(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 3090   Roll No. [ ][ ][ ][ ][ ][ ][ ][ ][ ]

B. Tech.

(SEM. VI) EXAMINATION, 2007-08
INDUSTRIAL MANAGEMENT

Time : 3 Hours]   *[Total Marks : 100*

Note :   *(1)*   Attempt **all** *questions.*

           (2)   *All questions carry **equal** marks.*

1   Attempt any **four** of the following :   5×4=20

    (a)   What is operations research ? Account for the growing importance of operations research in business decisions.

    (b)   What is simulation ? Enumerate the steps involved in simulation process. Mention its application in business.

    (c)   A company produces three types of parts for automatic washing machines. It purchases castings of the parts from a local foundry and then finishes the parts on drilling, shaping and polishing machines. The selling prices of parts A, B and C respectively are Rs. 8, Rs. 10 and Rs. 14. All parts made can be sold. Castings for parts A, B and C respectively cost Rs. 5, Rs. 6 and Rs. 10. The company possesses only one of each type of

machine. Costs per hour to run each of the three machines are Rs. 20 for drilling, Rs. 30 for shaping and Rs. 30 for polishing. The capacities (parts per hour) for each part on each machine are shown in the following table :

Machine	Capacity per hour		
	Part – A	Part – B	Part – C
Drilling	25	40	25
Shaping	25	20	20
Polishing	40	30	40

Formulate the above problem as a linear programming problem with a view to maximizing profit.

(d) Timber Ltd. has two products Sofa and Chair to produce one unit of sofa, 2 units of material X and 4 units of material Y are required. To produce one unit of chair, 3 units of material X and 2 units of material Y are required. As the raw material is in short supply not more than 16 units of each material, can be used. The cost per unit of material X and material Y are Rs. 2.50 and Rs. 0.25 respectively. At least 2 units of sofa must be produced and sold. You are required to find out minimum cost graphically.

(e) Explain the phenomenon of infeasibility in an LP problem. What are the indicators of such a phenomenon ? How can it be handled ?

(f) What is the difference between slack, surplus and artificial variables ? How do they differ in their structure and use ?

2   Answer any **four** of the following :

(a)   Use Simplex method to solve the following LP problem :

Maximize $Z = 5x_1 + 3x_2$

S.T. $x_1 + x_2 \leq 6$

$2x_1 + 3x_2 \leq 12$

$x_1 \leq 3$

$x_2 \leq 3$

$x_1, x_2, x_3 \geq 0$

(b)   What do you understand by the problem of alternative optima ? With the help of the following problem, explain the practical significance of such phenomenon :

Max. $Z = 2x_1 + 4x_2$

S.T. $x_1 + 2x_2 \leq 5$

$x_1 + x_2 \leq 4$

$x_1, x_2 \geq 0$

(c) Find the initial feasible solution to the following transportation problem by VAM method :

	W_1	W_2	W_3	W_4	Supply
F_1	48	60	56	58	140
F_2	45	55	53	60	260
F_3	50	65	60	62	360
F_4	52	64	55	61	220
Demand	200	320	250	210	

(All entries indicate unit costs $F_i \rightarrow$ Factory

$W_j \rightarrow$ Warehouse)

(d) What do you understand by unbalanced transportation problem ? How would you convert it into balanced transportation problem ? What is the indication that the given transportation problem has multiple optimal solutions ?

(e) What kind of decision making situations may be analysed using PERT and CPM techniques ? Compare between PERT and CPM.

(f) Consider the following project :

Activity	Predecessors	Time (weeks)		
		t_0	t_m	t_g
A	—	3	6	9
B	—	2	5	8
C	A	2	4	6
D	B	2	3	10
E	B	1	3	11
F	C, D	4	6	8
G	E	1	5	15

Draw the network diagram and find out the critical path.

3 Answer any **two** of the following :   10×2=20

(a) Describe the maximin and minimax principles of game theory. .

(b) Further give the linear programming equivalent to a game theory problem.

(c) Find the optimal strategies for A and B in the following game. Also obtain the value of the game :

		B's strategy		
		b_1	b_2	b_3
A's strategy	a_1	9	8	-7
	a_2	3	-6	4
	a_3	6	7	-7

(d) What is a queuing problem ? Analyse the following queuing systems by describing their various system properties :

(i) Hospital emergency room

(ii) Traffic light.

4 Answer any **two** of the following :   10×2=20

(a) Write a lucid note on patents and intellectual propriety rights with reference to recent developments.

(b) The rate of arrival of customers in a telephone booth follows Poisson distribution with an average time of ten minutes between one customer and the next the duration of the phone call is assumed to follow exponential distribution with a mean time of three minutes :

(i) What is the probability that a person arriving at the booth will have to wait ?

(ii) What is the average length of the queue ?

(c) Why does degeneracy arise in the solution of

(i) a transportation problem

(ii) an LP problem.

In case of a transportation problem, why is it necessary to resolve degeneracy before testing any basic feasible solution for optimality ?

5 Answer any **four** of the following :   5×4=20

(a) What is the need for management in engineering ? How engineering management is different from general management ?

(b) "For managing today's modern technology, it is necessary to have a suitable organization structure, wherein the people will be able to put in their best." Discuss with the help of an example.

(c) Briefly discuss the factors to be taken into consideration while deciding about a particular type of technology for an organization.

(d) How is project management different from managing an established organization ? Explain with the help of an example.

(e) What are different forms of organizations for managing a project ? Mention any one with the help of an example.

(f) Briefly discuss the impact of technological development on project management.