Time : 1 1/2 hours. Max.Marks : 40

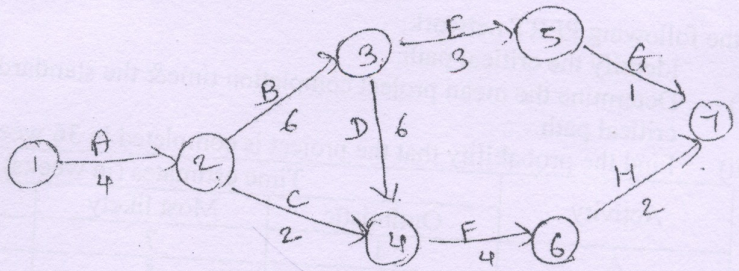
Note : 1) All questions are compulsory
2) Attempt any two sub questions from each question.
3) Graph papers will be provided on request.
4) Calculators are allowed .
5) Figures to the right indicate marks.

Q.1

a) Draw network diagram for the following set of activities. Also find the critical path & the project completion time. (5)

Activity	1-2	1-3	2-4	3-5	4-6	5-6
Time(days)	4	5	3	2	2	4

b) For the following project : (5)
(i) Find the critical path & the project completion time.
(ii) Find the earliest & latest starting & finishing times of all the activities.



c) For the following project, draw the PERT network & find the expected project completion time. (5)

Activity	1-2	1-3	2-3	2-5	3-4	4-5	5-6	4-6	6-7
Optimistic time	3	5	6	1	2	Zero	1	1	2
Most likely time	6	6	8	4	3	Zero	1	2	4
Pessimistic time	9	13	10	7	10	Zero	1	3	12

Q.2

a) There are 100 students in a class .Using the following random numbers draw a random sample of size 24, given that the numbers from 1 to 100 are the roll numbers of the student. (5)

24 12 26 65 91 27 69 90 64 44 04 84 34 66 72 61
19 65 06 31 92 96 17 73 61 82 96 53 82 30 33 22
17 04 10 27 41 22 39 50 52 33 22 17 04 10 27 41
22 39 50 52 33 09 03 78 89 75 99 75 86 72 07 17
24 51 65 57 66 45 22 16 35 79 85 78 84.

b) A population contains four units with values 3,5,6,8. Write all possible samples of size 2 assuming simple random sampling with replacement .Verify that the mean of the sample means is the population mean. (5)

c) For the small population containing 6 units 2,5,7,11,16 and 19, write down all possible simple random sampling of size 2 without replacement from this population . Show that $E(\bar{y}) = \bar{Y}$. (5)

[P.T.O.]

N03AFG

Q.3

a) Calculate trend values using 5 yearly moving average from the following data. **(5)**

Year :	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Sales in (thousand units)	50	70	90	120	110	100	80	120	105	115

b) Apply the method of least squares to fit a straight line trend and determine the sales figures for the year 1999 from the following data :- **(5)**

Year :	1992	1993	1994	1995	1996	1997	1998
Sales of Refrigerators :	100	110	130	125	170	168	172

c) The sales of a company in thousands of rupees for the year 2000 to 2004 are given below. **(5)**

Year :	2000	2001	2002	2003	2004
Sales :	32	47	65	92	98

Fit an equation of the form $y = a.b^x$ where x = years and y = sales.

Q.4 **(5)**

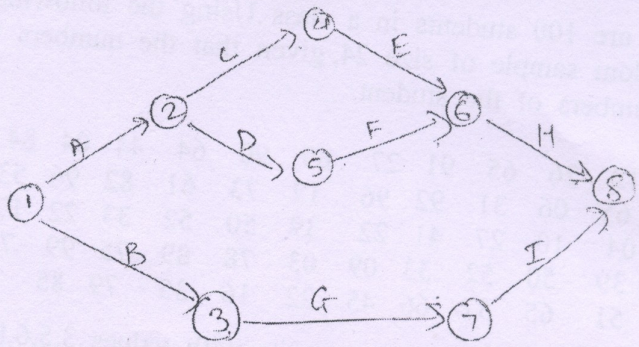
a) From the following PERT network,

(i) Identify the critical path.

(ii) Determine the mean project completion time& the standard deviation of the critical path.

(iii) Find the probability that the project is completed in 36 weeks.

Activity	Time estimates (in weeks)		
	Optimistic	Most likely	Pessimistic
A	4	7	16
B	1	5	15
C	6	12	30
D	2	5	8
E	5	11	12
F	3	6	15
G	3	9	27
H	1	4	7
I	4	10	28



b) In selecting 3 units with simple random sampling without replacement from a population having 4 units with the values 3,6,8 and 10 . Show that the sample mean is an unbiased estimate of the population mean by enumerating all possible samples. Also verify the formula for the variance of the sample mean. **(5)**

[P.T.O.]

N03AFG

c) Work out the centered 4 yearly moving average for the following data to obtain the trend values. **(5)**

Year :	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Export of Goods ('00 units)	220	236	250	242	263	290	309	317	320	324

------X------X------X------