Answer all the following questions:

Question 1 (30 marks)

The following are Multiple Choice Questions. Read the questions carefully and select the most appropriate answer for each question (Choose only **ONE** answer).

1. Which of the following is not a characteristic of service operations?
   a) high customer contact
   b) intangible output
   c) easy measurement of productivity
   d) low uniformity of output

2. *"Exactly the capacity and functionality needed, exactly when needed"*; This expression refers to
   a) Flexible Manufacturing Systems
   b) Cellular Manufacturing Systems
   c) Reconfigurable Manufacturing Systems
   d) none of the above

3. Which of the following does not relate to system design?
   a) Changing the system capacity
   b) Inventory management
   c) Selection and acquisition of equipment
   d) Physical arrangement of departments

4. Heuristic approaches used for line balancing will guarantee obtaining an optimal solution.
   a) True
   b) False

5. A process layout problem consists of 5 departments, each of which can be assigned to one of five locations. The number of different solution alternatives to be considered equals
   a) 25
   b) 120
   c) 3125
   d) None of the above

6. Extra capacity used to offset demand uncertainty is known as:
   a) Safety stock capacity
   b) Capacity cushion
   c) Capacity margins
   d) None of the above

7. Given that effective capacity = 80 units per day, design capacity = 100 units per day, and Utilization = 48%, what would efficiency be ?
   a) 48%
   b) 60%
   c) 80%
   d) None of the above

8. Which of the following aims to eliminate defects by preventing or detecting human-generated errors?
   a) Kaizen
   b) Poka-yoke
   c) SMED
   d) Kanban

9. A production line is to be designed for a job with three tasks. The task times are 0.4 minutes, 1.2 minutes, and 1.7 minutes. The maximum cycle time and the minimum cycle time equal.
   a) 1.7 and 0.4, respectively.
   b) 3.3 and 0.4 respectively.
   c) 3.3 and 1.7 respectively.
   d) none of these

10. The grouping of equipment by the operations needed to perform similar work for part families is :
    a) product layout
    b) cellular layout
    c) functional layout
    d) retail layout

Question 2 (20 marks)

a) "A systems approach means that we concentrate on efficiency within a subsystem and thereby assure overall efficiency." Do you agree or disagree with the previous statement? Justify your answer. (4 marks)

b) The essence of the operations function is to add value during the transformation process. Explain what is meant by value-added. (4 marks)

c) There are different techniques that can be used for evaluating capacity alternatives, identify four of these. (4 marks)

d) Provide a comparison between Job shop and repetitive processing with respect to the following: (4 marks)
   - Labor skills required
   - Scheduling complexity
   - Work-in-process inventory
   - Equipment utilization

e) A hardware distributor has regional warehouses at the locations shown below. The company wants to locate a new central distribution center to serve this warehouse network.

Location	(x, y)
WH 1	2,3
WH 2	3,7
WH 3	5,5
WH 4	7,3
WH 5	8,7

   i. If weekly shipments to each warehouse will be approximately equal, what is the optimal location for the distribution center? (2 marks)
   ii. If weekly shipments to each warehouse will be: WH1, 100; WH2, 150; WH3, 120; WH4, 150; and WH5, 120. What is the optimal location of the distribution center? (2 marks)

Question 3 (30 marks)

a) A company is designing an assembly line for a new product. It plans to operate this line eight hours a day, and its target is to meet a schedule of 40 units per day. The tasks necessary to produce this product are detailed in the table below.

Task	Immediate Predecessor	Task Time (in minutes)
A	---	10
B	A	11
C	B	5
D	B	4
E	A	12
F	C,D	3
G	F	7
H	E	11
I	G,H	3

   i. Determine the minimum number of workstations required. (4 marks)
   ii. Assign tasks to workstations on the basis of greatest number of following tasks. Use longest processing time as a tiebreaker. If ties still exist, assume indifference in choice. (8 marks)
   iii. Compute the resulting percent idle time and efficiency of the assembly line. (4 marks)

b) You have been assigned in this course to search for computer software for process oriented layouts, mention at least one of these, and briefly discuss its basic approach in designing process layouts. (4 marks)

c) Briefly discuss each of the following concepts:
agility, sustainability, takt time, kanban, heijunka. (10 marks)

Question 4 (20 marks)

a) Differentiate between independent and dependent demand.Specify in which case MRP is appropriate? (5 marks)

b) Identify the inputs of an MRP system? (3 marks)

c) Referring to the following product-tree: (4 marks)
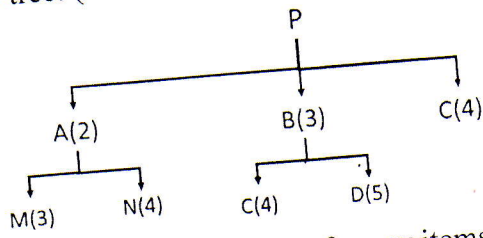
i. If 17 Ps are needed, and no on-hand inventory exists for any items, how many Cs will be needed?

ii. If 17 Ps are needed, and on-hand inventory consists of 10 As, 15 Bs, 20 Cs, 12 Ms, and 5 Ns, how many Cs are needed?

d) Complete the following MRP record for an item X, if you are given the following: (8 marks)
Lead times for X = 1 week
Lot size for X = Multiples of 40
Beginning inventory for X= 80 units

Week Number	1	2	3	4	5	6	7
Gross requirements			150	440			
Scheduled receipts		40					
Projected on hand							
Net requirements							
Planned-order receipts							
Planned-order releases							

===================== End of Questions ==

With my best wishes

Dr. Omayma Nada

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			This exam measures the following ILOs								
Question Number	Q1 Q3-b,c	Q1 Q2-a, Q4-a,b	Q1 Q3-c	Q1 Q2-c	Q1 Q3-a	Q1 Q4-d	Q2-d,e Q4-c	Q2-b Q3-a Q4-d	Q4-d	Q4-d	
			b1-1	b1-2	b2-1	b2-2	c1-1	c1-2	c1-3	c2-1	
Skills	a1-1	a1-2						Professional Skills			
	Knowledge &Understanding Skills				Intellectual Skills						

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