

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

- Q. 1 a)** Describe the advantages and disadvantages of sample survey over census survey. (5)
- b)** What is meant by curve fitting? Explain how the principle of least squares is used. (4)
- c)** How does PERT technique help a business manager in decision making? What are the major limitations of the PERT Model? (5)

OR

- Q. 1 p)** In selecting 2 units with simple random sampling without replacement from a population having 6 units the values 2,5,7,11,16 and 19, show that the sample mean is an unbiased estimator of the population mean by enumerating all possible samples. (5)

- q)** Fit a power curve of the form. (5)
 $y = a, x^b$ to the following data.

x	:	1	2	3	4
y	:	0.7	0.86	0.97	1.06

- r)** The following table give the activities in a construction project and other relevant information. (4)

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

- i) Draw the network for the project.
ii) Find critical path.

- Q. 2 a)** Define simple random sampling. Describe (i) lottery method (ii) random number method to draw a simple random sample of size n from a population of size N . (6)

- b)** A population consists of 240 units. To estimate population mean, a simple random sample without replacement of size 16 is drawn. (5)

The sample observations are -

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

Estimate - (i) Population mean

OR

Q. 2 p) Write short note on

- (i) Systematic sampling
- (ii) Cluster Sampling.

q) A School consists of 1200 children. using the following random numbers, draw a random sample of size 10, given that the children have 1 to 1200 as their roll numbers. (6)

24 12 26 65 91 27 69 90 64 94

04 84 54 66 72 61 19 63 02 31

92 96 26 17 73 41 82 95 53 82

Use SRSWR

OR

Q. 3 a) How do you fit a curve of the type

$$y = a x^b ? \text{ Explain.}$$

(4)

b) Fit a curve of the form $y = a.e^{bx}$ to the following data.

(6)

X :	1	2	3	4	5
Y :	1.230	2.042	3.162	3.981	5.624

OR

Q. 3 p) What do you understand by coefficient of determination ? Explain the difference between coefficient of determination and coefficient of correlation. (4)

q) Fit a straight line $y = a + bx$ to the following data - (6)

Year (x) :	1999	2000	2001	2002	2003	2004	2005
Production (y) :	77	88	94	85	91	98	90

Q. 4 a) What is float ? what are the different types of float ? Explain. (6)

b) A small project is composed of 7 activities whose time estimates 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 ?

OR

Q. 4 p) Explain the following terms in PERT - (6)

- i) Three time estimates
- ii) Expected time
- iii) Activity variance

q) A small assembly plant assembles PCS through 9 interlinked stages according to adjoining precedence / process- (6)

Form to	Duration
1 - 2	2
1 - 3	2
1 - 4	1
2 - 5	4
3 - 6	8
3 - 7	5
4 - 6	3
5 - 8	1
6 - 9	5
7 - 8	4
8 - 9	3

- i) Draw the network
- ii) Calculate earliest start and latest start also earliest finish and latest finish time for all activities.
- iii) Calculate total float, free float and independent float.

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