AB** = **95m** and **BC** =**80m**. A car is moving along the road with a constant acceleration in the direction ABC. The car reaches B from A 5 seconds later and C from B, 2 seconds later. Calculate the acceleration and initial speed of the car at A.
- 4. An overloaded tax travelling at a constant speed of 25ms<sup>-1</sup> passes a stationary traffic police car. Two seconds later, the police car sets off in pursuit of the taxi accelerating at 6ms<sup>-2</sup>. Calculate the distance covered by the police car before catching up with the tax.
- 5. A rally car increased speed from 108kmh<sup>-1</sup> to 72kmh<sup>-1</sup> in a distance of 0.05km, the acceleration being constant. Find the speed when the car has covered a distance 0.5m
- 6. A car starts from rest accelerating at  $\frac{3}{8}$  m/s<sup>2</sup> until it reaches a speed of 81km/hr. It maintains this speed until it has covered 900m. It then decelerates to rest at  $\frac{3}{4}$  m/s<sup>2</sup>.
  - (a) Sketch the velocity- time graph.
  - (b) Find the total time the car is in motion.
  - (c) Calculate the total distance covered for the time the car is in motion.
- 7. Two cars A and B start together and move along the same straight road. Car A starts with a speed of 10m/s and experiences a constant retardation while B starts with a speed of 5m/s and moves with a constant acceleration of 4 m/s<sup>2</sup>. If the cars meet when the speed of B is double that of A, calculate the;

- (a) acceleration of A. (b) distance covered when they meet.
- 8. A car initially moving at a speed of  $80m \, s^{-1}$  decelerates uniformly and attains a velocity of  $40m \, s^{-1}$  for 20s and comes to rest in the next 30s. Sketch a velocity time graph and use it to calculate the average velocity.
- 9. A particle moving along a straight line with uniform acceleration covers the first consecutive distance of 100 m and 140 m in the intervals of 20 and 40 seconds respectively. Calculate the acceleration and initial velocity of the particle.
- 10. A cyclist starts from rest at point O and accelerates uniformly at 2 m/s<sup>2</sup> for 10 seconds until he reaches a point A. He moves at the attained speed for 20 seconds up to point B, before decelerating uniformly to rest at point C for a further 30 seconds.
  - (a) Draw a velocity-time graph for the motion of the cyclist.
  - (b) Calculate the:
    - (i) velocity at A,
    - (ii) distance OA, AB and BC. Hence determine the total distance OC.