Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2023/2024

COURSE NAME	:	INDUSTRIAL AUTOMATION
COURSE CODE	:	BPC 41203
PROGRAMME CODE	:	BPB
EXAMINATION DATE	:	JULY 2024
DURATION	:	3 HOURS
INSTRUCTIONS	:	1. ANSWER ALL QUESTIONS 2. THIS FINAL EXAMINATION IS CONDUCTED VIA ☐ Open book ☒ Closed book 3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK

THIS QUESTION PAPER CONSISTS OF **THREE (3)** PAGES

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Q1 (a) Discuss **TWO (2)** benefits of using unit load in material handling process.

(4 marks)

(b) Explain **THREE (3)** types of conveyors for moving items or bulk materials commonly used inside production facility.

(6 marks)

(c) Outline **FIVE (5)** technologies utilized in commercial Automated Guided Vehicle (AGV) system.

(10 marks)

Q2 (a) Explain with example **TWO (2)** types of storage strategies.

(6 marks)

(b) Differentiate **TWO (2)** general types of automated storage systems in term of their layout, structure and its application.

(6 marks)

(c) A single carousel storage system has an oval rail loop shape that is 12 meter long and 1 meter wide. There are 50 carriers which are equally spaced around the oval rail. Suspended from each carrier are 5 bins. Each bin has a volumetric capacity of 0.026 meter^3. Carousel speed is 30 meter/minute. Average pick and deposit time for each retrieval process is 20 seconds.

Calculate:

(i) Volumetric capacity of the storage system.

(6 marks)

(ii) Hourly retrieval rate of the storage system.

(10 marks)

Q3 The National Fourth Industrial Revolution (4IR) Policy is the guiding principle for Malaysia to stay ahead of the 4IR curve. It should be utilised to harness the power of science and it knowledge as the most important drivers for development, progress and prosperity, now, and the foreseeable future. Malaysia needs to take advantage of this window of transformational opportunity, to uplift its people, businesses and government.

(Sources: National Fourth Industrial Revolution Policy 2021)

(a) Recommend **TWO (2)** improvement projects utilising Industrial Revolution 4.0 technologies which can transform Malaysia's car manufacturing operation performance.

(8 marks)

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(b) Justify **ONE (1)** industrial application for each of these Industrial Revolution 4.0 pillars.

(i) Internet of Things.

(6 marks)

(ii) Additive Manufacturing.

(6 marks)

(iii) Big Data Analytics.

(6 marks)

Q4 Computer Aided Design (CAD) is a powerful tool that has revolutionised the manufacturing industry. However, the use of CAD comes with challenges, including the high cost of software and hardware, and the need for skilled personnel. Despite these challenges, the benefits of using CAD in manufacturing far outweigh the drawbacks. With the continued advancement of technology, it is likely that the use of CAD in manufacturing will continue to grow, leading to even greater innovations in the manufacturing process.

(Sources: Computer Aided Design (CAD), Mingo Smart Factory 2024)

(a) Explain **THREE (3)** advantages of using Computer Aided Design (CAD).

(9 marks)

(b) Outline **THREE (3)** benefits of new product design which complied to Design for Manufacturing (DFM) guidelines.

(9 marks)

(c) Propose **TWO (2)** production operation improvements enabled by Computer Aided Manufacturing (CAM) applications.

(8 marks)

- END OF QUESTIONS -

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