SECTION-A

1. Compare and contrast between the Ramsey model for the central planner and the Solow model for economic growth (your answer should include the assumptions, important equations, phase diagram and its interpretation).

   The Ramsey–Cass–Koopmans model, or Ramsey growth model, is a neoclassical model of economic growth based primarily on the work of Frank P. Ramsey, with significant extensions by David Cass and Tjalling Koopmans. The Ramsey–Cass–Koopmans model differs from the Solow–Swan model in that the choice of consumption is explicitly microfounded at a point in time and so endogenizes the savings rate. As a result, unlike in the Solow–Swan model, the saving rate may not be constant along the transition to the long run steady state. Another implication of the model is that the outcome is Pareto optimal or Pareto efficient [note

Originally Ramsey set out the model as a central planner’s problem of maximizing levels of consumption over successive generations. Only later was a model adopted by Cass and Koopmans as a description of a decentralized dynamic economy. The Ramsey–Cass–Koopmans model aims only at explaining long-run economic growth rather than business cycle fluctuations, and does not include any sources of disturbances like market imperfections, heterogeneity among households, or exogenous shocks. Subsequent researchers therefore extended the model, allowing for government-purchases shocks, variations in employment, and other sources of disturbances, which is known as real business cycle theory.

The Ramsey–Cass–Koopmans model starts with an aggregate production function that satisfies the Inada conditions, often specified to be of Cobb–Douglas type, \( F(K, L) \), with factors capital \( K \) and labour \( L \). Since this production function is assumed to be homogeneous of degree 1, one can express it in per capita terms, \( F(K, L) = L \cdot F\left(\frac{K}{L}, 1\right) = L \cdot f(k) \). The amount of labour is equal to the population in the economy, and grows at a constant rate \( n \), i.e., \( L = L_0 e^{nt} \) where \( L_0 > 0 \) was the population in the initial period.

The first key equation of the Ramsey–Cass–Koopmans model is the state equation for capital accumulation:

\[
\dot{k} = f(k) - (n + \delta)k - c
\]