Time : 2 ½ hours.   Max.Marks : 75

Note : 1) All questions are compulsory
2) Attempt any two sub questions out of four in question numbers 1,2 & 3
3) Attempt any three sub questions out of four in question number 4.
4) Graph papers will be provided on request.
5) Calculators are allowed .
6) Figures to the right indicate marks.
7) Statistical tables are allowed to use.

Q.1

a) Define the following terms in a Network diagram :-   (10)
i) Event.
ii) Merge Event.
iii) Burst Event.
iv) Merge and Burst Event.
v) Free float.
vi)Independent float.

b) What is network analysis and what are its objectives?   (10)
Explain CPM and PERT technique.

c) Activities involved in a small project are given below along with relavant   (10)
information :-

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

(i) Construct the network and find critical path.
(ii) Find and tabulate Earliest Start Time , Earliest Finish Time ,Latest Start
Time and Latest Finish Time and Total Float . Verify the critical path
found earlier.

d) A project manager has made following 3 points time estimates for various   (10)
activities of a project.

Three point time estimates in days:-

Events	Optimistic	Most likely	Pessimistic
1-2	6	6	24
1-3	6	12	18
1-4	12	12	30
2-5	6	6	6
3-5	12	30	48
4-6	12	30	42
5-6	18	30	54

(i)   Draw the PERT network and find out the expected project completion
time.

(ii)   Prepare a table to show estimated time for each activity and standard
deviation and variance for critical activities from time estimates as
given above.

(iii)   If 21 weeks deadlines is imposed , What is the probability that the
project will be completed within that time?

P.T.O

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Q.2.

a) What is a sample survey ? In what respects is it superior to a census survey? (10)

b) Write short note on " Designing a questionnaire " (10)

c) In selecting three units with simple random sampling without replacement from a population having 5 units with the values 2,5,8,12 and 15. Show that the sample mean is an unbiased estimator of the population mean enumerating all possible samples . (10)

d) For a population having four units with values 7,8,9 and 11. Write down all possible samples of size 2 (with replacement) from the given population units and verify whether the sample mean is an unbiassed estimator of the population mean (10)

Q.3.

a) Discuss a time series and its importance . What are the different components of a time series? (10)

b) What are the different methods of measurement of Trend? Explain any two in brief. (10)

c) Below are given the figures of production (in thousand tonnes) of a fertilizer factory :- (10)

Year	1995	1996	1997	1998	1999	2000	2001
Production ('000 tonnes)	77	88	94	85	91	98	90

Fit a straight line trend by the method of least squares. Estimate the trend values. Also estimate the trend value for the year 2002 . Plot the graph.

d) Use the method of monthly averages to determine the monthly indices for the following data of production of a commodity for the years 2010 , 2011 and 2012 :- (10)
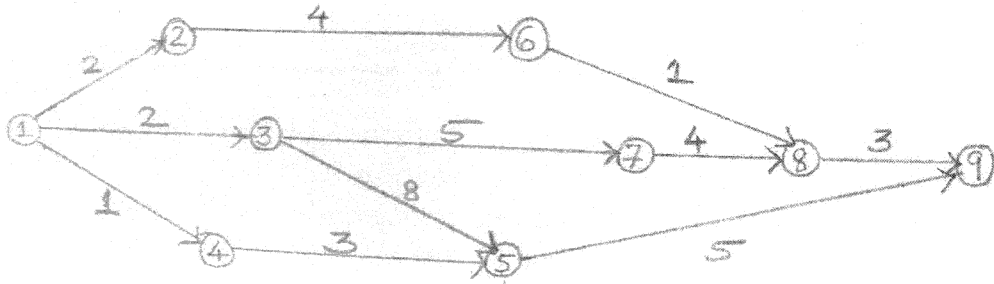
Month	2010	2011	2012
January	12	15	16
February	11	14	15
March	10	13	14
April	14	16	16
May	15	16	15
June	15	15	17
July	16	17	16
August	13	12	13
September	11	13	10
October	10	12	10
November	12	13	11
December	15	14	15

Q.4.

a) Find the critical path and calculate the slack time for each event for the following PERT :- (5)

b) Following are the random numbers of two digits each is provided to the field (5)
investigator :-

35, 97, 61, 85, 49, 78, 50, 02, 27, 13.

How should he use this table to make a random selection of 5 plots out of 40
plots.?

c) Calculate trend value by three yearly moving average method for the following (5)
data .:-

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999
Sales in ('000s)	70	90	120	110	100	80	120	130	170

d) You are given the population figures of India as follows :- (5)

Census Year :-(x)	1931	1941	1951	1961	1971
Population :- (y) in crores	27.9	31.9	36.1	43.9	54.7

Fit in exponential trend curve $y = a.b^x$ to the above data by the method of
least squares.

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