



**ELIZADE UNIVERSITY**

**ILARA-MOKIN**

**FACULTY: BASIC AND APPLIED SCIENCES**  
**DEPARTMENT: MATHEMATICS AND COMPUTER**  
**SCIENCE**

**1<sup>st</sup> SEMESTER EXAMINATION**  
**2018 / 2019 ACADEMIC SESSION**

**COURSE CODE: CSC 425**

**COURSE TITLE: Computer Networks and Communication**

**COURSE LEADER: Dr. Vincent Akpan**

**DURATION: 2 Hours**

**HOD's SIGNATURE**

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**INSTRUCTION:**

Candidates should answer any **THREE** Questions.

Students are warned that possession of any unauthorized materials in an examination is a serious assessment offence

Students are permitted to use **ONLY** a scientific calculator.

1. (a) Define the following terms:
    - (i) Signal bandwidth
    - (ii) Channel bandwidth
    - (iii) Channel capacity
  - (b) (i) Define the term Nyquist rate
    - (ii) State the Hartley's law
    - (iii) State the Shannon-Hartley theorem for multi-level and multi-phase encoding techniques.
    - (iv) By comparing the Shannon's capacity to the Hartley's law. State and give one reason if there is any implication between the two?
  - (c) (i) A noisy telephone channel has a bandwidth of 3 kHz and a signal-to-noise ratio (SNR). Compute the maximum channel capacity.
    - (ii) For a noiseless 3 kHz channel with 4 number of different quadrature phase shift keying (QPSK) signalling values, compute the maximum channel capacity.
    - (iii) If the requirement is to transmit at 50 kbit/s, and a bandwidth of 10 kHz is used. Compute the minimum signal-to-noise ratio (SNR) required.
2. (a) (i) In what situation is multiplexing used?
    - (ii) Why are guard bands used in frequency-division multiplexing (FDM)?
    - (iii) Why is synchronous pulse required in time-division multiplexing (TDM)?
    - (iv) How is the wastage of bandwidth in TDM overcome by Statistical-TDM?
    - (v) What limitation of TDM is overcome by ATM and how?
  - (b) Using suitable diagrams, briefly discuss the following terms:
    - (i) Frequency-division multiplexing (FDM)
    - (ii) Wavelength-frequency division multiplexing (WDM)
    - (iii) Time-division multiplexing (TDM)
    - (iv) Statistical time-division multiplexing (STDM)
    - (v) Orthogonal frequency division multiplexing (OFDM)
3. (a) Using a suitable block diagram, briefly explain the Open System Interconnection model (OSI model).
    - (b) Briefly explain the function of the respective layers of the OSI model.
4. (a) Using a suitable block diagram, briefly explain the TCP/IP stack model.
    - (b) Using suitable diagrams where necessary, briefly explain the function of the respective layers of the TCP/IP stack model.
5. (a) (i) Can a client computer act as a server? Briefly discuss your choice of answer.
    - (ii) State three characteristics of a client/server computer network.
  - (b) Using a suitable diagram, show the how you would position a router, a bridge and a repeater between two host computer running TCP/IP protocol stack.
  - (c) What is internetworking?
  - (d) Briefly discuss the following internetworking technology terms:
    - (i) Voice/Data integration technologies
    - (ii) Quality of service networking technologies
    - (iii) Multiservice Access Technologies
  - (e) Briefly discuss the following terms:
    - (i) Code division multiple access (CDMA)
    - (ii) Collision detection and avoidance (CD/CA)
  - (f) Using a summary-flow block diagram, briefly carrier sense multiple access/collision avoidance (CSMA/CA) process.