

- N.B. 1) Attempt all questions**
2) Figures to the right indicate marks
3) Use of statistical tables, calculator is allowed.

- Q.1 a)** What is an assignment problem? Give mathematical formulation of an assignment problem. **6**
- b)** A department has 5 employees with 5 jobs to be performed. The time (in hrs.) each man will take to perform each is given in the following matrix. **6**

		Employees				
		I	II	III	IV	V
Jobs	A	10	5	13	15	16
	B	3	9	18	13	6
	C	10	7	2	2	2
	D	7	11	9	7	12
	E	7	9	10	4	12

How should the jobs be allocated, one per employee, so as to minimize the total man hours?

OR

- Q.1 a)** How will you solve an assignment situation in an assignment problem of the type
 i) Maximization ii) unbalanced problem **6**
- b)** A Methods Engineer wants to assign four new methods to three work centres. The assignment of the new methods will increase production and they are given below. If only one method can be assigned to a work centre, determine the optimum assignment. **6**

		Increase in production (unit)		
		Work centres		
Method		A	B	C
1		10	7	8
2		8	9	7
3		7	12	6
4		10	10	8

- Q.2 a)** What is a sequencing problem? Explain the principal assumptions made while dealing with sequencing problems. **6**
- b)** Find sequence that minimizes the total elapsed time required to complete the following tasks on two machines.

Task	A	B	C	D	E	F	G	H	I
Machine I	2	5	4	9	6	8	7	5	4
Machine II	6	8	7	4	3	9	3	8	11

Also find total elapsed time, Idle time. **6**

OR

Q.2 a) Write a short note on the 'sequencing decision problem for n jobs on two machines'. 6

b) We have five jobs each of which must go through the machines A, B and C in order ABC. Processing times (in hours) is as follows. 6

Job	:	1	2	3	4	5
Machine A	:	5	7	6	9	5
Machine B	:	2	1	4	5	3
Machine C	:	3	7	5	6	7

Find the sequence that minimises total time required to complete the jobs. Find total elapsed time and idle time.

Q.3 a) Briefly mention the areas of application of network technique. What are the major limitation of PERT.? 5

b) A project has the following time schedule: 8

Activity	1 - 2	1 - 3	1 - 4	2 - 5	3 - 6	3 - 7
Time	2	2	1	4	8	5
Activity	4 - 6	5 - 8	6 - 9	7 - 8	8 - 9	
Time	3	1	5	4	3	

Construct PERT network Compute:

- i) Critical path and its duration
- ii) Total float for each activity

OR

Q.3 a) Explain Furkerson's forward and backward rule to find earliest start and latest finish time in a network. 5

b) A small project is composed of 7 activities whose time estimates are listed in the table below.

Activity	Estimated duration		
	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 the expected duration and variance for each activity. What is the expected project length?
- iii) Calculate the variance and standard deviation of the project length.

8

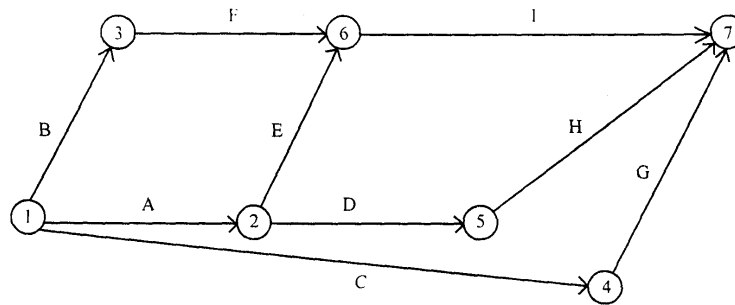
Q.4 a) What is PERT and CPM? Explain significance of using PERT/CPM. 5

b) A project is represented by the network shown below has the following data.

Task	A	B	C	D	E	F	G	H	I
Optimistic Time	5	18	26	16	15	6	7	7	3
Pessimistic Time	10	22	40	20	25	12	12	9	5
Most likely Time	8	20	33	18	20	9	10	8	4

Determine the following :

- i) Expected time and their variance.
- ii) The earliest and latest expected completion times for each event
- iii) The critical path.
- iv) The probability of completing project in 41.5 weeks. 8



OR

Q.4 a) With reference to PERT explain the following terms:

- i) Optimistic time
- ii) Pessimistic time
- iii) Most likely time. 6

b) A project has the following activities and other characteristics

Activity	Preceding activity	Duration
A	-	8
B	-	6
C	A	14
D	A	5
E	C	11
F	D	7
G	B	11
H	E,F	4
I	G	18

- i) Draw the PERT network.
- ii) Identify the critical path
- iii) Obtain total float, free float. 7
