MACHAKOS UNIVERSITY

University Examinations for 2022/2023

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

…….. YEAR ……..SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (TELECOMMUNICATION AND INFORMATION TECHNOLOGY)

SPH …… INDUSTRIAL COMMUNICATION AND NETWORKS

DATE: **TIME:**

Instructions to candidates:

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)(30 MARKS)

a) The signal-to-noise ratio is often given in decibels. Assume that SNR dB = 36 and the channel bandwidth is 2 MHz. Calculate channel capacity. (2 marks)

b) What is the propagation time and the transmission time for a 2.5-kbyte message (an email) if the bandwidth of the network is 1 Gbps? Assume that the distance between the sender and the receiver is 12,000 km and that light travels at 2.4 × 108 m/s. (2 marks)

c) Explain the four techniques for transmitting data in Wireless LANs use. (8 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 three modes of transmission in industrial communication networking (3 marks)

b) The effectiveness of a data communications system depends on what factors. Explain (2 marks)

c) Explain the principal of Carrier Sense Multiple Access with Collision Detection (CSMA/CD) (5 marks)

d) Explain three kinds of communication topology used in industrial communication network. State their advantages and disadvantages (10 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) Discuss all the protocol define in OSI Transport Layer and Application Layer (4 marks)

QUESTION FOUR (20 MARKS)

a) The backbone of automation system architecture is an extremely powerful means of exchange, visibility and flexibility in the devices connected to it.in your own context how field bus has gradually led to an overhaul in architecture in addressing market requirements and solutions. (12 marks)

b) Using illustration, explain the architecture of ZigBee Protocols. (8 marks)

QUESTION FIVE (20 MARKS)

a) Show how field bus protocol and Ethernet protocol are related to each other hence enlist their **advantages** (8 marks)

b) To have an effective network troubleshooting on wireless network their key important elements that should be noted. Enlist them. (2 marks)

c) Explain five devised troubleshooting tools that are used during network configuration. (10 marks)