UNIVERSITY COLLEGE TATI (UC TATI)

FINAL EXAMINATION QUESTION BOOKLET

COURSE CODE	:	BMT 4013
COURSE	:	COMPUTER INTEGRATED MANUFACTURING
SEMESTER/SESSION:		2 – 2024/2025
DURATION	:	3 HOURS

Instructions:

1. This booklet contains **4** questions. Answer **all** questions.

2. All answers should be written in the answer booklet.

3. Write legibly and draw sketches wherever required.

4. If in doubt, rise up your hands and ask the invigilator.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

THIS BOOKLET CONTAINS 6 PRINTED PAGES INCLUDING COVER PAGE

COMPUTER INTEGRATED MANUFACTURING (BMT 4013)

QUESTION 1

a) Give the definition of setup time and explain how a long setup time affects manufacturing cost. (6 marks)

b) Describe the three-step process for implementing CIM. (6 marks)

c) A machine burden rate (the cost per hour to have the machine in production) is $250 per hour. Production requires three setups of 40, 80 and 60 minutes during three shifts. Calculate the annual cost of the setup time for a 5-day production operation? (7 marks)

d) A production system has a burden rate of $500 per hour. The setup time for a machined casting is 4.6 hours, and the system can produce a finished part every 10 minutes. For a lot size of 500 parts, how much of the part cost is associated with setup cost? (6 marks)

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QUESTION 2

a) Explain three (3) technologies used in automated guided vehicles (AGV) for its guidance system.

(5 marks)

b) Define and give example for each below;

i. Batch manufacturing

(3 marks)

ii. Mass manufacturing

(3 marks)

c) Describe the following types of automation systems.

i. Fixed automation system

(3 marks)

ii. Programmable automation system

(3 marks)

iii. Flexible automation system

(3 marks)

d) An automated work cell used by the manufacturer covers 600 square feet of factory floor space. The CNC process machine in the cell has a footprint that measures 80 inches by 100 inches. The remaining space includes pallets for raw materials and finished parts, an operator's desk, walking space around the machine, and an inspector's bench. Calculate the manufacturing-space ratio for the work cell.

(5 marks)

QUESTION 3

a) Describe in detail the Six Sigma methodology in quality improvement of a manufacturing system. (6 marks)

b) Discuss on how a manufacturing system can be considered as being a flexible manufacturing system. (6 marks)

c) State the difference between single machine cell, flexible manufacturing cell (FMC) and flexible manufacturing system (FMS) in based on the number of stations. (6 marks)

d) A 200 ft long conveyor, which operates at a velocity = 60 ft/min, is used to move pallets between load and unload stations. Each pallet carries 10 parts. Cycle time to load a pallet is 15 sec and one worker at the load station is able to load pallets at the rate of 4 per min. It takes 10 sec to unload at the unload station. Calculate;

i. Center-to center distance between pallets. (4 marks)

ii. Maximum possible flow rate in parts/min. (3 marks)

QUESTION 4

a) Discuss the difference between the traditional view of quality and the modern view.

(5 marks)

b) In choosing the suitable type of network topology to be used in a manufacturing system, the factors to be considered include cost, expandability and availability. Select and justify the best network topology to be chosen for each of the factors listed.

(6 marks)

c) List the 7 OSI layers and a brief description of the use for each layer. (8 marks)

d) An automated guided vehicle system has an average travel distance per delivery =400 m and an average empty travel distance of 220 m. Load and unload times are each 0.75 min and the speed of the AGV is 50 m/min. How many vehicles are needed to satisfy a delivery requirement of 45 deliveries / hour? Traffic factor =0.9. Assume that availability =0.95.

(6 marks)

..................................END OF QUESTION..................................

FORMULA

Setup-time cost= setup time x burden rate

$$R_f = \frac{n_p v_c}{s_c}$$

$$T_c = T_L + \frac{L_d}{v_c} + T_U + \frac{L_e}{v_0}$$

$$WL = R_f T_c$$

$$AT = 60 A F_t E_w$$

$$n_c = \frac{WL}{AT}$$