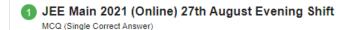
Q. Let I be the purchase value of an equipment and V(t) be the value after it has been used for t years. The value V(t) depreciates at a rate given by differential equation  $\frac{dV(t)}{dt} = -k(T-t)$  where k>0 is a constant and T is the total life in years of the equipment. Then the scrap value V(T) of the equipment is :-. (1)  $I - \frac{k(T-t)^2}{2}$  (2)  $e^{-kT}$  (3)  $T^2 - \frac{I}{k}$  (4)  $I - \frac{kT^2}{2}$ 



If the solution curve of the differential equation  $(2x - 10y^3)dy + ydx = 0$ , passes through the points (0, 1) and  $(2, \beta)$ , then  $\beta$  is a root of the equation :

A 
$$y^5 - 2y - 2 = 0$$

$$2y^5 - 2y - 1 = 0$$

$$y^5 - y^2 - 2 = 0$$

## **Explanation**

$$(2x - 10y^3)dy + ydx = 0$$

$$\Rightarrow rac{dx}{dy} + \left(rac{2}{y}
ight)x = 10y^2$$

$$I.\,F.=e^{\int \frac{2}{y}dy}=e^{2\ln(y)}=y^2$$

Solution of D.E. is

$$\therefore x \cdot y = \int (10y^2)y^2 \cdot dy$$

$$xy^2=rac{10y^5}{5}+C\Rightarrow xy^2=2y^5+C$$

It passes through (0, 1)  $\rightarrow$  0 = 2 + C  $\Rightarrow$  C = -2

Now, it passes through  $(2, \beta)$ 

$$2eta^2=2eta^5-2\Rightarroweta^5-eta^2-1=0$$

 $\therefore eta$  is root of an equation  $y^5-y^2-1=0$