

# UNIVERSITY OF MORATUWA Faculty of Information Technology

B.Sc. (Hons.) in Information Technology and Management Level 2 – Semester 2 Examination IN 2500 – ESSENTIALS OF COMPUTER COMMUNICATION

Time Allowed: 3 hours

May 2015

## ADDITIONAL MATERIAL

None.

## INSTRUCTIONS TO CANDIDATES

- This paper consists of two parts: SECTION A and SECTION B, which extends to 5
  pages including the cover page.
  - a. SECTION A contains 20 short Questions.
  - b. SECTION B contains 04 descriptive types of Questions.
- The total marks obtainable for this examination is 100. The marks assigned for each question is included in square brackets.
- 3. This examination accounts for 70% of the module assessment.
- 4. This is a closed book examination.
- 5. Answer ALL questions in SECTION A and SECTION B.
- Answers for the SECTION A should be written in the space provided in the question paper itself and annexed to the SECTION B answer booklet.
- 7. Write your index number in both SECTION A and SECTION B of the answer scripts clearly.
- 8. Non-programmable scientific calculators are allowed.

Continued......

B12L2S2 07-05-2015

Page 1 of 5

Index	Number:					٠				0	٠		

SECTION A [Total: 40 Marks] Write your answer in the space provided.

Question	11 [2 Marks for each question]								
1.	A periodic signal completes one cycle in 0.125 ms. If the amplitude (V <sub>p</sub> ) of this signal								
	is 250V, What is the frequency?								
2.	What sampling rate is needed for a signal with a bandwidth of 300 Hz to 3400 Hz?								
2	THE AND THE STATE OF THE STATE								
3.	We want to digitize the human voice [range: 0 Hz to 4000 Hz]. Calculate the data rate								
	to be maintained by assuming 8 bits per sample?								
4.	A signal has 100 mW power of which noise power is 1000 $\mu\text{W}.$ Calculate SNR and								
	SNR <sub>dB</sub> ?								
	$SNR = SNR_{dB} =$								
5.	Speed of a radio signal is $3x10^8 \ ms^{\text{-1}}$ . If the wavelength of this signal is 150 $\mu m$ , what								
	is the frequency of this signal (in Terahertz)?								
6.	A periodic signal is composed of five sine waves with frequencies of 200,400, 650, 850								
	and 1050 Hz. What is the bandwidth of this signal?								
7.	What are the three characteristics of a signal, which is used in modulation technique?								
	(i) (ii)								
	(iii)								
8.	Frequency band of a noise-free channel is 3 MHz to 5 MHz and $S/N = 254:2$ . What is								
-	the maximum achievable data rate of this noise-free channel?								
	Continued								

9.	How many bits per symbol, which are represented by the 64QAM technique?						
10.	(i) Write one multiplexing technique which transmits analog signals?						
	(ii)Write one multiplexing technique which transmits digital signals?						
11. Write down four major impairments in transmission media.							
	(i)(ii)						
	(iii)(iv)						
12.	What are the three characteristics of a signal, which is used in modulation technique?						
	(i)(ii)						
	(iii)						
13.	What does IEEE 802.3 specification refers?						
14.	What are the two types of multimode fibers that are used in fiber-optic communication?						
	(i)(ii)						
15.	What is the difference between Linear and Non-Linear Quantization?						
16.	What are the five basic network topologies?						
	(i) (ii) (iii)						
	(iv)(v)						
17.	List out two problems that are encountered when an optical signal travels through a						
	fiber-optic cable. (i)						
	(ii)						
18.	(i) Which network device contains the physical address of the host?						
	(ii) How do you find the physical Address of your PC? Write the windows command.						
	***************************************						
19.	List out four IEEE sub standards for wireless LAN. (i)						
	(ii)(iv)						
20.	What are the types of antennas used in unguided transmission media?						
	*						
	Continued						

# **Question 02**

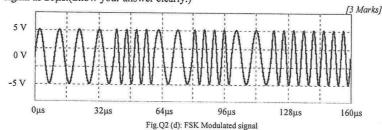
- (a) (i) What is meant by signal modulation?
  - (ii) With the aid of suitable diagrams, describe the principles of signal modulation process.
    12\*2=4 Ma
- (b) What are the modulation techniques used in digital-to-analog conversion process?

[3 Marks]

- (c) (i) What is the modulation technique, which is used to vary two parameters simultaneously?
  - (ii) What are those parameters referred in above (i)?
  - (iii) What is the major advantage of this technique?

3xI = 3 Mark

(d) Draw the input Information signal according to the resulting Frequency Shift Keying (FSK) Modulated signal in Fig.Q2 (d). Consider the bit duration of the Modulating signal as 20µs.(Show your answer clearly.)



(e) Draw the 4PSK modulated signal for the following bit pattern. Bit pattern - 1 0 1 01 1 0 0 10

[2 Marks]

# **Question 03**

(a) What is meant by communication protocol?

[1 Marks]

- (b) What is given by ISO-OSI reference model? Compare it with TCP/IP reference model.

  [3 Marks]
- (c) Briefly explain the responsibilities of the following layers.
  - (i) Session Layer.
  - (ii) Presentation Layer.
  - (iii) Network Layer.

[3\*1=3 Marks]

- (d) What is the most commonly used Analog to Digital conversion method? Briefly explain the steps involved in this conversion. [2 Marks]
- (e) Draw the Line Coding bit patterns for the data stream 100110101 when the following encoding techniques are employed.
  - (i) RZ
- (ii) AMI
- (iii) Differential Manchester Encoding

[3x2=6 Marks]

Continued.....

B12L2S2 07-05-2015

Page 4 of 5

## **Question 04**

- (i) Explain Time Division Multiplexing using a diagram. Give one example. (a)
  - (ii) Explain Frequency Division Multiplexing using a diagram. Give one example.

- (i) How many data channels and overhead channels are available in E1 (b) telecommunication channel?
  - (ii) What is the total transmission speed of E1 telecommunication channel (in bps)?
  - (iii) What is the total transmission speed of T1 telecommunication channel (in bps)?
- Four channels are to be multiplexed together using FDM. Each channel contains 100 (c) KHz bandwidth. It required guard band of 10 KHz between the channels to prevent interference.
  - (i) Draw a diagram to illustrate the FDM process of this example.
  - (ii) What is the minimum bandwidth of the output link?
  - (iii) Draw the output bandwidth in frequency domain?

[3 Marks]

- Seven (07) digital data channels and one (01) overhead channel are multiplexed using TDM. If each channel sends 32 kbps and multiplexed using 4 bits per channel.
  - (i) Draw a diagram to illustrate the TDM process and the resulting frame structure.
  - (ii) Calculate the size of the frame.
  - (iii) Find the frame rate.
  - (iv) Calculate the duration of the frame.
  - (v) Find the bit rate of the transmission link.

[5 Marks]

# Question 05

Write four advantages of computer networks? (a)

[2 Marks]

(b) Write an advantage and disadvantage of serial transmission.

[2 Marks]

Is there any relationship between transmission media and topology? (c) If yes, explain the relationship.

[2 Marks]

- (c) (i) What are the widely used two Media Access Control (MAC) methods?
  - (ii) Briefly explain the operation of two MAC protocols.

[2\*2=4 Marks]

(d) What are the four major wireless access methods used in satellite communication?

[2 Marks]

Explain how the optical fibers are affected from attenuation and dispersion. (e)

[2 Marks]

(f) Write an advantage of the satellite communication over terrestrial communication.

[1 Marks]

## **End of Paper**