Department of Computer Science & Engineering
Begum Rokeya University, Rangpur
3rd Year 1st Semester Final Examination – 2015 (Session 2012-13)

Course Title: ~~Operating System~~ Computer Architecture   Course Code: 3105

Total Marks: 50   Exam Duration: 3 Hours

Answer any of the five questions

1 a. Why do we need to study Computer Architecture? Write down different properties of von Neumann and Harvard architecture?   1+3

   b. What is Logic Gate. Using truth table, proof De Morgan's law   1+3

   c. What is integrated circuit? Define MSI, LSI and VLSI.   2

2 a. Draw a 4-to-1-line multiplexer and describe how it works.   4

   b. What is micro-operation? Why do we need to use Registrar Transfer ~~Logic~~ Language?   1+2

   c. What is Bus? Why do we need to use common bus system?   2

   d. Why do we need to use 2s complement?   1

3 a. Draw a Three-State-Bus Buffers and describe how with works?   4

   b. What is difference between Full Adder and Half Adder? How can be an Adder utilize as a Subtractor, describe in details.   4

   c. If R1 and R2 are two 4 bit registers and P is control variable. If R1 holds a content 1010 and R2 holds a content 1100, then describe below micro-operation   2

$$P: R1 \leftarrow R1 \oplus R2$$

4 a. What is shift operation?   1

   b. Draw and describe a hardware implementation diagram for a 4-bit shifter.   4

   c. What is an opcode? How many bits are needed to specify 32 distinct operations?   1+4

5 a. Describe different memory address techniques in micro-operation.   3

   b. Write down at least 8 different computer registers that are commonly used along with their functions.   2

   c. What do you mean by Instruction Set Completeness? What are the four sufficient properties that identify completeness of an Instruction Set?   1+4

6 a. Derive and explain an algorithm for adding and subtracting 2 floating point binary numbers.   5

A

b. What is Control Unit? By showing a block diagram, show and describe how a Control   5
Unit select next micro-instruction address?

7 a. Differentiate between RISC and CISC architectures.   2

b. How Memory Stack is implemented in CPU?   3

c. Write any of the two short notes from the below   5

i. Decoder

ii. Compiler

iii ALU

Begum Rokeya University, Rangpur
Department of Computer Science and Engineering
B.Sc. (Engg.) 3rd year 1st Semester Final Examination, 2015. (Session: 2012-13)

Course Code: **CSE 3103**
Course Title: **Data Communication**

Time: **3.00 hours**
Total Marks: **50**

[N B: *Answer any five (5) questions and figures in the right margin indicate full marks*]
[*All parts of each question must be answered sequentially*]

1. a) What do you mean by Data communication? Describe different types of component in a data communication. — 1+3
   b) Write down the differences between Timeliness and Jitter in terms of Data Communication System. — 2
   c) What are the two types of line configuration? — 2
   d) For n devices in a network, what is the number of cable links required for a mesh, ring, star and bus topology? — 2

2. a) Define host-to-host protocol. Why we need logical address whenever we have physical address? — 1+2
   b) What are the sources of Induced noise? The most fundamental periodic analog signal can be represented by three parameters. Briefly discuss those parameters. — 1+3
   c) Define Signal-to-Noise Ratio. We need to send 128 kbps over a noiseless channel with bandwidth of 15 KHz. How many signal levels do we need? — 1+2

3. a) What is Line Coding? Differentiate between data rate and signal rate. — 1+2
   b) How self-synchronization occur between sender and receiver. Discuss with diagram. — 3
   c) Define scrambling. Find out the B8ZS and HDB3 code of binary string 100000000 and 1100000000010000. — 1+3

4. a) What are the differences between synchronous transmission and isochronous transmission? — 2
   b) Explain Constellation diagram. A signal has a bandwidth of 20 MHz. The highest frequency is 60 MHz. What is the lowest frequency? Draw the spectrum if the signal contains all integral frequencies of the same amplitude. — 1+2
   c) What is guard band in standard bandwidth allocation for AM radio? — 2
   d) What is the major disadvantage in using NRZ encoding? How does RZ encoding attempt to solve the problem? — 3

5. a) Why analog-to-analog conversion is necessary, explain it with example. — 3
   b) Find the maximum bit rates for an FSK signal if the bandwidth of the medium is 12, 000 MHz and the difference between two carries is 2000MHz. Transmission is in full duplex mode. — 2
   c) Describe the analog hierarchy in which groups of signals are successfully multiplexed onto higher bandwidth lines — 3
   d) Write down the importance of statistical TDM over synchronous TDM. — 2

6. a) Define cellular telephony. Describe the working principle of frequency reuse principle. — 1+3
   b) Define Burst error with example. Write down distinguish between error detection versus correction. — 2+2
   c) What are problem of class-full IP address. — 2

7. a) What are footprints? Describe GEO and MEO in brief. — 1+3
   b) What is cipher? Write down the difference between symmetric key cryptography and asymmetric cryptography. — 1+2
   c) Describe transposition ciphers with appropriate example. — 3

A

b. What is Control Unit? By showing a block diagram, show and describe how a Control Unit select next micro-instruction address?   5

7 a. Differentiate between RISC and CISC architectures.   2

b. How Memory Stack is implemented in CPU?   3

c. Write any of the two short notes from the below   5

i.   Decoder

ii. Compiler

iii ALU

Begum Rokeya University, Rangpur

Department of Computer Science and Engineering

B.Sc. (Engg.) 3rd year 1st Semester Final Examination, 2015. (Session: 2012-13)

Course Code: **CSE 3103**   Time: **3.00 hours**

Course Title: **Data Communication**   Total Marks: **50**

[N B: *Answer any five (5) questions and figures in the right margin indicate full marks*]
[*All parts of each question must be answered sequentially*]

1.	a)	What do you mean by Data communication? Describe different types of component in a data communication.	1+3
	b)	Write down the differences between Timeliness and Jitter in terms of Data Communication System.	2
	c)	What are the two types of line configuration?	2
	d)	For n devices in a network, what is the number of cable links required for a mesh, ring, star and bus topology?	2
2.	a)	Define host-to-host protocol. Why we need logical address whenever we have physical address?	1+2
	b)	What are the sources of Induced noise? The most fundamental periodic analog signal can be represented by three parameters. Briefly discuss those parameters.	1+3
	c)	Define Signal-to-Noise Ratio. We need to send 128 kbps over a noiseless channel with bandwidth of 15 KHz. How many signal levels do we need?	1+2
3.	a)	What is Line Coding? Differentiate between data rate and signal rate.	1+2
	b)	How self-synchronization occur between sender and receiver. Discuss with diagram.	3
	c)	Define scrambling. Find out the B8ZS and HDB3 code of binary string 100000000 and 1100000000010000.	1+3
4.	a)	What are the differences between synchronous transmission and isochronous transmission?	2
	b)	Explain Constellation diagram. A signal has a bandwidth of 20 MHz. The highest frequency is 60 MHz. What is the lowest frequency? Draw the spectrum if the signal contains all integral frequencies of the same amplitude.	1+2
	c)	What is guard band in standard bandwidth allocation for AM radio?	2
	d)	What is the major disadvantage in using NRZ encoding? How does RZ encoding attempt to solve the problem?	3
5.	a)	Why analog-to-analog conversion is necessary, explain it with example.	3
	b)	Find the maximum bit rates for an FSK signal if the bandwidth of the medium is 12, 000 MHz and the difference between two carries is 2000MHz. Transmission is in full duplex mode.	2
	c)	Describe the analog hierarchy in which groups of signals are successfully multiplexed onto higher bandwidth lines	3
	d)	Write down the importance of statistical TDM over synchronous TDM.	2
6.	a)	Define cellular telephony. Describe the working principle of frequency reuse principle.	1+3
	b)	Define Burst error with example. Write down distinguish between error detection versus correction.	2+2
	c)	What are problem of class-full IP address.	2
7.	a)	What are footprints? Describe GEO and MEO in brief.	1+3
	b)	What is cipher? Write down the difference between symmetric key cryptography and asymmetric cryptography.	1+2
	c)	Describe transposition ciphers with appropriate example.	3

Begum Rokeya University, Rangpur.
Department of Computer Science and Engineering
B.Sc. (Engg.) 3rd Year 1st Semester Final Examination-2016 (Session: 2012-13)
Course Title: Operating System and Systems Programming; Course Code: CSE 3101

Total Marks: **50**   Time: **3.00 hours**

Answer any five from the given questions.
[Note: Numbers on right margin indicate the marks for each question. Answer the question sequentially]

---

1. a) What is a system call?   1
    b) Why PCB is called the information repository of process?   3
    c) Describe the differences among short-term, medium-term and long-term scheduler.   3
    d) Briefly describe the inter-process communication through shared memory and message passing.   3

2. a) Illustrate how a binary semaphore and counting semaphore can be used to implement mutual exclusion   3
        among n process.
    b) Suppose you want to synchronize two processes **P** and **Q** using two binary semaphores **S,T**; then the   5
        output string will be **001100110011** for which of the below answers choice:

        W   X   Y   Z
        i) P(S), V(S), P(T), V(T)   for S,T=1
        ii) P(S), V(T), P(T), V(S)   for S=1,T=0
        iii) P(S), V(T), P(T), V(S)   for S,T=1
        iv) P(S), V(S), P(T), V(T)   for S=1,T=0

        Here, P(S): **Wait(S)** and V(S): **Signal(S)**

        [Note: proper reason with detail calculation must be shown in favor of your answer choice in question no.2]
    c) Explain why interrupts are not appropriate for implementing synchronization primitives in   2
        multiprocessor systems

3. a) Write benefits of using thread.   2
    b) Consider the following set of processes with the length of the CPU burst given in milliseconds.

Process	Burst Time	Priority
P_1	10	3
P_2	1	1
P_3	2	3
P_4	1	4
P_5	5	2

        Here, the processes are assumed to have arrived in the order $P_1 P_2 P_3 P_4 P_3 P_5$ all at time 0.

        Draw four Gantt charts that illustrate the execution of these processes using the following   6
        scheduling algorithms: *FCFS, SJF, nonpreemptive priority* (a smaller priority number implies
        a higher priority), and *RR* (quantum =1)

    c) Which of the algorithm(s) in the question 3b) results minimum average waiting time (over all   2
        processes)?

4. a) How can we detect deadlock for single instance resource type and multiple instance resource type?   6
    b) A snapshot of a system at particular instance of   4
        time is shown here. Now, answer the following
        questions using the banker's algorithm:
        i)Is the system in deadlock state or not? Find the
        sequence.
        ii)If P_2 makes one additional request for an
        of type C, What will be the request matrix. Find the sequence.

	Allocation			Request			Available		
	A	B	C	A	B	C	A	B	C
P_0	0	1	0	0	0	0	0	0	0
P_1	2	0	0	2	0	2			
P_2	3	0	3	0	0	0			
P_3	2	1	1	1	0	0			
P_4	0	0	2	0	0	2			

5.   a)   What is the role of paging to maximize memory utilization and minimize access time?

      b)   With T.L.B. effective access time minimizes to less than 50%. Justify it and also demonstrate the flow of operation of T.L.B. with flow chart.

      c)   A byte addressable system has a logical address of 24 bits, a physical address of 24 bits and a page size of KB

         i).How many logical addresses can we generate?

         ii).How many frames can we generate?

         iii).What is the size of the instruction offset?

         iv).What is the total address space need for the physical memory and logical memory?

6.   a)   Under what circumstances do page fault occurs? Describe the actions taken by operating the system when a page fault occurs?   4

      b)   Consider the following page reference string: **1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6.** How many page faults would occur for the following replacement algorithms, assuming one, two, three, four, five, six, and seven frames? Remember that all frames are initially empty, so your first unique pages will cost one fault each.   6

         i).LRU replacement

         ii).FIFO replacement

         iii).Optimal replacement

7.   Write short notes on the followings: 4×2.5

         i)   Demand paging

         ii)   Segmentation

         iii)   Atomic transactions

         iv)   Multithreading models

Begum Rokeya University, Rangpur

Department of Computer Science and Engineering

B.Sc. (Engg.) Third year First Semester Final Examination- 2015

Code: CSE 3107

se Title: Computer Peripheral and Interfacing

Time: **3:00 hours**

Full Marks: **50**

X ZۭTۭM

[N B: Answer any five (5) questions and figures in the right margin indicate full marks. All parts of the question must be answered sequentially.]

1. a) Define computer peripheral and computer interfacing.   2
   b) Differentiate different types of computer interfacing techniques.   3
   c) Explain cycle steeling in the data transferring technique.   5

2. a) Write the features of 8279. Draw it's block diagram and explain in brief.   1+6
   b) What are the different operation modes of 8279?   3

3. a) How interrupt structures of 8086 expands using PIC 8259?   1
   b) Write the features of 8259.   2
   c) Draw the pin configuration of 8259 and give the name of different pins.   4
   d) What is the major advantage of calling BIOS procedures with software interrupts instead of calling them with absolute address?   3

4. a) Write the features of PPI 8255.   2
   b) Draw the block diagram of 8255 and explain in brief.   5
   c) Write a program to initialize 8255 in the below configuration: (i) Port A: output with handshake; (ii) Port B: input with handshake; (iii) Port C_L: output; (iv) Port C_U: input; Assume address of the control word register of 8255 is 23H.   3

5. a) Draw the block diagram of DMA controller 8237 and explain in brief it's different parts?   5
   b) Explain the DMA operation with 8237.   5

6. a) Write the basic concepts of digital to analog converter.   4
   b) Explain the interfacing an 8- bit D/A converter with 8086.   6

7. a) Define different ways of transferring data between a microcomputer and physical I/O devices.   3
   b) Explain different protocol steps in programmed I/O techniques.   4
   c) List the various advantages and disadvantages of memory mapped I/O and isolated I/O.   3

Begum Rokeya University, Rangpur
Department of Computer Science and Engineering
3rd year 1st semester Final Examination-2015
Course Code: MAT3121   Course Title: Numerical Analysis

Total marks: 50   Time: 03 Hours
Answer any five of the following questions:

1. (a) What do you know about error in numerical analysis? Establish the general formula of error. **5**

   (b) Define forward difference operator, backward difference operator and shifting operator. Hence prove that **5**

   $$y'' = \frac{1}{h^2}\left[\nabla^2 y + \nabla^3 y + \frac{11}{12}\nabla^2 y + \ldots\ldots\ldots\right]$$

2. (a) Establish False position method to determine a root of $f(x) = 0$. Discuss the geometric interpretation of this method. **5**

   (b) Find a real root lying between 1 and 2 of the equation $x^3 + 3x + 1 = 0$ upto three places of decimal using False position method. **5**

3. (a) What do you know about divided difference? Establish the Newton's divided difference formula for unequal intervals. **5**

   (b) The table gives the distance in nautical miles of the visible horizon for the given heights in feet above the following table: **5**

x (height)	100	150	200	250	300	350	400
y (distance)	10.63	13.03	15.04	16.81	18.42	19.90	21.27

   Find the distance of the visible horizon for the height 385.

4. (a) State Lagrange's interpolation formula for unequal intervals. Using Lagrange's interpolation formula, find the form of the function $y = f(x)$ from the following data: **5**

x	-1	0	2	5
y = f(x)	9	5	3	15

   (b) Apply Gauss forward central difference formula to find the value of y when x = 3.75 given the following table: **5**

x	2.5	3.0	3.5	4.0	4.5	5.0
y	24.145	22.043	20.225	18.644	17.262	16.047

5. Solve the following system of linear equations   4

   (a) By Gauss elimination method:

$$3x + 5y - 7z = 13$$
$$4x + y - 12z = 6$$
$$2x + 9y - 3z = 20$$

   (b) By LU Factorization method: 6

$$x + 2y - z = -1$$
$$3x + 8y + 2z = 28$$
$$4x + 9y - z = 14$$

6. (a) Establish general quadrature formula for equidistance ordinates and derive Simpson's   5
three-eight rule.

   (b) Compute the value of integral $\int_0^{\frac{\pi}{2}} \sqrt{1 - \frac{1}{4} \sin^2 t}\, dt$ up to four decimal place by Simpson's   5
three-eight rule.

7. (a) Derive Simpson's 1/3 rule for numerical integration.   6

   (b) Compute the value of the the definite integral $\int_4^{5.2} \ln x\, dx$ by trapezoidal rule.   4