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COLLEGE OF ENGINEERING AND ENVIRONMENTAL STUDIES, IBOGUN
FACULTY OF ENGINEERING
DEPARTMENT OF COMPUTER ENGINEERING
2020/2021 HARMATTAN SEMESTER EXAMINATION

COURSE CODE: CPE 505 **COURSE TITLE:** DATA COMMUNICATION & NETWORKING
TIME ALLOWED: 2 Hours
COURSE UNIT: 2
INSTRUCTION: Answer **Question One** any Other **THREE (3)**

Question One

(a) What do you understand by Data communication? **1½ mrks**
(b) List four (4) fundamental characteristics used in measuring the effectiveness of a data communication system **2 mrks**
(c) With the aid of well annotated diagrams, describe the three (3) modes of data flow in data communication **3 mrks**
(d) Define the following terms: (i) Throughput (ii) Latency (iii) Topology **3 mrks**
(e) What is a Network? List three (3) Network Criteria **4 mrks**
(f) List and briefly describe three (3) elements of a Protocol **4½ mrks**
(g) With only a diagram, describe the Ring Topology with six workstations **2 mrks**

Question Two

(a) i. Briefly describe the two classes of data transmission media **2 mrks**
ii. With the aid of a table, describe the various categories of coaxial cables under the following headings: *Category*, *Impedance* and *Application* **2 mrks**
(b) i. Distinguish among the following propagation methods, with respect to their frequencies of propagation: Ground propagation, Sky propagation and Line-of-Sight propagation. Use appropriate diagrams as well. **3 mrks**
ii. List three (3) differences between Radiowaves and Microwaves **3 mrks**

Question Three

(a) i. Distinguish between Analog and Digital data **2 mrks**
ii. Give clear sketches of a sinusoidal signal with a peak value of 5 V and frequency of 6 Hz in both time and frequency domains **3 mrks**
(b) i. What do you understand by the Bandwidth of a composite signal? **1 mrk**
ii. If a periodic signal is decomposed into five sine waves with frequencies of 100, 300, 500, 700, and 900 Hz, what is its bandwidth? Draw the spectrum, assuming all components have a maximum amplitude of 10 V. **4 mrks**

Question Four

(a) i. List three (3) causes of signal impairment during transmission **1½ mrks**
ii. With the aid of a diagram, describe how an original signal gets attenuated and also gets amplified (on passing through an amplifier) as it moves through a transmission medium **3½ mrks**
(b) i. Why do you think engineers use the decibel to measure the changes in the power of a signal? **1 mrk**
ii. The loss in a cable is usually defined in decibels per kilometer (dB/km). If the signal at the beginning of a cable with −0.3 dB/km has a power of 2 mW, what is the power of the signal at 5 km? **4 mrk**

Question Five

(a) i. Increasing the levels of a signal increases the probability of an error occurring during the transmission of that signal. Briefly discuss why? **2 mrks**
ii. Distinguish between the Nyquist and Shannon theorems with regards to the capacity of a transmitted signal **3 mrks**
(b) i. Distinguish between Propagation Time and Transmission Time of a signal **2 mrks**

ii. What are (A) propagation time and (B) transmission time for a 2.5-kbyte message if the bandwidth of the network is 1 Gbps; assuming that the distance between the transmitter and the receiver is 12,000 km and the speed of light is 2.4×10^8 ms^{-1}. **3 mrks**

Question Six

(a) i. What do you understand by the Open System Interconnection (OSI) model? **1½ mrks**

ii. List, in the correct order the seven layers of the OSI model **3½ mrks**

(b) i. Briefly describe, in one sentence each any three (3) of the listed layers in (a)ii **3 mrks**

ii. List four (4) levels of addresses used on an Internet employing the TCP/IP protocols **2 mrks**