



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

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

**INSTRUCTIONS: Attempt all questions**

**Q. No. 1** Ken and Larry, Inc., supplies its ice cream parlors with three flavors of ice cream: chocolate, vanilla, and banana. Due to extremely hot weather and a high demand for its products, the company has run short of its supply of ingredients: milk, sugar, and cream. Hence, they will not be able to fill all the orders received from their retail outlets, the ice cream parlors. Due to these circumstances, the company has decided to choose the amount of each flavor to produce that will maximize total profit, given the constraints on supply of the basic ingredients.

The chocolate, vanilla, and banana flavors generate, respectively, \$1.00, \$0.90, and \$0.95 of profit per gallon sold. The company has only 200 gallons of milk, 150 pounds of sugar, and 60 gallons of cream left in its inventory. The linear programming formulation for this problem is shown below in algebraic form. This problem was solved using the Excel Solver. The sensitivity report are shown below.

**Microsoft Excel 12.0 Sensitivity Report**

**Adjustable Cells**

Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease
\$B\$9	Solution Chocolate	0	-0.0375	1	0.0375	1E+30
\$D\$9	Solution Vanilla	300	0	0.9	0.05	0.0125
\$E\$9	Solution Banana	75	0	0.95	0.021428571	0.05

**Constraints**

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
\$F\$5	Milk Totals	180	0	200	1E+30	20
\$F\$6	Sugar Totals	150	1.875	150	10	30
\$F\$7	Cream Totals	60	1	60	15	3.75

For each of the following parts, answer the question as specifically and completely as is possible without solving the problem again on the Excel Solver.

(a) What is the optimal solution and total profit?

(b) Suppose the profit per gallon of banana changes to \$1.00. Will the optimal solution change, and what can be said about the effect on total profit?

(c) Suppose the profit per gallon of banana changes to 92¢. Will the optimal solution change, and what can be said about the effect on total profit?

(d) Suppose the company discovers that 3 gallons of cream have gone sour and so must be thrown out. Will the optimal solution change, and what can be said about the effect on total profit?

(e) Suppose the company has the opportunity to buy an additional 15 pounds of sugar at a total cost of \$15. Should they? Explain. (5X1=5 Marks)

### Q. No. 2

Marc Smith's construction firm currently has three projects under way in various places. Each requires a specific supply of gravel. Three gravel pits are available to provide smith's needs but shipping cost differs from location to location. The following table summarizes the problem smith faces:

FROM	TO			TONNAGE ALLOWANCE
	JOB 1	JOB 2	JOB3	
WATERLOO PIT	\$9	\$8	\$7	1500
DES MOINES PIT	\$7	\$11	\$6	1750
LOWA CITY PIT	\$4	\$3	\$12	2750
JOB REQUIREMENTS (TONS)	2000	3000	1000	

Formulate problem as LPP

(5 Marks)

Q. No. 3 Use graphical method for solving the following game and find the value of game.

	Player B	
	B1	B2
Player A	A1	1      -3
	A2	3      5
	A3	-1     6

	A4	4	1
	A5	2	2
	A6	-5	0

(5 Marks)

**Q. No. 4** Waldo books need to decide how many copy of new hard release to purchase for its shelves. The store has assumed that demand will be 50, 100, 150 or 200 copies next month, and it need to decide whether to order 50, 100, 150 or 200 copies for this period. Each book cost Waldo \$30 and can be sold for \$50. Waldo can sell any unsold books back to supplier in \$5. After researching the market, Waldo Books has concluded that the probabilities of selling 50, 100, 150 or 200 copies next month are 0.2, 0.35, 0.25 and 0.2 respectively. How many books should Waldo order?

(5 Marks)

**Q. No. 5** The school of "International Studies for Population" found out by its survey that the mobility of the population (in per cent) of a state to village and town to city in the following percentages.

	To			
		Village	Town	City
FROM	Village	50	30	20
	Town	10	70	20
	City	10	40	50

What will be proportion of population in village, town and city after two years given that the present population has proportion of 0.7, 0.2 and 0.1 in the village, town and city respectively?

(5 Marks)

**Q. No. 6** Dr. Adinombe Watage, deputy director of the Family Planning Research Center in Nigeria's Over-the-river Province, was assign the task of organizing and training five teams of field workers to perform educational and outreach activities as a part of large project to demonstrate acceptance of a new method of birth control. These workers already had training in family planning education but must receive special training regarding the new method of contraception. Two types of material must also be prepared: those for use in training for workers and those for distribution in the field. Training faculty must be brought in, and arrangement must be made for transportation and accommodation for the

participants. Dr. Watage first called a meeting of this office staff. Together they identified the activities that must be carried out, and their necessary sequences and the time they would require mentioned in the table below:

ACTIVITY	IMMEDIATE PREDECESSORS	TIME (DAYS)
A: Identify faculty and their schedules	-	5
B: Arrange transport to base	-	7
C: Identify and collect training materials	-	5
D: Arrange accommodation	A	3
E: Identify team	A	7
F: Bring in team	E	2
G: Transport faculty to base	B	3
H: Print program material	C	10
I: Have program material delivered	H	7
J: Conduct training program	D, F, G, I	15
K Perform fieldwork training	J	30

Draw network diagram for the project. Identify the critical path and project completion time. Calculate the total float for all the activities of the project.

(15 Marks)