L-7

Population Forecasting Methods

Environmental engineering-I

Contents

- Population forecasting methods

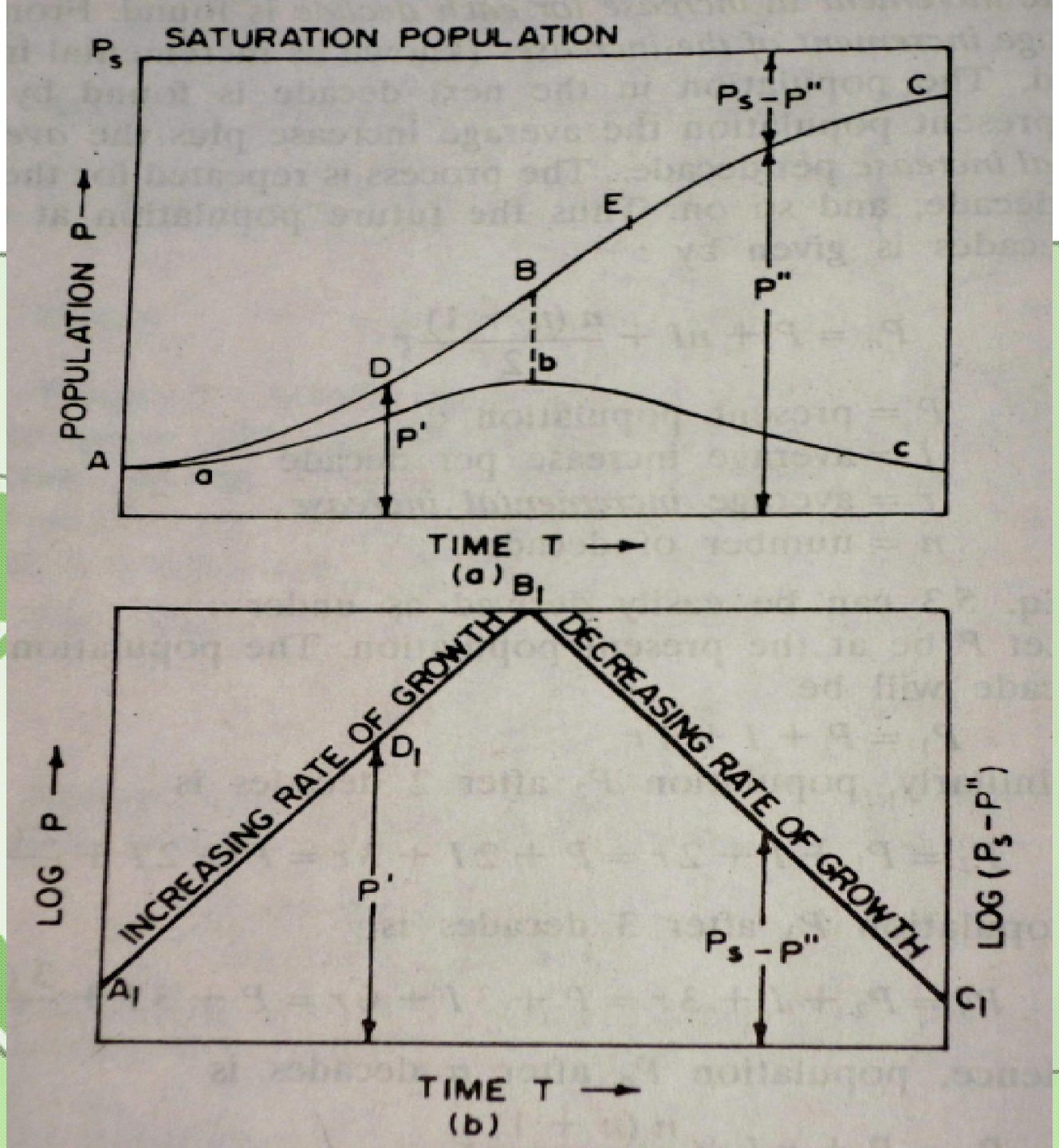
1) *Arithmetical Mean Method*
2) *Geometric Increase Method*
3) *Incremental Increase Method*

Already Covered

4) *Decreasing Rate of Growth Method* or *Logistic Curve Method*
5) *Graphical Extension Method*
6) *Graphical Comparison Method*
7) Zoning or master plan method
8) *Ratio and correlation Method*
9) Growth composition analysis method

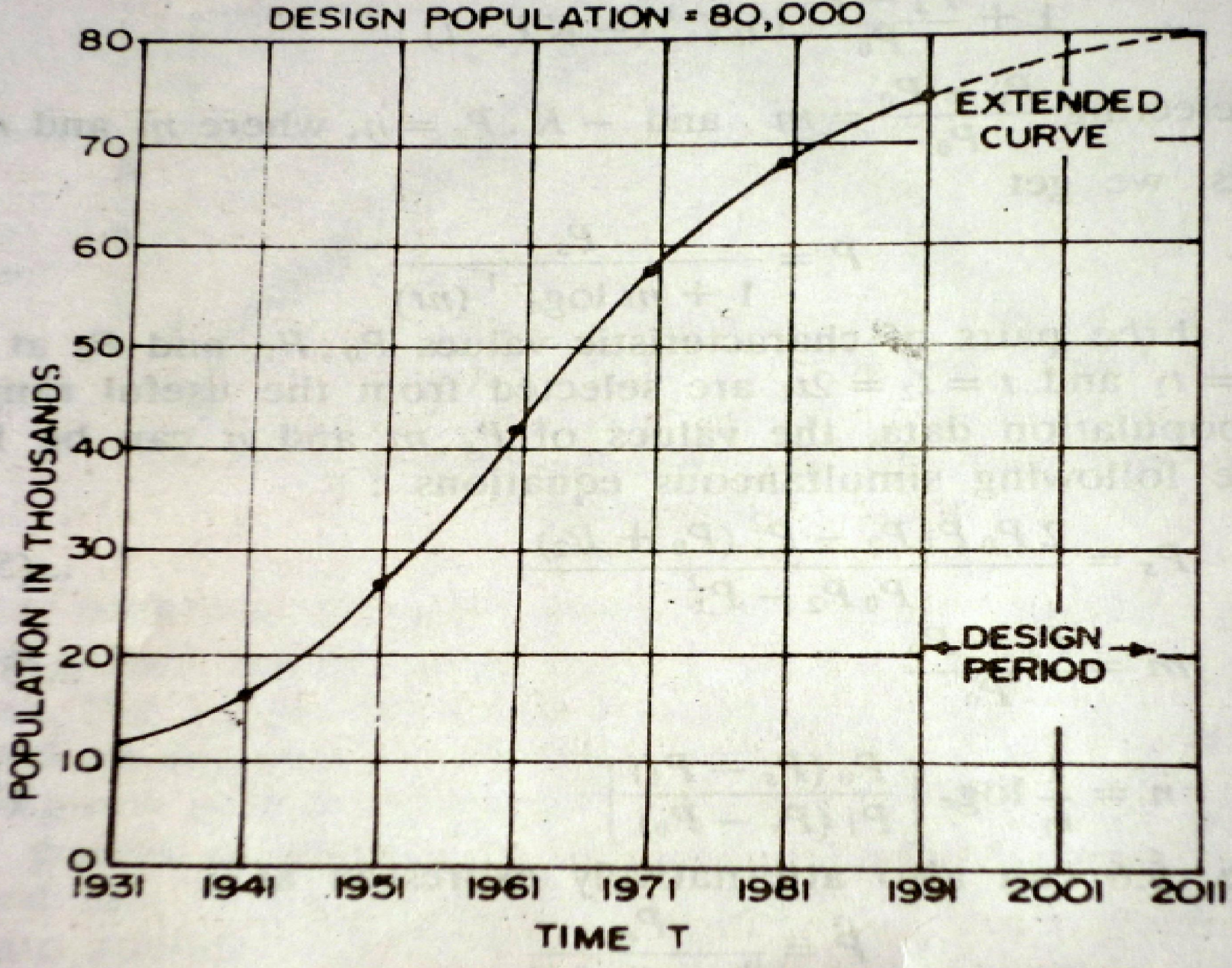
4. *Decreasing Rate of Growth Method* or *Logistic Curve Method*

- Rate of increase of population never remains constant.
- Population of the city grows until it reaches saturation, which is established by limit of economic opportunity.
- Thus all populations grow according to the logistic or S-curve.


SATURATION POPULATION
P_s
POPULATION P
A
a
D
B
E
C
b
c
P'
P''
$P_s - P''$
TIME T
(a)
B_1
INCREASING RATE OF GROWTH
DECREASING RATE OF GROWTH
D_1
A_1
C_1
LOG P
LOG $(P_s - P'')$
P'
$P_s - P''$
TIME T
(b)

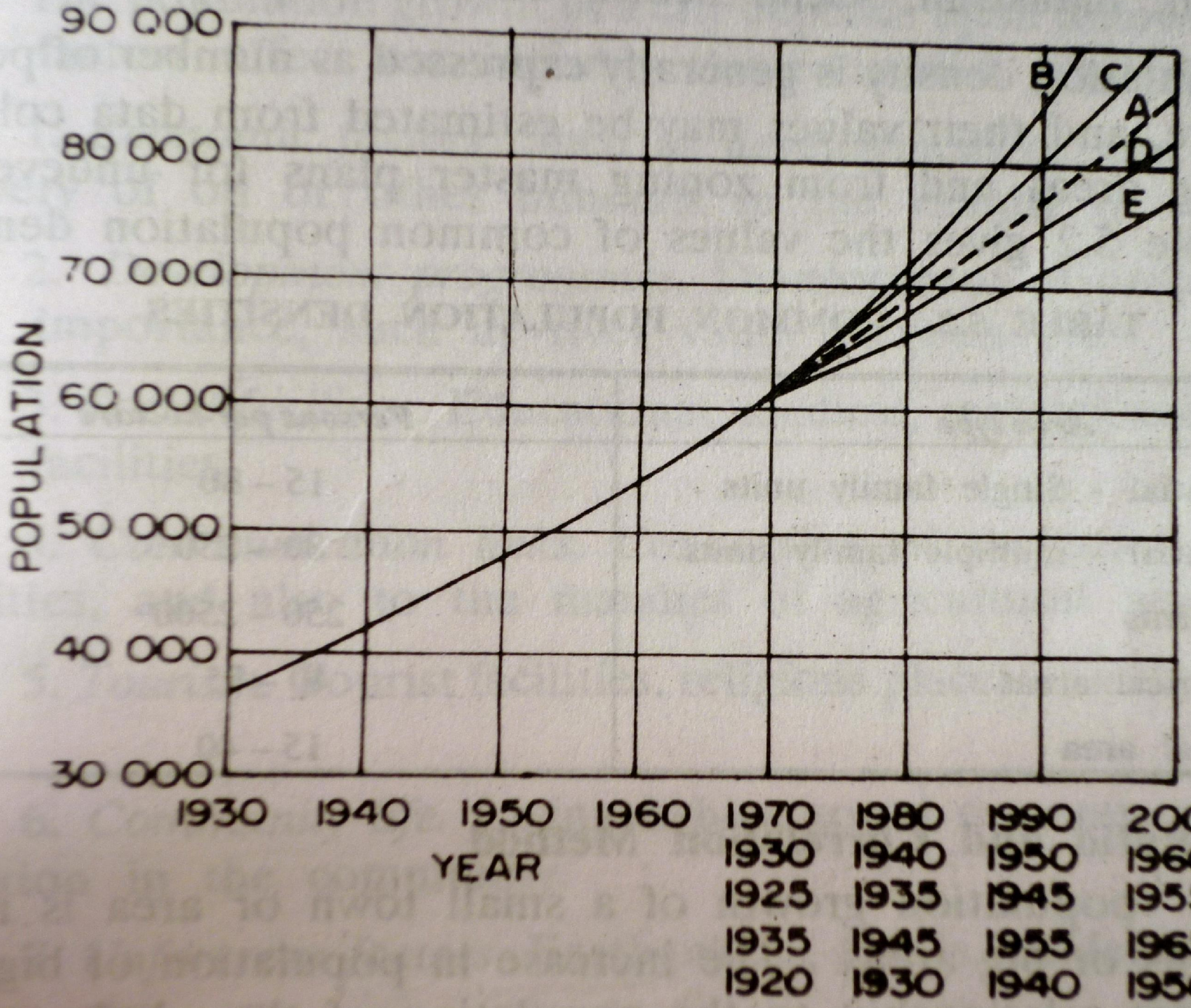
5. Graphical Extension Method

- A curve is drawn between population P and time T, with the help of previous census data so that the shape of population curve is obtained up to the present period.
- From extended part of the curve population at the end of any future decade can be obtained.


DESIGN POPULATION = 80,000
80
70
60
50
40
30
20
10
0
EXTENDED CURVE
DESIGN PERIOD
POPULATION IN THOUSANDS
1931
1941
1951
1961
1971
1981
1991
2001
2011
TIME T

6. Graphical Comparison Method

- It assumes that the city under consideration will develop as similar cities developed in the past.
- The method consists of plotting the curves of cities hat, one or more decades ago, had reached the present population of the city under consideration.
- Difficult to find the identical cities with respect to population growth


90 000
80 000
70 000
60 000
50 000
40 000
30 000
POPULATION
1930
1940
1950
1960
1970
1980
1990
2000
YEAR
B
C
A
D
E
1930 1940 1950 1960 (B)
1925 1935 1945 1955 (C)
1935 1945 1955 1965 (D)
1920 1930 1940 1950 (E)

7. Zoning or master plan method

- City is divided into various zones by town planner
- Industrial
- Commercial
- Residential and
- Other zones
- Population density is expressed as no of people/hectare
- Future development is allowed to take place as per master plan

S. No.	Area type	Persons per hectare
1	Residential – single family units	15 - 80
2	Residential – multiple family units	80 - 250
3	apartments	250 - 2500
4	Commercial area	40 - 75
5	Industrial area	15 - 40

8. *Ratio and correlation Method*

- Population growth of a small town or city is related with growth of big cities or state or country.
- Ratio of local to national or state population is worked out in last 2 to 4 decades.
- These ratios may be used to predict the population.
- Method takes into account national and regional factors affecting population growth.

9. Growth composition analysis method

- Population of city changes due to

- Birth
- Death and
- Migration

P_n = P +Natural increase + Migration

Natural increase =$T[I_BP - I_DP]$

T= design forecast period

P= present population

I_B= avg. birth rate/yr and I_D= avg. death rate/yr

Factors affecting population growth

- **Economic factors** : - New industries, discovery of oil or minerals.
- **Development programmes**: - of national importance such as river valley project.
- **Social facilities**: -Educational, medical and recreational facilities.
- **Communication links**: - Connectivity of the town with other cities and mandies (Markets) of agro products

- **Tourism**: - Tourists facilities, religious places and historical buildings.
- **Community life**: - Living habits, social customs and general education in the community.
- **Unforeseen factors**: - Earthquakes, Floods, Epidemics, Frequent famines etc.

Objective Questions

1. In _____method population growth of a small town or area is related to big towns or big areas. (Ratio and Correlation/Graphical/Zoning/Logistic)
2. Difference between birth rate and death rate give _____ _____.
3. _____ affects growth of population. (River valley project/tourist places/unforeseen factors/ all of above)

Theory Questions

Q1. Enlist all the methods of population forecasting and explain Ratio and correlation method. (May 2011, 5 marks)

OR

Enlist all the methods of population forecasting and explain any two methods.

Q2. Explain factors affecting population growth.