JAIPURIA
INSTITUTE OF MANAGEMENT
LUCKNOW NOIDA JAIPUR INDORE

JAIPURIA INSTITUTE OF MANAGEMENT, NOIDA
PGDM / PGDM (M) / PGDM (SM)
FIFTH TRIMESTER (Batch 2017-19)
END TERM EXAMINATIONS, JANUARY 2018

Course Name	Management Science	Course Code	OP 201
Max. Time	2 hours	Max. Marks	40

INSTRUCTIONS: *Attempt all questions. Marks are indicated against each question.*

1. The Furniture Works Company is producing three type of furniture A, B and C on the monthly basis. The unit profit would be Rs. 6000, Rs. 3500 and Rs. 3000 respectively. The products use three machines with limiting capacity as: Cutter 600 hours, Smoother 400 hours and Polisher 150 hours. Company wants to know how many units of each product to produce to maximize the profit. From operation department of the company, following results were provided. **(4)**

SensitivityReport

Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease
C4	Product A	34.26	0	6000	200	2300
D4	Product B	70.45	0	3500	1E+30	100
E4	Product C	18.50	0	3000	2000	120

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
F5	Cutter	600	389	600 500	60	130
F6	Smoother	400	150	400 350	190	70
F7	Polisher	118	0	150 150	1E+30	50

(i) Suggest the optimum production policy to the company with appropriate recommendations.

(ii) Comment on the utilization of resources available with the company?

(iii) The company can arrange additional time for the Smoother by hiring a part-time worker. The worker is asking for a charge of Rs. 500 for 1 hour of smoothening time. What recommendations would you give in this aspect and why?

(iv) If company is to hire only one worker for either Cutter or Smoother or Polisher, suggest for which job worker is to be hired?

2. Two firms A and B have for years been selling a competing product which forms a part of both firms total sales. The marketing executive of Firm A raised the question: 'What should be the firm's strategies in terms of advertising for the product'. The market research team of Firm A developed the following information for the varying degree of advertising:

- 'No advertising', 'medium advertising' and 'large advertising' for both firms will result in equal half market shares.
- If Firm A uses 'no advertisement' then Firm A will have 52 % of the market share for the 'medium advertising' by Firm B and 28% of the market share for the 'large advertising' by Firm B.
- If Firm A uses 'medium advertisement' then Firm B will lose 70% market share with 'no advertising' and lose 45% market share with 'large advertising' strategy.

- If firm A uses 'large advertising', Firm A will have 75% market share for the 'no advertising' of firm B and 48% market share for the 'medium advertising' by Firm B.

Construct the payoff table and suggest the optimum advertising strategy for the firm A. **(8)**

3. A market analysis group studying ca purchasing trends in a certain region concluded that on average, a new car is purchased once every 3 years. The buying patterns are described by the following matrix

		Period-1	
		Small	Large
Period-0	Small	80%	20%
	Large	40%	60%

The first row indicates that of the current small cars, 80% will be replaced by with small car, and 20 % with large cars. The second row implies that 40% of the current large cars will be replace with small cars and 60 % replaced by large cars. If there are 40,000 small and 50,000 large cars in the region, what will the distribution be in 2 years? **(4)**

4. "McSandwich" a fast food outlet sells sandwich. The sandwiches are sold in dozens and the probability of demand (in dozen sandwiches) is given below. Each dozen of sandwich costs Rs 22/- and is sold for Rs 30/-. The unsold sandwiches are scraped to a cattle food organization for Rs 18/- per dozen. Find out the best policy for "McSandwich". **(8)**

Demand in Dozens	65	70	75	80	85	90	95
Probability	0.1	0.15	0.25	0.3	0.1	0.05	0.05

5. You need to take a trip by car to another town (node 7) that you have never visited before. Therefore, you are studying a map to determine the shortest route to your destination. Depending on which route you choose, there are five other towns (**node 2, 3, 4, 5 and 6**) that might pass through on the way. The table shows the mileage along each road that directly connects two towns without any intervening towns. A dash indicates that there is no road directly connecting these two towns without going through any other towns.
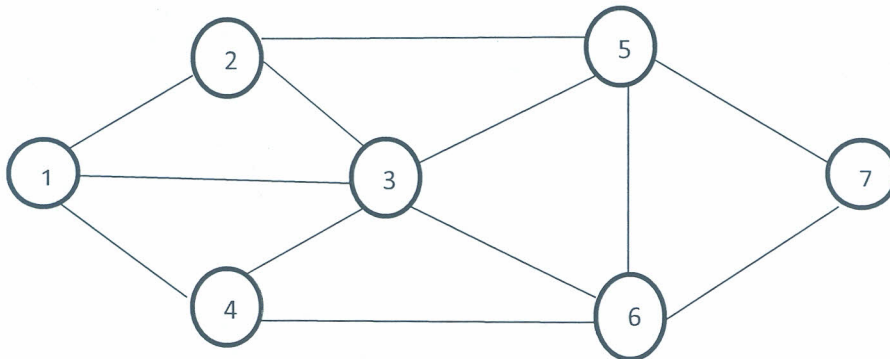
Town	Miles between Adjacent Towns					
	Node 2	Node 3	Node 4	Node 5	Node 6	Node 7
Node 1	40	60	50	---	----	-----
Node 2		10	-----	70	----	-----
Node 3			20	55	40	-----
Node 4				----	50	----
Node 5					10	60
Node 6						80

Formulate this problem as the shortest path problem. **(8)**

6. The hospital administrators at General Hospital, University Hospital, County Hospital, and State Hospital have been meeting to discuss ways in which they can help one another improve the performance at each of their hospitals. A consultant suggested measuring the performance of each hospital relative to the performance of all four hospitals. Data envelopment analysis was used to evaluate the relative efficiencies of four hospitals.

To determine the weight that each hospital will have in computing the outputs and inputs for the composite hospital, we use the following decision variables: wg = weight applied to inputs and outputs for General Hospital, wu = weight applied to inputs and outputs for University Hospital, wc = weight applied to inputs and outputs for County Hospital and ws = weight applied to inputs and outputs for State Hospital.

Data for input measures and output measures were provided in the following solution is optimal using Excel.

	E	wg	wu	wc	ws			
	0.905197	0.212266	0.260447	0	0.527287			
MinZ	1					0.905197		
Weights		1	1	1	1	1	=	1
Medicare patient-days (1000s)		48.14	34.62	36.72	33.16	36.72	>=	36.72
Non-Medicare patient-days (1000s)		43.1	27.11	45.98	56.46	45.98	>=	45.98
Nurses trained		253	148	175	160	176.6154	>=	175
Interns trained		41	27	23	84	60.02707	>=	23
Full-time equivalent nonphysicians	-275.7	285.2	162.3	275.7	210.4	-35.8128	<=	0
Supply expense ($1000s)	-348.5	123.8	128.7	348.5	154	-174.461	<=	0
Bed-days available (1000s)	-104.1	106.7	64.21	104.1	104.04	3.55E-14	<=	0

Questions: (8)

a) In the given output which hospital is being compared? What does the solution indicate about the efficiency of selected hospital?

b) Explain which hospital or hospitals make up the composite unit used to evaluate selected hospital and why.

c) Which hospitals would you recommend to consider emulating to improve the operations efficiency?

d) Can you identify most problematic area to improve efficiency of operation?