Department of Computer Science & Engineering
Begum Rokeya University, Rangpur

3rd Year 1st Semester Final Examination – 2012 (Session: 2009-2010)

Course Code:**CSE 3101**   Course Title: **Data Communication**

Full Marks: **50**   Time: **03:00 hrs**

(Answer any Five. Figures in the right margin indicate full marks.)

1.	(a)	What is OSI model? Write the difference between OSI and TCP/IP model.	2
	(b)	Write the major duties of physical layer.	3
	(c)	What is routing and logical addressing?	2
	(d)	Describe that layer which is responsible for process to process delivery.	3
2.	(a)	Describe the three major properties of an analog signal.	3
	(b)	A sine wave is offset one-sixth of a cycle with respect to time zero. What is its phase in degrees and radians?	2
	(c)	What is composite signal? Depict a composite signal of 3Hz, 6Hz, 12Hz in frequency and time domain	3
	(d)	What is bandwidth? How it affect on communication speed?	2
3.	(a)	What is Shannon Capacity?	1
	(b)	Calculate the channel capacity for a teleprinter channel with a 300MHz bandwidth and Signal to Noise ratio of 3 db, where noise is white thermal noise.	3
	(c)	Write about throughput and propagation time.	2
	(d)	Expatiate serial and parallel transmission.	4
4.	(a)	Depict time domain for an 8-QAM signal.	2
	(b)	What is the difference between baud rate and bit rate.	1
	(c)	With the aid of block diagram explain the operation of ASK,FSK,PSK.	3
	(d)	For the bit stream 01001100011 sketches the waveforms using the following encode format.	4

        i)   Non return to Zero level(NRZ-L)
        ii)   Non return to Zero inverted
        iii)   Manchester
        iv)   Differential Manchester.

5.	(a)	What is multiplexing? Why and where do you use it in transmission?	2
	(b)	Describe a digital multiplexing technique.	3
	(c)	Write about interleaving and synchronizing.	4
	(d)	Mention some drawbacks of FDM.	1
6.	(a)	Why hexagonal shape is considered as the cell of a cellular communication?	1.5
	(b)	Describe the cell splitting for capacity expansion.	3
	(c)	Write the difference between FCA and DCA.	2
	(d)	What is cell dragging and co-channel reuse ratio?	2
	(e)	Explain Cell breathing technique.	1.5

7. Write Short note: 4x2.5=10
      (a) WDM.
      (b) OSI
      (c) CDMA

Department of Computer Science & Engineering
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3rd Year 1st Semester Final Examination – 2012 (Session: 2009-10)
Course Code: **CSE 3103**   Course Title: **Computer Architecture**
Full Marks: **50**   Time: **03:00 hrs**

(Answer any Five. Figures in the right margin indicate full marks.)

1. (a) What do you mean by performance of computer? Discuss various attributes that affect performance of a computer architecture? — 1+1=2

   (b) What is Register Transfer Language (RTL)? Mention its significance in the design of digital modules. Show the RTL and its block level implementation for exchanging values between registers S and D when the control variable T is active. — 1+1+2=4

   (c) What is common bus organization? Why is it preferred? — 2

   (d) Why is the data bus in most microprocessors bidirectional while the address bus is unidirectional? — 2

2. (a) Mention the advantages and disadvantages of indirect addressing. — 2

   (b) Explain why each of the following microoperations cannot be executed during a single clock pulse in the basic computer discussed in your text. Also, specify a sequence of microoperations that will perform the operations. — 2

       (a) $IR \leftarrow M[PC]$ b) $DR \leftarrow DR+AC$ (AC doesn't change)

   (c) Suppose, that the PC register of the basic computer discussed in your text currently holds 021_{16} which contains the instruction word $D083_{16}$ standing for the BSA instruction. The memory word at address 083_{16} contains $F112_{16}$. Give the contents of PC, AR and the memory location 112_{16} after the current instruction is executed. — 3

   (d) With a flowchart discuss the instruction cycle of the basic computer discussed in your text. — 3

3. (a) Does the basic computer discussed in your text support concurrent interrupts? Why or why not? — 1+2=3

   (b) Suppose, you want to extend the basic computer's capability of addressing operands by introducing two new addressing modes – register direct and register indirect. In register direct mode the effective address is stored in a register as mentioned in the instruction, whereas in register indirect mode the effective address is stored in the memory address currently stored in the register. Show the new instruction format and the required register transfer statements for the decode and execute phases of the ADD instruction. — 3

   (c) What are the functions of the flip-flops R and S in the basic computer? How does the basic computer recognize overflow during addition? — 1+1=2

   (d) Does the basic computer support sub-routine call and return? Explain how. — 2

4. (a) With the help of a flowchart discuss the job of the second pass of the assembler required for the basic computer. — 3

   (b) Write assembly language program for the basic computer to multiply two numbers stored in memory locations A and B and store the product in C. — 3

   (c) How many tables are looked up during the second pass of the assembler for the basic computer? What are those? — 2

(d) Convert the following C statement into assembly language code for the basic computer.   2

    for (int i = 0; i<10; i++)   int j = i+1;

5. (a) What is the function of control unit of a computer? Give a relative comparison   1+2=3
between hardwired and microprogrammed control.

(b) Describe the organization of a microprogrammed control unit.   4

(c) What is mapping of instruction? How can you map an instruction to a   2
microprogram routine so that each routine takes up 8 consecutive microinstructions.
Assume that instruction opcode has 6 bits and control memory has 2048 words.

(d) Differentiate between microinstruction and microoperation.   1

6. (a) Show the microinstruction format along with the length of the different fields for   3
the basic computer discussed in your text.

(b) Write a symbolic microprogram routine for the ISZ instruction provided in the basic   3
computer discussed in your text.

(c) Describe how the different microoperation fields in a microinstruction are decoded   2
to execute the microinstruction.

(d) What is it meant by dynamic microprogramming? Mention its merits and demerits   2

7.   Write short notes on the following topics.   2.5x4=10

        (a) CAR   (b) Interrupt Cycle   (c) SBR   (d) Symbol Table

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3rd Year 1st Semester Final Examination – 2012 (Session: 2009–10)
Course Code: **CSE 3105**   Course Title: **Computer Peripherals and Interfacing**
Full Marks: **50**   Time: **03:00 hrs**

(Answer any Five. Figures in the right margin indicate full marks.)

1. (a) What is transducer? Mention its function.   1+1=2
    (b) Describe the working principle of digital RAMP ADC.   6
    (c) If the range output voltage of a 6-bit DAC is 0 to 15 volts, what is the step voltage   2
         of the output?

2. (a) What is programmed I/O and virtual I/O?   3
    (b) What are the difference between subroutine and interrupt I/O?   2
    (c) Explain DMA? Define cycle stealing, block transfer and interleaved DMA.   2+3=5

3. (a) Draw the internal block diagram of 8255 and explain its working.   3+4=7
    (b) Write the features of 8255A.   3

4. (a) Explain the working function of DMA controller 8237 with its block diagram.   2+5=7
    (b) Discuss the DMA data transfer method.   3

5.   Explain with necessary diagram and flowchart for centronics printer interfacing   2+3+5
         using 8255 to the 8086 system.

6. (a) What are the different sensors used to A/D system?   3
    (b) Explain the working function of parallel comparator A/D with suitable circuit   7
         diagram.

7. (a) What are the different applications of Op-Amp in A/D and D/A converter?   4
    (b) Explain the working of a simple 4-bit D/A converter with circuit diagram.   6

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Department of Computer Science & Engineering
Begum Rokeya University, Rangpur
3rd Year 1st Semester Final Examination – 2012 (Session: 2009–10)
Course Code: **CSE 3107**   Course Title: **Algorithm Design and Analysis**
Full Marks: **50**   Time: **03:00 hrs**

(Answer any Five. Figures in the right margin indicate full marks.)

1. (a) What is an Algorithm? Bring out the necessities of space and time complexity of an algorithm with suitable example.   1+3=4

   (b) Define all asymptotic notation used in the analysis of algorithm explain each with an example.   3

   (c) Define Randomized algorithm. What are the classifications of Randomized algorithm?   2

   (d) Prove: $10n^2 + 4n + 2 = O(n^2)$ 1

2. (a) Write an algorithm to find maximum and minimum number of an array using divide and conquer strategy. Write the tree recursive call for the following input set.   2+2=4

   $$\{22, \ 13, \ -5, \ -8, \ 15, \ 60, \ 17, \ 31, \ 47\}$$

   (b) Design an algorithm of binary search. Discuss about its best case, average case and worst case time complexity.   3

   (c) Solved the following recurrence relation when n is a power of 2.   2

   $$T(n) = \begin{cases} T(1) & n = 1 \\ T\left(\frac{n}{2}\right) + c & n > 1 \end{cases}$$

   (d) Why balancing is necessary in divide and conquer?   1

3. (a) Briefly explain the greedy method.   2

   (b) If $p_1/w_1 \geq p_2/w_2 \geq p_3/w_3 \geq \ldots \ldots \ldots \ldots \ldots \geq p_n/w_n$ then prove that knapsack Generates optimal solution? Illustrate knapsack on the following data below.   2+2=4

Item	A	B	C	D
Weight	10	5	8	10
Profit	30	10	40	15

   Capacity M=25.

   (c) Explain job sequencing with deadline problem? Develop an algorithm for the same using greedy technique.   4

4. (a) Consider the following problem: The input is a set S containing n real numbers and one real number x.   5+5

   i) Design an algorithm to determine whether there are two elements of S whose sum is exactly x. The algorithm should run in time O(n log n).

   ii) Suppose now that the set S is given in sorted order. Design an algorithm to solve the problem in time O(n).

5. **(a)** What is meant by dynamic programming? Explain how a multistage graph can be solved using dynamic programming?   4

(b) Design an algorithm for all pair shortest path problem?   2

(c) What are the applications of Traveling Salesman Problem? Using dynamic programming find out optimal tour for the Traveling Salesman Problem starting from node 1 with the following matrix defined to the distance between four cities.   4

$$\begin{bmatrix} 0 & 10 & 15 & 20 \\ 5 & 0 & 9 & 10 \\ 6 & 13 & 0 & 12 \\ 8 & 8 & 9 & 0 \end{bmatrix}$$

6. **(a)** Define multistage graph. Give one application of multistage graph.   3

(b) How Dijkstra's algorithm determine the single source shortest path from source vertex v_0 to all other vertices in a graph.   5

(c) Describe radix tress.   2

7. **(a)** Give the backtracking for the solution space in 4 queen problem and obtain one solution.   4

(b) Define Flow network and residual network.   2

(c) Explain Ford-Fulkerson method for solving maximum flow problem with an example.   4

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Course Code: **CSE 3109**   Course Title: **Numerical Analysis**

Full Marks: **50**   Time: **03:00 hrs**

Answer any Five. Figures in the right margin indicate full marks.)

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1. (a)   Derive Newton's forward difference formula. When this formula is used.   5

    (b)   From the following table of values of x and $y = e^x$, interpolate the value of y when x=1.91   5

X	1.7	1.8	1.9	2.0	2.1	2.2
$y = e^x$	5.4739	6.0496	6.6859	7.3891	8.1662	9.0250

2. (a)   By means of Newton's divided difference formula find the value of f(8) and f(15)   5
          from the table

X	4	5	7	10	11	13
f(x)	48	100	294	900	1210	2028

    (b)   Given the table of values :   5

X	150	152	154	156
$y=\sqrt{x}$	12.247	12.329	12.410	12.490

Evaluate $\sqrt{155}$ using Lagrange's interpolation formula.

3. (a)   Using Newton's forward difference formula find the 1st and 2nd derivative of a function.   5

    (b)   Find the 1st and 2nd derivatives of the function tabulated bellow, at the point x=1.2   5

X	1.0	1.2	1.4	1.6	1.8	2.0	2.2
f(x)	2.7183	3.3201	4.0552	4.9530	6.0496	7.3891	9.0250

4. (a)   Derive the formula for Regular- False method.   5

    (b)   Find a real root of the equation $f(x) = x^3 - 2x - 5 = 0$ by the method of False Position.   5

5. (a)   Derive Simpson's $\frac{1}{3}$ rule for numerical integral.   6

    (b)   Evaluate $\int_{0}^{1}(4x - 3x^2)dx$ taking h=0.1 by Simpson's $\frac{1}{3}$ rule . Compute the exact 4

          value and find the absolute and relative errors in your results.

6. (a) Find the approximate solution by picard's method, to the initial value problem   4

$y' = 1 + y^2, y(0) = 0.$

(b) Given $\dfrac{dy}{dx}$ =y-x, where y(0)=2   6

Find y(0.1) and y(0.2) correct to four decimal place using Runge-kutta second order method.

7. (a) Solve the system of equations   4

$8x_1 - 3x_2 + 2x_3 = 20$

$4x_1 + 11x_2 - x_3 = 33$

$x_1 + x_2 + 4x_3 = 9$

by Gauss-Jacobi method.

(b) Solve the following system of equations by matrix factorization method   6

$2x - 3y + 4z = 8$

$x + y + 4z = 15$

$3x + 4y - z = 8$