



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF ENGINEERING

DEPARTMENT OF INDUSTRIAL AND MANUFACTURING ENGINEERING

**MASTER OF ENGINEERING DEGREE IN MANUFACTURING ENGINEERING/ SYSTEMS
AND OPERATIONS MANAGEMENT**

MANUFACTURING INFORMATION AND DATABASE SYSTEMS

TIE 6110

Special Supplementary Examination Paper

August 2024

This examination paper consists of 8 printed pages

Time Allowed : 3 hours

Total Marks: 100

Special Requirements: none

Examiner's Name: Dr Eng E Murena & Dr Eng S T Nyadongo

External Examiner :

INSTRUCTIONS

1. The question paper consists of six (6) questions
2. **Answer four (4) questions, two (2) questions from each section**
3. Each question carries 25 marks
4. Use of calculators is permissible

SECTION A

Answer any two questions

Question 1

- a) Discuss how Big Data can assist in accelerating the manufacturing process. [10]
- b) Explain the five (5) characteristics of big data using examples of your choice. [5]
- c) Cyber-Physical Systems (CPS) are enabling technologies that bring the virtual and physical worlds together. Identify the key CPS-related enabling technologies. [5]

Question 2

- a) Explain with the aid of diagrams the architecture of a cloud-based database management system [10]
- b) Illustrate the components and functions of a Database Management System. [5]
- c) Describe the information systems that support the major business functions in manufacturing organisations. [10]
- d) Identify the main obstacles to the deployment of the Internet of Things. [5]

Question 3

Augmented reality deals with the combination of real-world and computer-generated data.

- a) Identify the main differences between virtual reality and augmented reality. [6]
- AR/VR devices rely on information from multiple sources to deliver an optimal user experience and achieve functions other consumer devices cannot.
- b) With the aid of examples state and explain the types of data that AR/VR technologies rely on to create user experiences. [5]
 - c) Virtual reality software creates a new world. Identify the software used to build VR systems. [5]
 - d) As a method of manufacturing, identify five and explain components that distinguish CIM from other manufacturing methodologies. [5]

SECTION B

Answer any two questions

Question 4

- (a) Dynasty milling company has scaled up its operations and the move has necessitated the acquisition of a new Enterprise Resource Planning (ERP) software. You have been consulted for advice on which software to purchase. Discuss the software features which you will recommend when giving the advice. [10]
- (b) Compare and contrast the Open Systems Interconnection (OSI) model and the Transmission Control Protocol / Internet Protocol (TCP/IP) model. [15]

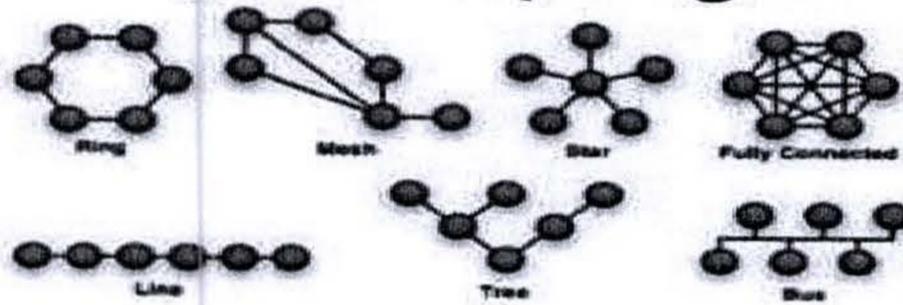
Question 5

- a) The "Transport Layer" is frequently employed in computers and internetworking technologies. Utilise suitable diagrams to demonstrate the functions of the "transport layer" and how they can be integrated into contemporary manufacturing companies. [15]
- b) Write a brief explanation demonstrating your comprehension of the three steps involved in TCP connection establishment. [10]

Question 6

- a) Your company is 'going green' and a decision against the use of paperwork between departments has been made. Using appropriate diagrams, distinguish the two (2) media access controls for shared media. In your explanation highlight the best method for a manufacturing company. [10]
- b) Figure Q6 illustrates the difference between physical topology and logical topology. Clearly bring out the difference between the two. Use your answer, appropriate diagrams and reasoning to design an efficient internetwork/system for a manufacturing company that is made up of five (5) departments viz; manufacturing, design, marketing, finance and administration departments respectively. [15]

Physical topologies



Logical topologies

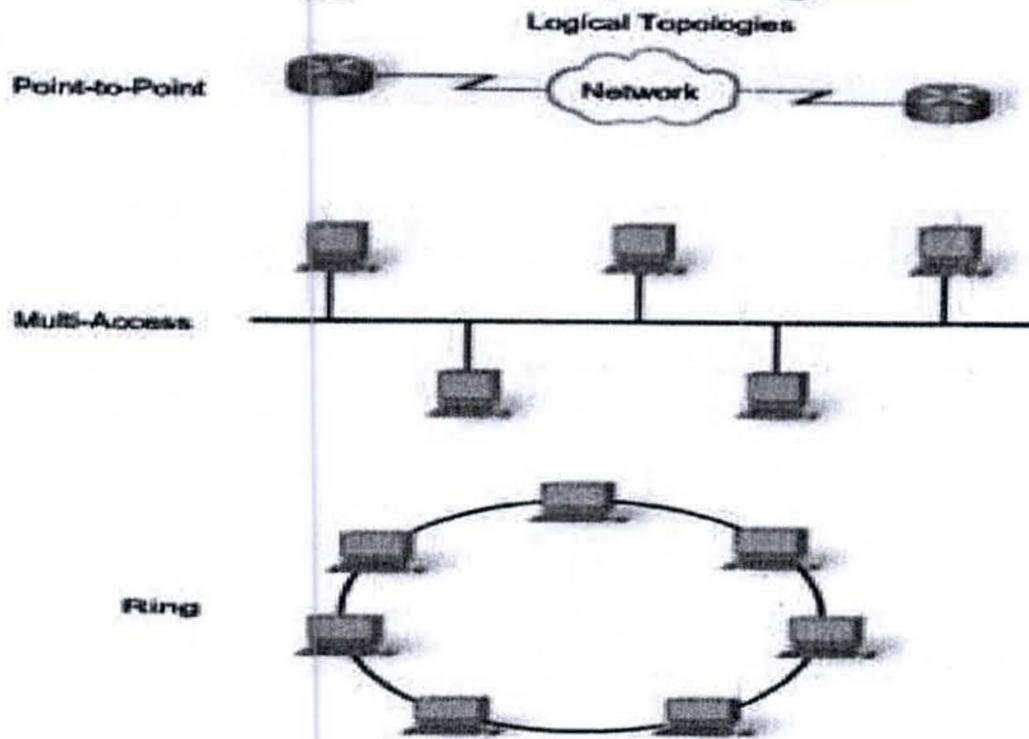


Figure Q6 - Topologies

END OF EXAMINATION