

- N.B. :** 1) All questions are compulsory.  
 2) Figures to the right indicate marks.  
 3) Statistical tables will be provided on request.

- Q.1** a) What are the main steps involved in a sample survey ? Discuss them briefly. (6)
- b) What is a simple random sample ? Mention various methods of drawing a random sample. (6)

**OR**

- Q.1** p) Describe the procedure of stratified random sampling. Under what conditions is stratified random sampling preferred to simple random sampling and why? (6)
- q) Consider a population of size 5, consisting of values 2, 3, 6, 8, 11. Draw all possible samples of size 2 using -  
 i) SRSWOR  
 ii) SRSWR.

- Q.2** a) Indicate the major areas of forecasting. What preliminary steps are necessary for a proper statistical forecasting? (6)
- b) Fit a power curve of the form  $y = a.x^b$  to the following data - (6)
- |            |     |      |      |      |
|------------|-----|------|------|------|
| <b>x :</b> | 1   | 2    | 3    | 4    |
| <b>y :</b> | 0.7 | 0.86 | 0.97 | 1.06 |

**OR**

- Q. 2** p) Why are forecasts important to organization ? (6)
- q) Fit a straight line  $y = a + bx$  to the following data - (6)
- |                       |      |      |      |      |      |
|-----------------------|------|------|------|------|------|
| <b>Year (x)</b>       | 1981 | 1982 | 1983 | 1984 | 1985 |
| <b>Production (y)</b> | 210  | 224  | 250  | 280  | 310  |

- Q.3** a) Explain the usefulness of PERT and CPM techniques in decision making. (6)
- b) A small project is composed of 7 activities whose time estimate are listed in the table below. (6)

<b>Activity</b>	<b>Estimated duration (weeks)</b>		
	<b>Optimistic</b>	<b>Most likely</b>	<b>Pessimistic</b>
<b>1 -2</b>	1	1	7
<b>1-3</b>	1	4	7
<b>1-4</b>	2	2	8
<b>2-5</b>	1	1	1
<b>3-5</b>	2	5	14

- i) Draw the project network.
- ii) Find the expected duration and variance for each activity.
- iii) Find the probability that project will be completed in 13 weeks.

**OR**

**Q.3 p)** Explain the following terms in PERT / CPM - (6)

- i) Earliest Time
- ii) Latest Time
- iii) Critical Path

q) A company manufacturing plant and equipment for chemical processing is in the process of quoting a tender called by a Public sector undertaking. Delivery date once promised is crucial and penalty clause is applicable. Project manager has listed down the Activities in the project as under. (6)

Activity	immediate preceding activity	activity time week
A	-	3
B	-	4
C	A	5
D	A	6
E	C	7
F	D	8
G	B	9
H	E, F, G	3

- i) Draw the network
- ii) Find the critical path
- iii) Compute Total Float, Free Float, independent Float for each activity.

**Q.4 a)** Explain - (7)

- i) Systematic sampling
- ii) Two Stage sampling

b) A small project consisting of eight activities has the following characteristics - (7)

Activity	Preceding Activity	Optimistic Time	Most likely	Pessimistic time
A	none	2	4	12
B	none	10	12	26
C	A	8	9	10
D	A	10	15	20
E	A	7	7.5	11
F	B,C	9	9	9
G	D	3	3.5	7
H	E, F, G	5	5	5

- i) Draw the PERT network

- iii) Prepare the activity schedule for the project  
iv) What is the probability that project will be completed in 30 weeks?

**OR**

p) What is float ? What are the different types of floats ? (7)

q) Fit the curve  $ae^{bx}$  to the following data - (7)

<b>x</b>	<b>:</b>	<b>0</b>	<b>2</b>	<b>4</b>
<b>y</b>	<b>:</b>	<b>5.013</b>	<b>10</b>	<b>31.62</b>
<b><math>\log_{10} y</math></b>	<b>:</b>	<b>0.7</b>	<b>1.0</b>	<b>1.5</b>

You are given that

$$\log_{10} 4.642 = 0.666$$

$$0.46 \log_e 10 = 0.2$$

**\*\*\*\*\***