IIHMR UNIVERSITY

Institute of Health Management Research

MBA Hospital and Health Management

Batch-23 (2018-2020)

Hospital Management

Operations Management in Hospitals

Term Examination
August 2019

Time - 3 Hour **MM-70**

The question paper contains **4** printed pages. Attempt any ***five*** questions.

Q. 1. What is operations management? How you can apply in healthcare services production. Explain the various modern operations management tools and techniques that could be applied in hospitals. **[14]**

Q. 2. A hospital is considering a project of launching a new radiation oncology service. The with the list of necessary activities and their duration, in table below:

	Activity	**Immediate Predecessors**	**Duration (weeks)**
Start	A	-	6
	B	A	12
	C	A	10
	D	B	20
	E	B	11
	F	C	8
	G	E	6
	H	D,F	3
Finish	I	G,H	6

From the above information you are required to:

a) Draw the activity on arrow network for the project. **[4]**

b) Determine the critical path and ES, LS, EF, LF for each activity. **[6]**

c) Find the total, free and independent float for each non-critical activities. **[4]**

Q. 3. The activities of a hospital project are tabulated with the corresponding resource requirement is shown below:

Activity	Immediate Predecessor	Activity Time (weeks)	Number of resource units
A	-	4	2
B	-	4	1
C	-	4	2
D	A	2	5
E	B	3	2
F	C	2	2
G	D	3	5
H	G	5	3

Draw the resource aggregation graph using early start schedule. Carry out resource smoothing and draw the best levelled schedule and corresponding resource usage profile. **[14]**

Q. 4. (a) Explain the general structure of the linear programming model. **[4]**

(b) A regional laboratory that performs nontraditional tests is planning to offer new diagnostic tests for regional hospitals. Current analyzers and staff are capable of performing these tests. The laboratory manager assessed the required staff and analyzer times, as well as the chemical materials required for a bundle of 50 vials for each type of test listed in Table.

TABLE

Test Type →	I	II	III	IV	V	Available Resources
Profit ($)	8	10	8	7	10	
Staff (minutes)	15	15	15	20	25	3,400
Auto analyzer equipment (minutes)	20	40	40	60	45	6,000
Materials	12	15	16	14	14	2,700

Formulate this as a linear programming problem, clearly identifying the decision variables, objective function, and constraints. **[10]**

Q. 5. (a) Explain the structure of transportation problem as a special class of the linear programming problem. **[4]**

(b) A Medical Supply company produces catheters in packs at three productions facilities. The company ships the packs from the production facilities to four warehouses. The packs are distributed directly to hospitals from the warehouses. The table shows the costs per pack to ship to the four warehouses.

Medical Supply

	TO WAREHOUSE			
FROM PLANT	**Seattle**	**New York**	**Phoenix**	**Miami**
Juarez	$19	$7	$3	$21
Seoul	$15	$21	$18	$6
Tel Aviv	$11	$14	$15	$22

The supply capacity and demand is as follows:

Capacity		**Demand**	
Juarez	100	Seattle	150
Seoul	300	New York	100
Tel Aviv	200	Phoenix	200
		Miami	150

Find the solution for the given problem by VAM method, if the object is to minimize total transportation cost. **[10]**

Q. 6. An orthopedic physician group practice uses 12cc syringes from Sherwood for its cortisone injections. During each of the last two years, forty thousand of the syringes were used in the office. Each syringe costs $ 1.50. The physician's office annually discards, on average, five hundred of the syringes that have became inoperable (broken, wrong injection material, lost). The syringes are stored in a room that occupies 2 percent of the storage area. The storage area constitutes 10% of the leased space. The annual office lease costs $ 60,000. The group

practice can secure loans from a local bank at 6% interest to purchase the syringes. For each placed order, it takes about three hours for an office assistant (whose hourly wage is $ 9.00 and who receives $ 3.25 in fringe benefits) to prepare and communicate the order and place its shipment in storage. In addition, each order's overhead share of equipment and supplies (phone, fax, computer, stationery paper) is approximately $ 4.50. In the past, the office assistant always placed 5,000 syringes in each order. The deliveries are made in boxes of one thousand syringes and are always received three working days after the order is placed.

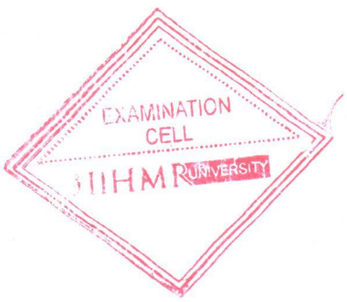
(a) What should be the EOQ for the 12cc syringe? **[8]**

(b) What are the inventory management costs for these syringes? **[4]**

(c) How many times in a year should an order be placed? **[2]**

Q. 7. Patient days in a hospital were recorded as shown in Table below.

Month	**Patient Days**
January	543
February	528
March	531
April	542
May	558
June	545
July	543
August	550
September	546
October	540
November	535
December	529



Predict naïve forecasts of patient days for February and June. Predict the patient days for January, using a four - period moving average and using the six - period moving average. Calculate MAD and MAPE, which forecast appears more accurate? Which method is a better predictor? **[14]**

Q. 8. Complaints of late responses to patient calls in a nursing unit trigger a study by the decision support department, requested by the nursing manager. A time study team made observations and compiled the data in Table below.

Observation	Day-1	Day-2	Day-3	Day-4	Day-5	Day-6	Day-7
1	3	6	2	4	5	3	4
2	6	5	3	7	3	4	1
3	4	2	5	3	5	3	6
4	7	6	5	9	2	5	4
5	8	3	3	3	4	3	2
6	12	8	4	2	3	7	6
7	5	6	5	6	5	7	4
8	6	4	8	5	8	4	7
9	8	7	6	4	3	6	2
10	9	6	2	3	4	11	2
11	6	3	3	8	4	4	5
12	4	7	4	3	3	2	9
13	7	2	5	5	5	3	3
14	11	4	7	3	2	1	3
15	7	6	3	2	3	4	2

The measurements are recorded in minutes (rounded to the nearest minute) of response time once the patient has pressed the call button.

a) Develop an X-chart and R-chart for the days for three-sigma or 99.7 percent confidence limits for patient call response times. **[6+6]**

b) Are there any days in violation of the confidence limits? **[2]**

(for n = 15, A_2 = 0.22, D_3 = 0.35 and D_4 = 1.65)

Q. 9. Write short notes on any ***two*** of the following: **[7 x 2 = 14]**

(i). Assignment problem and Hungarian Method.

(ii). 7 QC Tools for investigation of quality problems in Hospitals.

(iii). ABC Inventory Classification

(iv). Queuing & Capacity Planning in Hospitals.

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