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08MBA21

Second Semester MBA Degree Examination, December 2012
Quantitative Techniques for Management

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FOUR full questions from Q.No.1 to 7.*
2. Q.No.8 is compulsory
3. Use of statistical tables is permitted.

1 a. Define operation research. **(03 Marks)**

b. Explain scope of operation research. **(07 Marks)**

c. Following table shows time estimate of a project in days:

Activity	1-2	1-3	1-4	2-5	3-5	4-6	5-6
t_o	1	1	2	1	2	2	3
t_m	1	4	2	1	5	5	6
t_p	7	7	8	1	14	8	15

i) Draw the project network.

ii) Calculate critical path.

iii) What is the probability that the project will not take more than four days latter than expected? **(10 Marks)**

2 a. What are three components of linear programming? **(03 Marks)**

b. Write the dual of the following LPP

Minimize $Z = 2x_1 + 3x_2 + 4x_3$

Subject to constraints : $2x_1 + 3x_2 + 4x_3 \geq 2$

$3x_1 + x_2 + 7x_3 = 3$

$x_1 + 4x_2 + 6x_3 \leq 5$

$x_1, x_2, x_3 \geq 0$ **(07 Marks)**

c. Solve the following LPP graphically.

Minimize $Z = 20x + 40y$

Subject to constraints : $6x + y \geq 18$

$2x + y \geq 10$

$x + 4y \geq 12$

$x, y \geq 0$ **(10 Marks)**

3 a. How do you solve maximization type of assignment problem? **(03 Marks)**

b. Solve the following transportation problem using north west corner rule: **(07 Marks)**

	Distribution centers				Supply
Sources	D_1	D_2	D_3	D_4	
S_1	14	25	45	5	6
S_2	35	25	35	55	8
S_3	35	3	65	15	16
Requirement	4	7	6	13	

c. Solve the following transportation problem by Vogel's approximation method (VAM):

	To warehouses				
From factories	D	E	F	G	Supply
A	7	14	8	12	400
B	9	10	12	5	300
C	11	6	11	4	300
Requirement	200	450	300	250	

(10 Marks)

4 a. What is crashing of the activity? **(03 Marks)**

b. Draw the network from the information given below:
A < C, D, I ; B < G, F ; D < G, F ; F < H, K ; G, H < J ; I, J, K < E. **(07 Marks)**

c. A project schedule has the following data:

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

i) Construct network diagram.
ii) Perform forward pass and backward pass computation.
iii) Calculate total float.
iv) Based on total float calculate critical path. **(10 Marks)**

5 a. What is the difference between PERT and CPM? **(03 Marks)**

b. There are five jobs, each of which must go through the two machines A and B in order AB. Processing time are given below:

Job	1	2	3	4	5
A	5	1	9	3	10
B	2	6	7	8	4

Determine a sequence for the five jobs that will minimize the total elapsed time and machine idle time. **(07 Marks)**

c. The owner of a machine shop has four mechanics available to assign jobs for the day. Five jobs are offered with expected profit for each mechanic on each jobs are:

		Job				
		A	B	C	D	E
Mechanic	1	6	8	5	10	8
	2	7	8	6	7	6
	3	9	9	11	7	8
	4	5	7	9	8	8

By using assignment method, find the assignment of mechanics to the jobs that will result in maximum profit. Which job should be declined? **(10 Marks)**

6 a. What is saddle point in game theory? **(03 Marks)**

b. Solve the following game by mini-max and max-min method. **(07 Marks)**

		Player B				
Player A		3	−1	4	6	7
		−1	8	2	4	12
		16	8	6	14	12
		1	11	−4	2	1

c. Solve the following game applying dominance principle:

		Player B			
		B_1	B_2	B_3	B_4
Player A	A_1	7	7	5	1
	A_2	6	4	3	0
	A_3	8	10	0	2
	A_4	11	20	2	3

(10 Marks)

7 a. What are the components of queuing system? **(03 Marks)**

b. An airlines organization has one reservation clerk on duty in its local branch at any given time. The clerk handles information regarding passenger reservation and flight timings. The number of customers arriving during any given period is Poisson distributed with an arrival rate of eight per hour and he serves the customer in six units on an average with an exponentially distributed service time:

i) What is the probability that the system is busy.

ii) What is the average time a customer spends in the system?

iii) What is the average length of the queue and what is the number of customers in the system? **(07 Marks)**

c. A machine operator has to perform three operations A, B and C. The time required to perform these operations (in minutes) on each job is known. Determine the order in which the jobs should be processed in order to minimize the total time required to comple the jobs. Also find minimum elapsed time and idle time of each machine. **(10 Marks)**

Job	1	2	3	4	5	6
A	3	12	5	2	9	11
B	8	6	4	6	3	1
C	13	14	9	12	8	13

8 a. Explain any three area of application of simulation. **(03 Marks)**

b. Explain steps in Monte Carlo simulation. **(07 Marks)**

c. A book stall owner stocks a particular magazine past records show weekly demand as follows:

Demand	20	25	30	35	40	45
Probability	0.10	0.16	0.20	0.34	0.15	0.05

Using the following sequence of random numbers 23, 32, 14, 35, 75, 90, 62, 74, 31, 40, 95, 89 simulate the demand for the next 12 weeks. If the stall owner decides to order 35 copies every week compute:

i) The average number of copies not sold.

ii) The average size of unfilled demand. **(10 Marks)**

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