NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY



FACULTY OF INDUSTRIAL TECHNOLOGY

DEPARTMENT OF INDUSTRIAL AND MANUFACTURING ENGINEERING

B-Eng Hons in Industrial and Manufacturing Engineering

2nd Semester Main Examination

- COURSE : MANUFACTURING SYSTEMS II
- **CODE** : TIE 3212
- DATE : APRIL/MAY 2014
- **DURATION** : 3 HOURS

INSTRUCTIONS AND INFORMATION TO CANDIDATES

- 1. Answer **ANY** five **(5)** questions.
- 2. All questions carry <u>20 marks</u> each.
- 3. This paper contains seven (7) questions.
- 4. There are four (4) printed pages.

QUESTION 1

- (a) Briefly outline the steps involved in binary ordering algorithm. [6]
- (b) By applying the binary ordering algorithm determine the natural groups that can be formed using information given in Table Q1. [14]

	Part					
Machine	1	2	3	4	5	6
Α			1		1	
В		1	1			
С	1			1		
D		1	1			
Е		1	1			1

Table Q1: Machine-part matrix

QUESTION 2

(a) Suppose that four machines, 1, 2, 3 and 4 have been identified as belonging in a machine cell. An analysis of 50 parts processed on these machines has been summarised in the from-to-chart presented in Table Q2. Additional information is that 50 parts enter the machine grouping at machine 3, 20 parts leave after processing at machine 1, and 30 parts leave after processing at machine 4. Determine a logical machine arrangement using the Hollier method. [12]

FROM	ТО			
	1	2	3	4
1	0	5	0	25
2	30	0	0	15
3	10	40	0	0
4	10	0	0	0

[8]

 Table Q2: From-to-chart for machine cell

(b) Draw the flow diagram for the machine cell.

QUESTION 3

Using examples describe the following coding methods used in Group Technology. Also state the main advantage of each coding method.

(a) Hierarchical code	[5]
(b) Attribute code	[5]
(c) MICLASS	[5]
(d) DCLASS	[5]

QUESTION 4

(a) Distinguish clearly between flow shop scheduling and job shop scheduling.	[6]			
(b) Outline three benefits of effective scheduling within the service sector.				
 (c) Briefly explain the following terms used in scheduling: i) Aggregate planning, ii) Master production schedule, iii) Material requirements planning, iv) Shop floor schedule. 	[2] [2] [2] [2]			

QUESTION 5

Table Q5 contains information on the cost of running three jobs on four available machines. Determine an assignment plan that will minimise costs. Also calculate the total cost associated with your plan. [20]

Table Q5: Cost of running jobs on machines

Job	Machine			
	Α	В	С	D
1	12	16	14	10
2	9	8	13	7
3	15	12	9	11

QUESTION 6

Processing times and due dates for six jobs waiting to be processed at a work center are given in Table Q6. Assuming that the jobs arrived in the order shown, determine the sequence of jobs, the average flow time, average tardiness, and the average number of jobs at the work center, for each of these rules:

(a) First Come First Served (FCFS) [5] (b) Shortest Processing Time (SPT) [5] [5]

[5]

- (c) Earliest Due Date (EDD)
 - (d) Critical Ratio (CR)

Table Q6:	Processing	times	and due	dates	for jobs
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Job	Processing Time (days)	Due date (days)
А	2	7
В	8	16
С	4	4
D	10	17
Е	5	15
F	12	18

QUESTION 7

- (a) Using appropriate examples distinguish between the two general approaches to scheduling. [10]
- (b) Using well labelled charts distinguish between the two approaches used to load work centers. [10]

END OF EXAMINATION PAPER