

Department of Computer Science & Engineering

Begum Rokeya University, Rangpur

3rd Year 1st Semester Final Examination – 2011 (Session: 2008–09)

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 are the purpose of a Data Communication System? 2
(b) Draw two sine waves on the same time domain plot. The characteristics of each signals are as follows: 2
A: amplitude 4, frequency 4, and phase 0;
B: amplitude 5, frequency 8, and phase 90;
(c) What are the bit interval and bit rate? 2
(d) Define Low – pass, Band- pass and High Pass channel. 2
(e) We have a Channel B.W the SNR for this channel is 63; what is the appropriate bit rate and signal level? 2
2. (a) What are the difference between TCP/IP and OSI model? 3
(b) With lucid figure explain in details about phase shift keying. 3
(c) Compute the bit rate for a 1000-baud 16-QAM signal and the baud rate for a 72,000-bps 64-QAM signal. 4
3. (a) What is multiplexing? How many kinds it, as you know? 1
(b) Write the problems and prospective of TDM. 3
(c) Describe in details of WDM. 4
(d) Five channels, each with a 100-KHz bandwidth, are to be multiplexed together. What is the minimum bandwidth of the link if there is a need for a guard band of 10 KHz between the channels to prevent interface. 2
4. (a) What is the relationship between a signal's spectrum and it's bandwidth? 2
(b) Write what the duties of those layers, which are responsible for transmitting frames from one node to the next and process to process delivery. 8
5. (a) What is cluster? Why it necessary in cellular communication? 3
(b) Describe what things are affect on the narrow cluster size? 2
(c) Of the following, what values are possible for a cluster size in a cellular topology? Why? Assume a hexagonal geometry: 8, 21, 23, 30, 61. 3
(d) Write the drawback of cell splitting. 2
6. (a) Briefly explain the channel allocation techniques for capacity expansion. 3
(b) Write the comparison between Ad Hoc and Infrastructure Network. 4
(c) What is channel capacity? What is the channel capacity for a teleprinter channel with a 300 MHz bandwidth and Signal-to- Noise ratio of 3 db, where the noise is white thermal noise? 3
7. Write short note: 4×2.5=10
(a) FSK (b) OFDM (c) Cell Sectoring (d) Network Criteria.

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Department of Computer Science & Engineering
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3rd Year 1st Semester Final Examination – 2011 (Session: 2008–09)
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) A digital computer has a common bus system for 16 registers of 32 bits each. The bus is constructed with multiplexers. 3
i) How many selection inputs are there in each multiplexer?
ii) What size of multiplexers are needed?
iii) How many multiplexers are there in the bus?
- (b) Design a 4-bit combinational circuit decremter using four full-adder circuits and explain its function. 5
- (c) Show the block diagram of the hardware that implements the following register transfer statement: $yT_2: R2 \leftarrow R1, R1 \leftarrow R2$ 2
2. (a) What is it meant by completeness of an ISA? When an ISA is said to be complete? 1+1=2
- (b) Show the contents in hexadecimal of PC, AR, DR and IR of the basic computer discussed in your text when an ISZ (increment and skip if zero) instruction is executed? Suppose that initially, PC contains 7FF, memory address 7FF contains EA9F, A9F contains 0C35, C35 contains FFFF. 3
- (c) With a neat flow chart, explain the operations involved in an interrupt cycle. 5
3. (a) What does a two-pass assembler do during the first pass? For the following assembly language program written for the basic computer discussed in your text, simulate the operations of the assembler involved during the first pass. 1+2=3
- | | | | |
|---------|---------|--------------|------------|
| ORG 100 | INC | HLT | DIF, HEX 0 |
| LDA SUB | ADD MIN | MIN, HEX 53 | END |
| CMA | STA DIF | SUB, HEX -45 | |
- (b) Differentiate between machine microinstruction and microoperation. 2
- (c) With proper block diagram, explain the operation of a microprogram sequencer. 5
4. (a) Explain the internal organization of semiconductor RAM memories. 4
- (b) What is virtual memory? Explain how the virtual memory address is translated to physical address in main memory. 1+5=6
5. (a) Write assembly codes to execute the instruction $X = A - B + C * (D - E) / (F + G / H)$ based on a single-accumulator CPU, general register CPU and then a stack-organized CPU. 4.5

- (b) A certain microprocessor ISA includes the following instructions. Classify each instruction as data movement, data manipulation or program control.

(i) XTOY ($x = y$) (ii) CLRX ($x = 0$) (iii) JXT (if $x = 1$, go to T)
(iv) XMLY ($x = x * y$) (v) XNEG ($x = \bar{x} + 1$)

- (c) List the various addressing modes possible in a computer. What is PC relative addressing mode? Give an application of this addressing mode. 3

6. (a) What do you mean by normalization of a floating-point number? Why is it important? Explain the algorithm for floating-point number addition. $1+1+2=4$
(b) Explain the multiplication of 5 by -4 using 4 bit Booth's algorithm. Mention the best case and worst case scenario of Booth's algorithm. $4+2=6$

7. Write short notes on the following topics. $2.5 \times 4 = 10$

(a) RISC (b) CAR (c) Interrupt I/O (d) Array multiplier

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Course Code: **CSE 3105** Course Title: **Computer Interfacing**
Full Marks: **50** Time: **03:00 hrs**

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

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|--------|--|-------|
| 1. (a) | Define the different ways of transferring data between a microcomputer and physical I/O devices. | 3 |
| (b) | What are the basic differences between the above different ways? | 5 |
| (c) | Write the difference between maskable and nonmaskable interrupts? | 2 |
| 2. (a) | Draw the internal block diagram of 8259 interrupt controller and explain its different parts in brief. | 1+4=5 |
| (b) | Explain the importance of 8259 interrupt controller and explain how does it handle the interrupt? | 2+3=5 |
| 3. (a) | Explain different types of keyboards. | 4 |
| (b) | Explain with necessary circuit diagram how a 4x4 matrix keyboard is interfaced to 8086 through 8255. | 6 |
| 4. (a) | What are the differences between memory mapping in a microprocessor and memory mapped I/O? | 2 |
| (b) | Explain different protocol steps in programmed I/O interfacing technique. | 6 |
| (c) | What is an interrupt address vector? | 2 |
| 5. (a) | Draw the internal block diagram of 8255 and explain its working. | 7 |
| (b) | Write the features of 8255A. | 3 |
| 6. (a) | Explain the need of DMA. Discuss the DMA data transfer method. | 1+3=4 |
| (b) | Explain the working function of DMA controller 8237 with its block diagram. | 6 |
| 7. (a) | Explain the basic concepts of A/D and D/A conversions with specific block diagram. | 4 |
| (b) | What is the difference between A/D and D/A converters? | 3 |
| (c) | An 8-bit DAC has an output voltage range of 0-2.55 v define it's resolution in two ways. | 3 |

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Course Code: CSE 3107

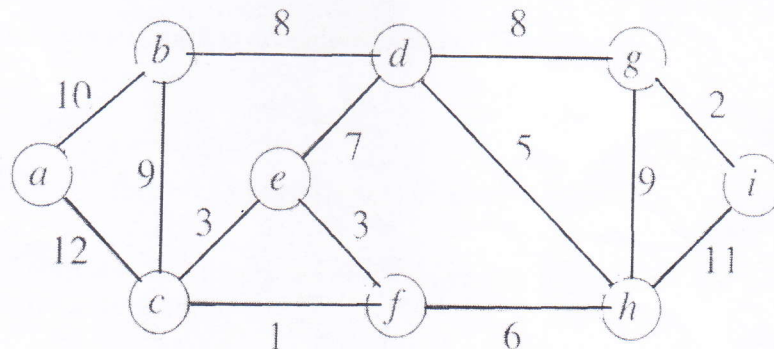
Course Title: Algorithm Design & Analysis

Full Marks: 50

Time: 03:00 hrs

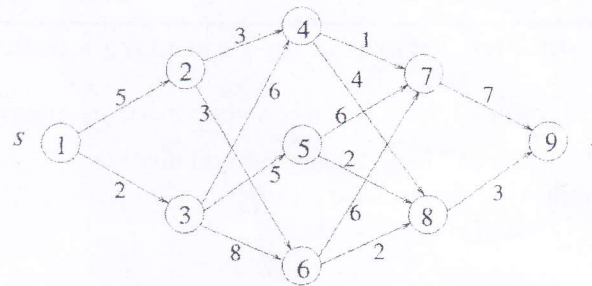
(Answer any Five. Figures in the right margin indicate full marks.)

1. (a) What is an Algorithm? What are the complexity of an Algorithm? 2.5
(b) Write an Algorithm of Magic Square for odd number. 3
(c) Define the following Asymptotic Notation 4.5
i. Big "O" ii. Omega iii. Theta
2. (a) Define the following term. 3
i. Worst case ii. Average Case iii. Best case
(b) Write an Algorithm of Insertion sort? Sort the following data using insertion sort algorithm : 5
77, 33, 44, 11, 88, 22, 66, 55
(c) Calculate the complexity of bubble sort Algorithm? 2
3. (a) State Divide-and-Conquer approach for problem solving. 2
(b) Write an Algorithm to find the Maximum and Minimum item from a set of n element using Divide –And-Conquer strategy also computes the complexity of that Algorithm. 6
(c) What are the fundamental difference between MergeSort and QuickSort Algorithm? 2
4. (a) Write an Algorithm for Knapsack problem using the Greedy strategies? 4
(b) Consider the following instance of the Job Sequencing with Deadline problem: $n=4$, $(p_1, p_2, p_3, p_4)=(100, 10, 15, 27)$ and $(d_1, d_2, d_3, d_4)=(2, 1, 2, 1)$ calculate the feasible solution using the above data. 4
(c) Define Minimum Spanning Tree (MST). 2
5. (a) Write the Prim's Algorithm for Minimum Cost Spanning Tree. 4
(b) Draw the Minimum Spanning Tree using Kruskal's Algorithm step by step of the following figure. 6

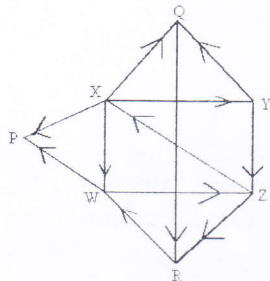


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6. (a) How Dijkstra's Algorithm Determine the Single source Shortest path from source vertex V_0 to all other vertices in a Graph.
- (b) Find a Minimum-cost path from s to t in the multistage graph of the following figure using the forward approach.



7. (a) What is graph traversal? What methods are there to traverse a graph? Explain the Depth-First Search algorithm on the following graph. $1+1+5=7$



- (b) Define multistage-graph. Give one application of multistage graph. $1+2=3$

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

1. (a) Describe Newton-Raphson method for the solution of the equation $f(x)=0$ 5
 (b) Using Ramanujan's method find the smallest root of the equation.
 $f(x) = x^3 - 6x^2 + 11x - 6 = 0$ 5
2. (a) Define divided difference. Find the Newton's general interpolation formula. 5
 (b) The following table give the population of a town during the least six censuses. 5
 Estimate using any suitable interpolation formula, the increase in the population during the period from 1946 to 1948.

Year:	1911	1921	1931	1941	1951	1961
Population (in thousands)	12	15	20	27	39	52

3. (a) From Newton's forward difference interpolation formula find $(\frac{d^2y}{dx^2})_{x=x_0}$ 5

- (b) From the following table of values of x and y, obtain $\frac{dy}{dx}$ and $(\frac{d^2y}{dx^2})$ for $x=1.2$ 5

x	1.0	1.2	1.4	1.6	1.8	2.0	2.2
y	2.7188	3.3201	4.0552	4.9530	6.0496	7.3891	9.0250

4. (a) Derive a general formula for numerical integration using Newton's forward difference formula and from this general formula find the Trapezoidal rule. 5
 (b) Compute the values of $I = \int_0^1 \frac{dx}{1+x^2}$ by using the Trapezoidal rule with $h=0.5$, 0.25 and 0.125. 5

5. Define differential equation, Describe Runge-Kutta method for approximating the values of the solution of the initial-value problem. 5

$$\frac{dy}{dx} = f(xy), y(x_0) = y_0$$

6. (a) Discuss the LU decomposition method of matrix. 5

- (b) Solved the equations by LU decomposition method. 5

$$2x+3y+z=9$$

$$x+2y+3z=6$$

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

7. (a) Solved $\frac{dy}{dx} = \frac{1}{x+y}$ for $x=0.5$ to $x=2$ ($h=0.5$) by using Runge-Kutta's method with 5
 $x_0 = 0$ and $y_0 = 1$

- (b) Define Eigen value and Eigen vector. Compute the Eigen value and associated Eigen vector of the matrix. 5

$$\begin{bmatrix} 2 & 1 & 0 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$$