TIME : 2 Hrs.   MARKS : 50

N.B :

    1) All questions are compulsory.

    2) Figures to the right indicate mark.

    3) Statistical table will be provided on request.

Q.1. a) Explain the sampling with replacement and sampling without replacement. [5]

    b) What is meant by curve fitting ? Explain how the principle of least squres is used. [4]

    c) Draw a network for the following project and find critical path. [5]

Activity	1-2	1-3	2-3	2-4	3-4	4-5
Duration	20	25	10	12	6	10

OR

Q.1 p) In selecting 2 units with simple random sampling without replacement from a population having 6 units the values 2, 4, 6, 7, 11 and 16 show that the sample mean is an unbiased estimator of the population mean by enumerating all possible samples. [5]

    q) Fit the curve $y = a.b^x$ for the following data. [4]

x	1	2	3
y	3-1	50	790

    r) How does PERT technique help a business manager in decision making ? What are the major limitations of the PERT model. [5]

Q.2 a) Write Short Note on. [6]

      i) Stratified Sampling

      ii) Systematic Sampling

    b) From a population of size 120 a o simple random sample of size 5 to be drawn without replacement. Using the following set of random numbers draw the sample giving reasons. Random nos. are 542, 230, 763, 997, 646, 883, 582, 602, 240

OR

Q.2. p) Define Simple random Sampling (SRS). Describe [6]

    i) lottery Method   ii) random number method to draw a simple random sample of size n from population of size N.

    q) A population consists of 240 units. To estimate population mean, a simple random sample without replacement (SRSWOR) of size 16 is drawn. The sample observations are - [6]

12	17	16	14	12	13	13	14
11	13	16	16	18	14	11	11

estimate

      i) Population Mean   ii) $V(\overline{y})$

Q.3. a) How to fit a curve of the type [6]

    $y = ax^b$? Explain

b) Fit the curve ae^{bx} to the following data [6]

x	0	2	4
y	5.013	10	31.62

OR

Q.3   p) Fit a straight line $y = a + bx$ to the following data.   [6]

Year (x)	1971	1972	1973	1974	1975
Production (y)	210	224	250	280	210

q) What do you understand by coefficient of determination ? Explain the difference between coefficient of determination and coefficient of correlation.   [6]

Q.4.   a) What are the different type of float ? Explain.   [6]

b) A small assembly plant assembles PCs through 9 inter liked stages according to adjoining process.   [6]

Stage	1-2	1-3	1-4	2-5	3-6	3-7
Duration	2	2	1	4	8	5
Stage	4-6	5-8	6-9	7-8	8-9	
Duration	3	1	5	4	3	

i)   Draw an arrow diagram

ii)   Tabulate earliest start, earliest finish and latest finish time for all the stages.

iii) Find Critical path and the assembly duration

OR

Q.4.   p) Explain the following terms in PERT -   [6]
i)   Three time estimates
ii)   Expected time
iii) Activity Variance

q) A small project is composed of 7 activities whose time estimate are listed below.   [6]

Activity (i - j)	Estimated Duration (Weeks)		
	Optimistic	Most likely	Pessimistic
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

i)   Draw the project Network.

ii)   Find expected duration and variance for each activity.

iii) What is the probability that the project will be completed at least 4 weeks earlier than expected time ?