PGDM (IBM), 2017

Data Analytics

INS 307

Trimester – III, End-Term Examination: March 2017

Time allowed: 2 hrs 30 min Max Marks: 50

Roll No: _____

Instruction: Students are required to write Roll No on every page of the question paper, writing anything except the Roll No will be treated as **Unfair Means.** In case of rough work please use answer sheet.

Section - A

Attempt any 3 out of 5 questions from this section. Each question carries 5 marks .

Question 1 It is important to understand the assumptions underlying the use of any quantitative analysis model. What are assumptions and requirements for an LP model to be formulated and used?

Question 2 Prentice Hall, Inc., a publisher headquartered in New Jersey, want to assien three recently hired college graduate, Jones, Smith and Wilson to regional sales district in Omaha, Dallas and Miami. But the firm also has an opening in New York and would sent one of the three there if it were more economical than a move to Omaha, Dallas, or Miami. It will cost $1000 to relocate Jones to New York, $800 to relocate Smith ther, and $1500 to move Wilson. What is the optimal assignment of personnel to office?

Office	OMAHA	MIAMI	DALLAS
Hiree			
Jones	$800	$1,100	$1,200
Smith	$500	$1,600	$1,300
Wilson	$500	$1,000	$2,300

Question 3 What is additive normalization in AHP?

Question 4 Under what conditions is it possible for an LP problem to have more than one optimum solution?

Question 5 Construct a network for a project having the following activities and activity time and find the critical path:

ACTIVITY	A	B	C	D	E	F	G
PREDECESSOR	-	-	A	A	C , B	C , B	D , E
TIME (MONTH)	4	6	2	6	3	3	5

Attempt any 2 out of 3 questions from this section. Each question carries 10 marks.

Question 1 A company manufactures two products A & B both the product passes through two machines M1 & M2. The time required to process each unit of products A & B on each machine & available capacity of each machine is given below.

Product	M1 (time per units)	M2 (time per units)
A	6	2
B	4	4
Available Capacity (hrs)	3600	2000

The profits on product A and B are Rs. 100 and Rs. 150 respectively. Solve the problem to get the optimal solution. Also formulate the dual.

Question 2 An organization was investigating relocation its corporate headquarters to one of the three possible cities. The pair wise comparison matrix shows the president's judgment regarding the desirability for the three cities.

$$\begin{pmatrix} 1 & 7 & 3 \\ 1/7 & 1 & 6 \\ 1/3 & 1/6 & 1 \end{pmatrix}$$

Determine the priorities for the three cities. Is the President consistent in terms of the judgment provided? Explain.

Question 3 A marketing manager has 5 salesmen and 5 districts. Considering the capabilities of the salesmen and the nature of districts. The marketing manager estimates that sales per month (In Hundred Rupees), for each salesman in each district are as follows:-

Districts	Salesmen				
	A	B	C	D	E
1	32	38	40	28	40
2	40	24	28	21	36
3	41	27	33	30	37
4	22	38	41	36	36
5	23	33	40	35	39

Find the assignment of salesman to district that will result in maximum sale.

Section - C

Compulsory Case Study (15 Marks)

Bluegrass Farms, located in Lexington, Kentucky, has been experimenting with a special diet for its racehorses. The feed components available for the diet are a standard horse feed product, a vitamin-enriched oat product, and a new vitamin and mineral feed additive. The nutritional values in units per pound and the costs for the three feed components are summarized in the following Table; for example, each pound of the standard feed components contains 0.8 unit of ingredient A, 1 unit of ingredient B, and 0.1 unit of ingredient C. The minimum daily diet requirements for each horse are three units of ingredient A, six units of ingredient B, and four units of ingredient C. In addition, to control the weight of the horses, the total daily feed for a horse should not exceed 6 pounds. Bluegrass Farms would like to determine the minimum-cost mix that will satisfy the daily diet requirements.

Table: Nutritional Value and Cost Data for the Bluegrass Farms Problem.

Feed Component	Standard	Enriched Oat	Additive
Ingredient A	0.8	0.2	0.0
Ingredient B	1.0	1.5	3.0
Ingredient C	0.1	0.6	2.0
Cost per pound	$0.25	$0.50	$3.00

Microsoft Excel Sensitivity Report

Adjustable Cells

Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease

C3	S	3.514	0.000	0.25	1E+30	0.642857143
D3	E	0.946	0.000	0.5	0.425	1E+30
E3	A	1.541	0.000	3	1E+30	1.47826087

Constraints

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
F7		3.000	1.216	3	0.368421053	1.857142857
F8		9.554	0.000	6	3.554054054	1E+30
F9		4.000	1.959	4	0.875	1.9
F10		6.000	-0.919	6	2.478260869	0.4375

a. Develop a LP model. What is the optimal solution, and what is the total profit? What is the plan for the use of overtime?

b. Referring to the sensitivity report, write down the intervals for profit coefficients and resources.

c. Referring to the sensitivity report, explain the reduced cost and shadow Price.