SECTION-A

1. Examine the effect of population growth in the Solow model of economic growth. Discuss how the Solow model could be used to explain poverty traps in developing nations.

Ans: Population growth modifies the basic structure of the Solow growth in three ways:

1. Achieving Steady State:
   Prima facie, population growth enables us to explain sustained economic growth. In the presence of population growth, capital per worker and output per worker remain constant in the steady state situation. Since the number of workers is increasing at the rate n, total capital and total output must also grow at the same rate if a steady state situation is to be maintained.

   Thus, population growth can explain sustained growth in GDP. However, since GDP per worker remains constant in the steady state, population growth cannot explain improvement in the standard of living.

2. Explaining income differences among countries:
   Population growth explains why some countries grow rich and others remain poor. Fig. 4.12 shows that an increase in the rate of population growth from n₁ to n₂ reduces the steady-state level of capital per worker from k* to k*₂. Since k* is lower, and because (y*) = f(k*), the level of output per worker y* is correspondingly lower.

   Thus, if the rate of population growth increases from n₁ to n₂ the new steady state has lower level of capital per worker (k*₂) compared to that in the initial steady state (k*). The Solow model is thus able to predict that countries with high rate of population growth will have lower level of capital per worker and, thus, lower level of GDP per capita.

   This is an observed reality. So the Solow model can explain the observed income differences among different nations of the world over time.

3. Altering the criterion for determining the Golden Rule level of capital:
   Finally, population growth alters the criterion for determining the Golden Rule (consumption maximising) level of capital. Since consumption per worker c = y – i, steady-state output is f(k*) and steady-state investment is (δ + n)k*, steady-state consumption can be expressed as

   \[ c* = f(k*) - (\delta + n)k* \]

   So the level of k* which maximises consumption is the level at which

   MPK = \delta + n

   or, MPK – \delta = n … (22)

   This means that in the Golden Rule steady state, the net marginal (physical) product of capital equals the rate of growth of population.

   The Solow growth model shows how saving and population growth conjointly determine the economy’s steady state capital stock and GDP per worker. It throws light on various features of actual growth experiences of advanced industrial countries.

   It explains why high investment nations grow faster than low investment nations. It also explains why per capita incomes are low in countries with high rate of population growth.