JAIPURIA INSTITUTE OF MANAGEMENT, NOIDA
PGDM / PGDM (M) / PGDM (SM)
2nd TRIMESTER (Batch 2016-18)
END TERM EXAMINATIONS

Course Name	Quantitative Analysis for Management-II (QAM-II)	Course Code	OP-201
Max. Time	2 Hours	Max. Marks	40

INSTRUCTIONS: Attempt all questions

Q. No. 1   Dwight is an elementary school teacher who also raises pigs for supplemental income. He is trying to   decide what to feed his pigs. He is considering using a combination of pig feeds available from local suppliers. He would like to feed the pigs at minimum cost while also making sure each pig receives an adequate supply of calories and vitamins. The cost, caloric content, and vitamin content of each feed are given in the table below.

Contents	Feed Type A	Feed Type B
Calories (per pound)	800	1,000
Vitamins (per pound)	140 units	70 units
Cost (per pound)	$0.40	$0.80

Each pig requires at least 8,000 calories per day and at least 700 units of vitamins. A further constraint is that no more than one-third of the diet (by weight) can consist of Feed Type A, since it contains an ingredient which is toxic if consumed in too large a quantity. Formulate a linear programming model for this problem.

(6 Marks)

Q. No. 2   Anderson Electronics is considering the production of four potential products: VCRs, Stereos, TVs and DVD players. It is assumed that the input for all products can be viewed in terms of just three resources': electronic components, non-electronic components and assembly time the composition of the four products In terms of these three inputs, maximum supply required, and profit per unit of the products is shown in the table given below.

	VCR	Stereo	TV	DVD Player	Max. Supply
Electronic components	3	1	4	3	1700
Non-electronic Components	2	2	4	3	4500
Assembly Time(Hrs)	1	1	3	2	2500
Profit (per unit)	$29	$32	$72	$54	

Linear programming problem is solved for profit maximization and sensitivity report of the same is given below.

Sensitivity Report Worksheet: Anderson Electronics

Adjustable Cells

Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease
B5	Solution value VCR	0.00	-1.00	29.00	1.00	1E+30
C5	Solution value Stereo	360.00	0.00	32.00	40.00	1.67
D5	Solution value TV	0.00	-8.00	72.00	8.00	1E+30
E5	Solution value DVD	1080.00	0.00	54.00	10.00	5.00

Constraints

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
F10	Electronic comp	4700.00	2.00	4700.00	2800.00	950.00
F11	Non-electronic comp	3940.00	0.00	4500.00	1E+30	560.00
F12	Assembly time	2500.00	24.00	2500.00	466.67	1325.00

Questions:

a. What is the impact on profit of a change in the supply of non-electronics components?
b. What is the impact on profit if we could increase the supply of electronic components by 400 units?
c. What would happen if we force the production of VCRs?
d. If Anderson increase profit on Stereo up to $40, what would be impact on current optimal production plan?

(4 Marks)

Q. No. 3

a) Three products of three plants X, Y, and Z are to be transported to four ware houses I, II, III, and IV. The cost of transportation of each unit from plant to warehouses along with the normal capacities of the plants and warehouses are indicated below:

FROM	TO				Available
	I	II	III	IV	
X	$25	$17	$25	$14	300
Y	$15	$10	$18	$24	500
Z	$16	$20	$8	$13	600
REQUIREMENTS	300	300	500	500	

Calculate minimum transportation cost using VAM.

b) A department of a company has five employees with five jobs to be performed. The time (in hours) that each person takes to perform each job is given in the effectiveness matrix.

		Employees				
		I	II	III	IV	V
Jobs	J1	10	5	13	15	16
	J2	3	9	18	13	6
	J3	10	7	2	2	2
	J4	7	11	9	7	12
	J5	7	9	10	4	12

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

(2.5X2=5 Marks)

Q. No.4   Use graphical method for solving the following game and find the value of game.

		Player B			
		B1	B2	B3	B4
Player A	A1	2	2	3	-2
	A2	4	3	2	6

(5 Marks)

Q. No.5

a) A retail store desires to determine the optimal daily order size for perishable items. The store buys the perishable item at the rate of $20 per KG and sells at the rate of $50 per KG. We assume the item has no value if it is not sold on the same day. Based on past experience it is found that demand varies from 50 KG to 200 KG in a step of 50 KG with probability 0.15, 0.20, 0.40 and 0.25 respectively. The possible values of the order size are from 50 KG to 200 KG in a step of 50 KG. Determine optimal order size which will maximize the daily profit of the store.

b) In the year 2016, Bakery A had 40% of local market share while other two bakeries B and C 40% and 20 % market share respectively. Based upon a study by a marketing research firm, the following facts

were compiled. Bakery A retains 90% of its customers while gaining 5% of B's customers and 10% C's customers. Bakery B retains 85% of its customers while gaining 5% of A's customers and 7% C's customers. Bakery C retains 83% of its customers while gaining 5% of A's customers and 10% C's customers. What will each firm's share be in year 2017?

(5X2=10 Marks)

Q. No. 6 A research and development department is developing a new power supply for a console television set. It has broken the job down in to the following:

JOBS	IMMEDIATE PREDECESSORS	TIME (DAYS)
A: Determine output voltages	-	5
B: Determine whether to use solid state rectifiers	A	7
C: Choose rectifiers	B	2
D: Choose filters	B	3
E: Choose transformers	C	1
F: Choose chassis	D	2
G: Choose rectifiers mounting	C	1
H: Layout Chassis	E, F	3
I: Build and Test	G, H	10

Draw the network diagram for the project. Identify the critical path and minimum time in which project can be completed?   (10 Marks)