IIHMR DELHI | INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT RESEARCH

Post Graduate Diploma in Management (Hospital & Health Management)
PGDM – 2022-24 Batch

Term – 2nd Year - 4th Term Examinations

Course & Code	:	**Operations Research in Healthcare-HEM 713**	**Reg. No.**	:	
Term & Batch	:	**IV, 2022-24**	**Date**	:	**September 22, 2023**
Duration	:	**3 Hrs.**	**Max. Marks**	:	**70**

Instructions:

- Budget your time as per the marks given for each question and write your answer accordingly.
- Don't write anything on the Question Paper except writing your Registration No.
- Mobile Phones are not allowed even for computations.
- All questions carry equal marks. Attempt any five. (5 x 14 marks = 70 marks)

1. The management of a company is interested in crashing of the following project by spending an additional amount not exceeding Rs. 2,000. Suggest how this can be accomplished.

Activity	Predecessor Activity	Normal Time (Weeks)	Crash Time (Weeks)	Normal Cost (Rs.)	Crash Cost (Rs.)
A	-	7	6	15,000	18,000
B	A	12	9	11,000	14,000
C	A	22	21	18,500	19,000
D	B	11	10	8,000	9,000
E	C, D	6	5	4,000	4,500

2. BIKO is a bike retailer located in the outskirts of Paris. BIKO purchases bikes from PMX in orders of 250 bikes which is the current economic order quantity. PMX is now offering the following bulk discounts to its customers:

   - 2% discount on orders above 200 units
   - 4% discount on orders above 500 units
   - 6% discount on orders above 600 units

Contd…2..

BIKO is wondering if the EOQ model is still the most economical and whether increasing the order size would be more beneficial. Following information is relevant to forming the decision:

- Annual demand is 5000 units.
- Ordering cost is $100 per order.
- Annual holding cost is comprised of the following:
    - 5% insurance premium for the average inventory held during the year calculated using the net purchase price
    - Warehousing cost of $6 per unit
- Purchase price is $200 per unit before discount.

3. The Peachtree Airport in Atlanta serves light aircraft. It has a single runway and one air traffic controller to land planes. It takes an airplane 12 minutes to land and clear the runway. Planes arrive at the airport at the rate of 4 per hour.

a. Determine the average number of planes that will stack up waiting to land.
b. Find the average time a plane must wait in line before it can land.
c. Calculate the average time it takes a plane to clear the runway once it has notified the airport that it is in the vicinity and want to land.
d. The FAA has a rule that an air traffic controller can on the average land planes a maximum of 45 minutes out of every hour. There must be 15 minutes of idle time available to relieve the tension. Will this airport have to hire an extra air traffic controller?

4. An investor is considering investing in two securities 'A' and 'B'. The risk and return associated with these securities is different. Security 'A' gives a return of 9% and has a risk factor of 5 on a scale of zero to 10. Security 'B' gives return of 15% but has risk factor of 8. Total amount to be invested is Rs. 5, 00, 000/- Total minimum returns on the investment should be 12%. Maximum combined risk should not be more than 6. Formulate as LPP.

5. A sales manager has to assign salesman to four territories. He has four candidates of varying experience and capabilities. The manager assesses the possible profit for each salesman in each territory as given below:

	Territory			
Salesman	T1	T2	T3	T4
S1	35	27	28	37
S2	28	34	29	40
S3	35	24	32	33
S4	24	32	25	28

Find the assignment of salesman to the territories so that the total profit is maximum.

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6. What are the different applications and extensions of Linear Programming. Explain Integer Programming and Goal Programming in detail.

7. Solve the following transportation problem using Vogel's Approximation Method: