International Institute of Health Management Research (IIHMR), New Delhi.
POSTGRADUATE DIPLOMA HOSPITAL AND HEALTH MANAGEMENT
(*Hospital Management Stream*)
(Batch 2017-2019)
OPERATIONS MANAGEMENT IN HOSPITALS
(HOM-716)
End Term Examination

Time allowed: 3 hrs   **Max. Marks: 70**

Note: Be brief and to the point. Answer any 5 questions. Each question carries 14 marks.

1. Define OR? What are the different phases in Operations Research?
   Describe briefly its applications in hospitals?

2. In a hospital layout, four different machines M1, M2, M3 and M4 are to be erected in a machine shop. There are five vacant areas A, B, C, D and E. Because of limited space, Machine M2 cannot be erected at area C and Machine M4 cannot be erected at area A. The cost of erection of machines is given in the table. What would be the erection cost of these four machines?

Area

	A	B	C	D	E
M₁	4	5	9	4	5
M₂	6	4	--	4	3
M₃	4	5	8	5	1
M₄	--	2	6	1	2

Machine (label for rows)

3. Find out the Economic Order Quantity and Order Schedule for the materials with the following data given to you:
   ➢ Cost of ordering: Raw Materials = Rs. 1,000 per order

      Packing Materials = Rs. 5,000 per order

   ➢ Cost of holding inventory: Raw Materials = 1 paisa per unit p.m.

      Packing Materials = 5 paisa per unit p.m.

   ➢ Production rate: 2,00,000 units per month

4. RELIABLE CONSTRUCTION COMPANY has just made the winning bid of Rs.5.4 million to construct a new hospital for a major hospital chain. The hospital chain needs the hospital to go into operation within a year. Therefore, the contract includes the following provisions: • A penalty of Rs. 300,000 if Reliable has not completed construction by the deadline 47 weeks from now. • To provide additional incentive for speedy construction, a bonus of Rs. 150,000 will be paid to Reliable if the plant is completed within 40 weeks. Reliable is assigning its best construction manager, David Pert, to this project to help ensure that it stays on schedule. He looks forward to the challenge of bringing the project in on schedule, and perhaps even finishing early. However, since he is doubtful that it will be feasible to finish within 40 weeks without incurring excessive costs, he has decided to focus his initial planning on meeting the deadline of 47 weeks. Mr. Pert will need to arrange for a number of crews to perform the various construction activities at different times. Table 10.1 shows his list of the various activities.

TABLE 10.1 Activity list for the Reliable Construction Co. project

Activity	Activity Description	Immediate Predecessors	Estimated Duration
A	Excavate	—	2 weeks
B	Lay the foundation	A	4 weeks
C	Put up the rough wall	B	10 weeks
D	Put up the roof	C	6 weeks
E	Install the exterior plumbing	C	4 weeks
F	Install the interior plumbing	E	5 weeks
G	Put up the exterior siding	D	7 weeks
H	Do the exterior painting	E, G	9 weeks
I	Do the electrical work	C	7 weeks
J	Put up the wallboard	F, I	8 weeks
K	Install the flooring	J	4 weeks
L	Do the interior painting	J	5 weeks
M	Install the exterior fixtures	H	2 weeks
N	Install the interior fixtures	K, L	6 weeks

Mr. Pert now wants to develop answers to the following questions. Can you help?
1. How can the project be displayed graphically to better visualize the flow of the activities?
2. What is the total time required to complete the project if no delays occur?
3. When do the individual activities need to start and finish (at the latest) to meet this project completion time?
4. When can the individual activities start and finish (at the earliest) if no delays occur?
5. Which are the critical bottleneck activities where any delays must be avoided to prevent delaying project completion?
6. For the other activities, how much delay can be tolerated without delaying project completion?
7. Given the uncertainties in accurately estimating activity durations, what is the probability of completing the project by the deadline?
8. If extra money is spent to expedite the project, what is the least expensive way of attempting to meet the target completion time (40 weeks)?
9. How should ongoing costs be monitored to try to keep the project within budget?

5. Government desires to inoculate its citizens against a certain flu virus. The virus has two strains, and the proportions in which the two strains occur in the virus population is not known. Two vaccines have been developed. Vaccine 1 is 85% effective against strain 1 and 70% effective against strain 2. Vaccine 2 is 60% effective against strain 1 and 90% effective against strain 2. What inoculation policy should the government adopt?

6. A Surgical Company wants to engage casual labors to assemble its products daily. The company works for only one shift which consists of 8 hours and 6 days a week. The casual labors consist of two categories, viz. skilled and semi-skilled. The daily production per skilled labor is 80 assemblies and that of the semi-skilled labor is 60 assemblies. The rejection rate of the assemblies produced by the skilled labors is 5% and that of semi-skilled labors is 10%. The loss to the company for rejecting an assembly is Rs. 25. The daily wage per labor of the skilled and semi-skilled are Rs. 240 and Rs. 160 respectively. The required weekly production is 1,86,000 assemblies. The company wants to limit the number of semi-skilled labors per day to utmost 400. Determine the optimal mix of casual labors to be employed so that the total cost (total wage + total cost of rejections) is minimized.

7. On average twenty customers per hour arrive at a hospital. There are c doctors available. Given that each doctor can deal with on average ten patients per hour, hospital administrators want to ensure that the average waiting time for any patient does not exceed 10 minutes. What is the smallest number of doctors that allows this?