NATIONAL OPEN UNIVERSITY OF NIGERIA,
PLOT 91 CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI – ABUJA
FACULTY OF SCIENCES

*Course Code:* CIT852                                        *Time:* 3 hrs
*Course Title:* Data Communication and Networks
*Course Credit Unit*: 3
*Instruction:* Attempt question one (22 marks) and any other four (4) questions (12 marks each)
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a. Complete the following table (7 marks):

| Layer | Data Package Name |
|---|---|
| Application | |
| Presentation | |
| Session | |
| Transport | |
| Network | |
| Data-link | |
| Physical | |

b. With the aid of a table ONLY, outline 5 differences between the OSI reference model and the TCP/IP model. (5 marks)

c. Define the following terms:
  i. Baud (2 mark)
  ii. Noise (2 mark)
  iii. Propagation delay (2 mark)
  iv. Attenuation (2 mark)

d. For a constant rate transmission, if it takes 100 seconds to complete 1 transmission cycle, what is the frequency of the transmission?( 2 marks)

2.

a. Briefly explain the key features of the following:
  i. Circuit-switched networks (2 marks)
  ii. Packaged-switched networks (2 marks)

b. State 3 advantages and 2 disadvantages of each of the following network topologies:
  i. Bus (1.5 marks)
  ii. Star (1.5 marks)
  iii. Ring (2 marks)

c. List 3 types of broadcast networks (1 mark each)

3.
   a. State 3 drawbacks each of the TCP/IP reference model and the OSI reference model.

   (4.5 marks)
   b. State 2 approaches to broadcast infrared networking.(1.5 marks)
   c. State 3 characteristics of a connection-oriented service (3 marks)
   d. List and explain very briefly 3 strategies to manage congestion in a network (3 marks)

4.
   a. State the 3 steps required for connection establishment in connection oriented services (3 marks).
   b. Briefly explain the following concepts:
      i. Flooding (3 marks)
      ii. Link state routing (3 marks)
   c. State 3 reasons for congestion on a network (3 marks)

5.
   a. List the steps of the Djikstra routing algorithm (3 marks)
   b. Using a table only, highlight 2 differences between congestion control and flow control. (4 marks)
   c. For each class of IP address, specify the following with the aid of a table containing the following columns:        (5 marks)
      i. IP address class
      ii. Higher order bit
      iii. Format

**6.**
   **a.**  List the 4 types of routers identified by OSPF and state the function of each router (4 marks).
   **b.** When an application invokes TCP, state and explain briefly what services it receives from TCP (4 marks).
   **c.** State 3 important features of UDP (3 marks)
   **d.** State 2 applications that use UDP exclusively (1 mark).

**7.**
   **a.** Explain the following terms:
      **i.** Hierarchical address (1 mark)
      **ii.** Flat address (1 mark)
      **iii.** Static Address assignment (1 marks)
      **iv.** Dynamic address assignment (1 marks)
      **v.** Adaptive routing (1 marks)
      **vi.** Non-adaptive routing (1 marks)

**b.** When routers receive packets faster than they can forward them, state the 2 possibilities that could occur in the case of congestion. (2 marks)

**c.** State 4 features of a token bucket traffic shaper. (4 marks)