

- Instruction :**
- 1) Attempt any one question from Section I and any one from Section II
 - 2) Figures to the right indicate marks.
 - 3) Graph papers and statistical table will be provided on request.

Section - I

- Q.1 a) A toy company manufactures two types of doll, a basic version - doll A and a deluxe version doll B. Each doll of type B takes twice as long to produce as one of type A, and the company would have time to make a maximum of 2000 per day. The supply of plastic is sufficient to produce 1500 dolls per day (both A & B combined). The deluxe version requires of fancy dress of which there are only 600 per day available. If the company makes a profit of Rs. 3.00 & Rs. 5.00 per doll, respectively on doll A & B. Formulate the problem. 07

- b) Solve the following LPP by simplex method

$$\max Z = 800x_1 + 600x_2 + 300x_3$$

$$\text{Subject to } 10x_1 + 4x_2 + 5x_3 \leq 2000$$

$$2x_1 + 5x_2 + 4x_3 \leq 1000$$

$$x_1, x_2, x_3 \geq 0$$

07

- c) Determine an initial basic feasible solution to the following transportation problem by using
- 1) North West Corner Rule
 - 2) Least cost Method
 - 3) Vogel's approximation Method

Source	D1	D2	D3	D4	Supply
S ₁	11	13	17	14	250
S ₂	16	18	14	10	300
S ₃	21	24	13	10	400
demand	200	225	275	250	

07

- Q.2 a) Solve the following LPP by graphical method

$$\text{Maximize } Z = 80x_1 + 120x_2$$

$$\text{Subject to } x_1 + x_2 \leq 9$$

$$x_1 \geq 2$$

$$x_2 \geq 3$$

$$20x_1 + 50x_2 \leq 360$$

$$x_1 \geq 0, x_2 \geq 0$$

07

- b) Write dual for the following Simplex problem.

$$\text{Max } Z = 6x + 8y + 2z$$

$$\text{Subject to } 30x + 20y + 10z \leq 300$$

$$5x + 10y + 7z \leq 100$$

$$10x - 8y + 5z \leq 225$$

$$x, y, z \geq 0$$

07

- c) Determine initial feasible solution by using Vogel's approximation method and test for the optimality

destination → Supplier ↓	D ₁	D ₂	D ₃	D ₄	Supply
S ₁	19	30	50	10	7

Section - II

Q.3 a) In a textile sales exporium four salesman A, B, C and D are available to four counters W, X, Y and Z. Each salesman can handle any counter. The service (in hours) of each counter by each salesman is given below.

Salesman →	A	B	C	D
Counters ↓				
W	41	72	39	52
X	22	29	49	65
Y	27	39	60	51
Z	45	50	48	52

How should the salesman be allocated to appropriate counters as to minimize the service time? Each salesman must handle only one counter.

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- b) Draw an arrow diagram for the following project find
 i) Earliest start ii) Latest finish iii) Critical path iv) Total float, free and independent float.

Activity	1 - 2	1 - 3	1 - 4	2 - 5	3 - 6	3 - 7
duration	2	2	2	4	5	8
Activity	4 - 7	5 - 8	6 - 8	7 - 9	8 - 9	9 - 10
duration	4	2	4	5	3	4

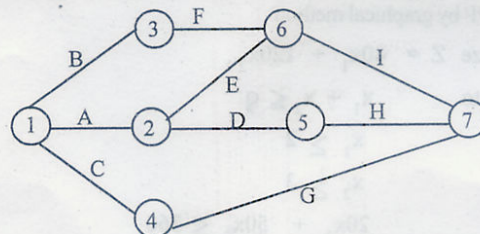
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- c) Find the sequence that minimises the total elapsed time required to complete following task on two machines, also find the total minimum elapsed time and Idle time for each machine.

Task	A	B	C	D	E	F	G	H	I
M ₁	2	5	4	9	6	8	7	5	4
M ₂	6	8	7	4	3	9	3	8	11

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Q.4 a) A project has the following network shown below & has the following data.



Activity	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) Draw the PERT Network diagram.
 ii) Identify the critical path
 iii) Determine the expected completion time
 iv) Find probability that the project is completed before 41.5 days.

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Machines →	A	B	C	D	E
Jobs ↓					
1	30	37	40	28	40
2	40	24	27	21	36
3	40	32	23	30	35
4	25	28	40	36	36
5	29	62	41	34	39

Find the maximum profit possible through assignment

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- c) There are 7 jobs each of which has go through Machine M_1 & Machine M_2 in the order M_1 & M_2 . The processing time in hrs. are given below

Jobs	1	2	3	4	5	6	7
M_1	3	12	15	6	10	11	9
M_2	8	10	10	6	12	1	3

Find the sequence that minimise total elapsed time. Also find idle time for each machine

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