

3886-R

B. Sc. (Third Year) Examination, 2020-21

(For Regular Students)

MATHEMATICS

Paper : Third Opt. (D)

(Mathematical Modelling)

Time Allowed : Three hours

Maximum Marks : 40

Note : All questions are compulsory. Each question carries equal marks.

1. Obtain the curves of pursuit when $K = 1$, $K > 1$.

2. Show that the diffusion equation

$$\frac{\partial^2 \theta}{\partial x^2} = \frac{1}{K} \frac{\partial \theta}{\partial t}$$

is satisfied by $\theta = \frac{1}{\sqrt{t}} \exp\left(-\frac{x^2}{4Kt}\right)$.

3. Write the diffusion equation in spherical polar and cylindrical polar coordinates.

4. Show that for the Canchester model, the trajectories are hyperbolas, all of which have the same asymptotes.

5. Obtain the steady-state solution of Leontief's model.