

## SUMMER EXAMINATION 2000

## Master of Engineering Science Degree

## INTEGRATED MANUFACTURING SYSTEMS

Dr. E. J. Wright  
 Prof. M. E. J. O'Kelly  
 Prof. J. Browne  
 Dr. S. Jackson  
 Dr. K. Goggin

Time allowed : 3 hours

Answer 5 Questions

1. (a) Distinguish clearly between "time to market" and "customer order fulfilment time".
- (b) Present a functional model of the Extended Enterprise, identifying clearly the major business processes in the model.
2. (i) What do you understand by the term "Manufacturing Strategy"?
- (ii) Hayess and Wheelwright presented one model of manufacturing strategy, in which they separated "structural" and "infrastructural" elements. Describe this model and indicate how it might be implemented in practice.
3. (a) What is the long-range production plan? How does it relate to the master production schedule?
- (b) How is total demand calculated in the MPS record?
- (c) Complete the following MPS record. Assume a safety stock of 20 items and a lead time of one month. Further, assume PAB(O) or the starting inventory, is 30.

<i>Item: Product A</i>		<i>Part number: FP-20</i>					
<i>Month Number</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	
Manual Forecast	40	50	50	60	40	50	
System Forecast	50	50	50	50	60	60	
Customer Orders	45	40	20	10	-	-	
Total Demand							
MPS							
PAB							
ATP							
Cumulative ATP							

4. (a) Differentiate clearly the respective roles of the scheduler and the dispatcher in a PAC system.
- (b) Explain the  $n/m/A/B/$  notation used to classify scheduling problems.
- (c) Use Moore's algorithm to solve the following  $6/1/N_T$  problem:

<i>Job Number</i>	1	2	3	4	5	6
Due Date	12	4	7	13	18	26
Production Time	4	2	4	3	3	5

5. (i) What is "flow based manufacturing"?
  - (ii) How does the JIT approach to manufacturing deal with the relationship between product and process variety?
  - (iii) Differentiate clearly between mixed model and multi-model production.
  - (iv) Differentiate clearly between the transfer lot and the process lot and show how the use of transfer lots reduces lead times.
6. (a) Explain why parametric representations have proved popular in computational geometry.
  - (b) A cubic Bézier curve is defined by the points (1,1) (2,3) (4,4) and (6,1). Calculate the coordinates of the parametric mid-point of this curve, and verify that its gradient is  $1/7$  at this point. Use this information to sketch the curve.
7. (a) Distinguish clearly between an engineering Bill of Material (BOM) and a planning BOM? Why are planning BOMs used?
  - (b) Why is "pegging" necessary in MRP systems? How does "single level pegging" differ from "full pegging"?
  - (c) Explain the background to the Least Total Cost Model, as used for lot sizing purposes in ERP systems.

oooOOOooo