



MACHAKOS UNIVERSITY

University Examinations for 2021/2022

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

THIRD YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (APPLIED PHYSICS AND TECHNOLOGY)

SPH 332: INDUSTRIAL COMMUNICATION AND NETWORKS

DATE: 9/12/2021

TIME: 2.00-4.00 PM

INSTRUCTIONS:

This paper consists of FIVE Questions.

Answer Question ONE [30 Marks] and any other TWO Questions [20 Marks Each].

Write your college number on the answer sheet.

This paper consists of 3 printed pages

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

QUESTION ONE (COMPULSORY) (30MARKS)

- a) Highlighting the features of HART Protocol. (4 marks)
- b) Demonstrate the possible characteristic of signal in industrial communication network (5 marks)
- c) Explain three modes of transmission in industrial communication networking (3 marks)
- d) The effectiveness of a data communications system depends on what factors. Explain (4 marks)
- e) Highlight the key features of ZigBee Protocols and the IEEE 802.15.4 standard (4 marks)
- f) Describe how the field bus operates and emirates its advantages (4 marks)
- g) Explain briefly the available limitations of Modbus Limitations (4 marks)
- h) Enlist the benefits of Ethernet based network. (2 marks)

QUESTION TWO (20 MARKS)

- a) Explain the principal of Carrier Sense Multiple Access with Collision Detection (CSMA/CD) and Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA).
(8 marks)
- b) Explain four kinds of communication topology used in industrial communication network. State their advantages and disadvantages
(12 marks)

QUESTION THREE (20 MARKS)

- a) Discuss the principle used in bounded and unbounded transmission media hence enlist their advantages and disadvantages
(16 marks)
- b) Explain how Ethernet support multiple protocol in industrial communication networks
(4 marks)

QUESTION FOUR (20 MARKS)

- a) Demonstrates how CANopen defines an application layer and a communication profile based on CAN.
(12 marks)
- b) Using illustration, explain the architecture of ZigBee Protocols
(8 marks)

QUESTION FIVE (20 MARKS)

- a) Discuss various advances of field bus protocol and show how it relates to Ethernet protocol.
(5 marks)
- b) To have an effective network troubleshooting on wireless network their key important elements that should be noted. Enlist them.
(5 marks)
- c) Explain five devised troubleshooting tools that are used during network configuration.
(10 marks)