CBT MATHS AUGUST (2025- 26) (CLASS XII)

CASE STUDY BASED QUESTIONS-

1. Overspeeding increases fuel consumption and decreases fuel economy as a result of tyre rolling friction and air resistance. While vehicles reach optimal fuel economy at different speeds, fuel mileage usually decreases rapidly at speeds above 80 km/h.The relation between fuel consumption F (l/100 km) and speed V (km/h)under some constraints is given as F = V^2 /500 - V/4 + 14. On the basis of the above information, answer the following questions :

(i) Find F, when V = 40 km/h.

(a) 7.2 (b) 8.2 (c) 10
(d) 8

Ans. 7.2

(ii) Find dF/dV =

(a) V^2-V (b) V/250 - 1/4 (c) V^2/500-V
(d) None of these

Ans. V/250 - ¼

(iii) Find the speed V for which fuel consumption F is minimum

(a) 50 km/hr (b) 62.5 km/hr (c) 62.5 km/hr
(d) 20 m/sec

Ans. 62.5 km/hr

(iv) Find the quantity of fuel required to travel 600 km at the speed V at which dF/dV = – 0·01.

(a) 37.2 litres (b) 40 litres (c) 10 litres
(d) 2 litres

Ans. 37.2 litres

2. P(x)=-6x^2+120x+25000 (in Rupees) is the total profit function of a company, where x denotes the production of the company. Based on the above information, answer the following questions.

(i) Find the profit of the company, when the production is 3 units.

(a) 1794 (b) 25306 (c) 3568
(d) 9585

Ans. 25306

(ii) Find P'(5)

(a) 70 (b) 80 (c) 60
(d) 30

Ans. 60

(iii) Find the interval in which the profit is strictly increasing

(a) [0,10] (b) (0,10) (c) (0,9)
(d) (0,8)

Ans. (0,10)

(iv) Find the production, when the profit is maximum

(a) at x=5 (b) at x=10 (c) at x=11
(d) at x=3

Ans. at x=10

ASSERTION AND REASONING QUESTIONS-

3. **Assertion (A):** If e^(xy) + log(xy) + cos(xy) +4=0 then dy/dx= -y/x

Reason (R): d/dx (xy)=0 implies that dy/dx= -y/x

Ans. Both A and R are true and R is the correct explanation of A.

4. **Assertion (A)** : A balloon, which always remains spherical , has a variable radius. The rate at which its volume is increasing with the radius when radius is 10 cm, is 400π cm^3/cm

Reason (R): Rate of change of volume V of balloon with respect to radius r is dV/dr = (2/3)π. 3r^2

Ans. A is true but R is false.