TIME : 2 Hrs. Q M - II Marks : 60

N.B.:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Use of simple calculator allowed.

Q.1 a) A company produces two products tables and chairs. Cost per unit for tables and a chairs is Rs. 20 and Rs. 30 One unit of table requires 4 Labours hrs. and 3 machine hrs. one unit of chair requires 5 Labour hrs and 4 machine hrs. At least 200 Labour hrs. and not more than 240 machine hrs. should be used. At least 30 tables and at least 20 chairs should be produced. Formulate as L.P.P. and solve graphically. [6]

b) The different between S.I. and C.I. (compounded annually) for a period of 2 yrs. at the rate of 6 % p.a. is Rs. 54. How much is the principal ? [4]

c) A machine which would cost Rs. 5,00,000 and has a solvage value of Rs. 30,000 has a working life of 15 yrs. Rate of interest is 9% p.a. compounded annually. Find annual deposit to be made at the end of each yr. to set-up a sinking fund. [5]

Q.2 a) solve the following maximization LPP by the simplex method. [7]

] Max Z = 2000x + 1800 y

Subject to

$x + y \leq 10$

$1000x + 800y \leq 9000$

$x \geq 0, y \geq 0$

b) In a plant, 4 employees are to be assigned 4 jobs on one-to-one basis. Find the optimal combination of employees and jobs to minimise total cost.

Job / Employee	P	Q	R	S
A	60	50	40	45
B	40	45	55	30

1. A constraint is called redundant when it does not affect the solution.
2. Infeasible solution happens when the constraints have contradictory Nature.
3. The transportation problem is balanced if total supply is equal to total demand.
4. In a feasible solution, if the No. of allocations is equal to (m + n - 1), then it is said that RIM condition is satisfied.

Q.3 a) A co. has three blants A,B,C for which cabacities are 7, 10 and 18 units. It has four warehouses P, Q, R, S for which demands are 5, 8, 7 and 15 units. Unit trasportation cost is given in Rs. Find IFS by N-W corner method and least cost method. [5]

WH / Plant	P	Q	R	S
A	38	60	100	24
B	140	60	80	120
C	80	20	120	40

b) i) Calculate C.I. for 2 yrs for a Sum of Rs. 10, 000. Rate of C.I. is 10% compounded half yearly. [2]

ii) Find out how many years it would take for a sum to double it self if rate of Interest is 8% compounded annually. [3]

c) A new machine would cost Rs. 10,00,000 after 10 yrs. Salvage value of a used machine would be Rs. 50,000. Rate of Interest is 7% p.a. Compounded annually. Final annual deposit to be made at the end of each yr if provision of sinking fund for purchase of new machine is to be made. [5]

OR

a) A firm employs typists for Job-work on an hourly basis. There are five typists available and their charges and speeds are different only one job is given to one typist and she works for a fraction of an hour. Find the least cost allocation for the following data : (7)

Typist	Rate per hours (Rs.)	No. of pages Typed per hour	Job	No. of Pages
A	5	12	P	200
B	6	14	Q	176
C	3	8	R	150
D	4	10	S	300
E	4	11	T	180

b) The following data relating to production capacities of plants, order from warehouses and freight costs for the company manufacturing consumer product is given below :

Table 1

Plant	Unit production Cost (Rs.)	Production capacity ('000 units)
X	12	20
Y	10	16
Z	15	25

Table 2

Warehouse	Order size
P	15
Q	18
R	12
S	14

Table 3

	Freight cost Rs. / Unit			
	P	Q	R	S
X	3	1	2	4
Y	6	4	3	2
Z	4	5	7	3

From the above information, determine the optimal shipping schedule. [8]

Q.4 a) Write short Note on operations Research. [5]

b) Solve the L.P.P. and tell which special case is this, [5]

Max Z = 5x + 8y

$3x + 2y \leq 24$

$x + 3y \leq 12$

$x \leq 16$

$x, y \geq 0$

c) A Co. has three plants P_1, P_2 and P_3 and three ware houses w_1, w_2 and w_3. Profit per unit from each plant to each warehouse is given in Rs.

WH / Plant	W_1	W_2	W_3
P_1	58	56	60
P_2	50	54	46
P_3	70	74	76

Plant	Capacity	Warehouse	Demand
P_1	2000	W_1	1500
P_2	2000	W_2	3000
P_3	2000	W_3	1500

Find IFS using VAM. [5]

OR

Q.4 a) Find optimal Assignment of Executives and territories to maximize total profit which sales executive will remain idle ?"

Exe. / Territory	T_1	T_2	T_3
E_1	60	67	90
E_2	80	83	95
E_3	70	72	82
E_4	85	95	110

b) An individual has two investment options to invest a sum of Rs. 10,000. Option one gives 9% interest compounded half yearly. Option two gives 9.5% interest compounded yearly. Compare the returns on both the options at the end of 3 years and decide which option is better. [5]

c) Find present value of an annuity due of annual payment of Rs. 10,000 at interest rate of 10% p.a. Compounded yearly for a period of 20 years. [4]

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