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**Department of Computer Science and Engineering**  
**Begum Rokeya University, Rangpur.**  
**3<sup>rd</sup> Year 1<sup>st</sup> Semester Final Examination, 2013.**

Course Title: Data Communication

2010 -11

Course Code: CSE3101

Full Marks: 50

**Answer Any Five from the Given Questions**

**(Note: Numbers in the right margin indicate marks for each question.)**

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|--|-----|
| 1. (a) What is protocol? Describe the key element of protocol.   | 3   |
| (b) Describe peer-to-peer process.   | 2   |
| (c) What are the responsibilities of following layers in internet model?<br>i) Transport layer<br>ii) Data Link layer  | 5   |
| 2. (a) Define Composite signal.  | 1   |
| (b) Write Shannon formula. Find the appropriate bit rate and signal level if a channel's bandwidth is 1 MHz and the SNR for this channel is 63.  | 3   |
| (c) Describe three major types of transmission impairments.  | 3   |
| (d) What is maximum amplitude of 10v, a frequency of 4 and a phase of $180^\circ$ ?  | 3   |
| 3. (a) State and prove sampling theorem.   | 5   |
| (b) Briefly describe all categories of line coding scheme.   | 3   |
| (c) Describe the all steps in transmission of block coding.  | 2   |
| 4. (a) Graphically show the relationship between baud rate and bandwidth in FSK.   | 2   |
| (b) Describe 4-PSK method with its constellation.  | 3   |
| (c) Draw the constellation diagram of 4-QAM and 8-QAM.   | 3   |
| (d) Compute bit rate for a 1000-baud 16-QAM signal and the baud rate for a 72,0000 bps 64-QAM signal.  | 2   |
| 5. (a) Define guard band. Assume that a voice channel occupies a bandwidth of 4 KHz. We need to combine three voice channels into a link with a bandwidth of 14 KHz from 20 to 34 KHz. Show the configuration using the frequency domain with the use of guard band 1 KHz. | 2.5 |
| (b) Describe the digital signal hierarchy.   | 2   |
| (c) What is multiplexing? Describe TDM, WDM.   | 3   |
| (d) Write the differences between guide and unguided media.  | 1   |
| (e) Write advantage and disadvantage of optical fiber.   | 1.5 |
| 6. (a) Briefly describe TS switch in telephone network.  | 2   |
| (b) Design a folded TDM bus with four lines.   | 1   |
| (c) Briefly describe piggybacking.   | 2   |
| (d) Obtain the expression for the average probability of symbol error assuming NRZ (Non-Return to Zero) signaling, if the noise is modeled as AWGN (Additive White Gaussian Noise)   | 5   |
| 7. (a) Define IP address. Change the following IP address from dotted decimal notation to binary notation.<br>i) 111.56.45.78<br>ii) 75.45.34.78   | 3   |
| (b) Define Netid and Hostid. Find the network address for IP:23.56.7.91 and IP:132.6.17.85   | 4   |
| (c) Write short notes on i) OFDM ii) FSK iii) wi-Fi.   | 3   |

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**Department of Computer Science & Engineering**  
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3<sup>rd</sup> Year 1<sup>st</sup> Semester Final Examination-2013 (Session: 2010-11)

Course Code: **CSE 3103**

Time: **3 hours**

Course Title: **Computer Architecture**

Total Marks: **50**

[Answer any **Five**. Figures in the right margin indicate full marks]

1. a) Construct a system comprised of four registers with four bits and explain the process of information transfer between them with the help of a suitable scheme. [6]  
b) Explain the concept of arithmetic shift microoperation and also give an idea about the overflow condition. [4]
2. a) Mention the difference between hardwired control and microprogrammed control. [1]  
b) What is BSA instruction? Explain its execution process with suitable example. [3]  
c) With a proper block diagram explain the function of control unit and also discuss the time relationship of the control signal using a timing diagram. [6]
3. a) What is pseudoinstruction? What does the following pseudoinstruction inform the assembler? [2]  
    (i) **ORG N**  
    (ii) **END**  
    (iii) **DEC N**  
    (iv) **HEX N**  
b) Suppose, you are given 89 as minuend and -26 as subtrahend. Now write an assembly language program to perform the subtraction operation between them. [3]  
c) Briefly describe the tasks performed by the assembler during the first pass with a flow chart. [5]
4. a) Illustrate a mapping process that converts the 4-bit operation code to a 7-bit address for control memory. [2]  
b) What are symbolic microinstructions? What do the fields of symbolic microinstruction specify? [1+2]  
c) Describe the operation of microprogram sequencer for a control memory using a block diagram. [5]
5. a) What is the difference between internal and external interrupt? [1]  
b) What are the selection inputs that must be provided with binary selection variables to perform the following operation? [2]  
$$R1 \leftarrow R2 + R3$$
  
c) Draw the block diagram of an 8-bit ALU with 4-bit status register and analyze the status bit condition in accordance with it. [4]  
d) Write a program to perform the following operation for RISC-type CPU- [3]  
$$X = (A + B) * (C + D)$$
6. a) Draw the block diagram of BCD adder and explain its operation. [5]  
b) Draw and explain the flow chart of Booth algorithm for multiplication of signed-2's complement numbers. [5]
7. a) Compare parallelism versus pipelining. [5]  
b) Explain parallel processing at job level and task level. [5]



Department of Computer Science and Engineering

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3<sup>rd</sup> Year 1<sup>st</sup> Semester Final Examination, 2013.

(2010-11)

ATM

Course Title: Computer Peripherals & Interfacing

Course Code: CSE 3105

Full Marks: 50

Answer Any Five from the Given Questions

(Note: Numbers in the right margin indicate marks for each question.)

1. (a) Define the different ways of transferring data between a microcomputer and physical I/O devices. 3  
(b) Write the difference between maskable and non-maskable interrupts. 3  
(c) Explain different protocol steps in programmed I/O interfacing technique. 4
2. (a) What are the difference between subroutine and interrupt I/O? 3  
(b) What is an interrupt address vector? 2  
(c) Explain memory mapping in a microprocessor and memory mapped I/O? 5
3. (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
4. (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 block diagram. 6
5. (a) Explain different types of keyboards. 4  
(b) Explain with necessary circuit diagram how a 4x4 matrix keyboard is interfaced to 8086 through 8279. 6
6. (a) What are the different sensors those are used to A/D system? 3  
(b) Explain the working function of parallel comparator A/D converter with suitable circuit diagram. 7
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 Compute Science and Engineering  
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3<sup>rd</sup> Year 1<sup>st</sup> Semester Final Examination, 2013.

Course Title: Algorithm Design and Analysis  
Course Code: CSE3107

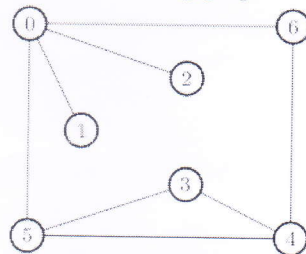
Full Marks: 50  
Time: 3 Hours

Answer Any FIVE From the Given Questions

(Note: Numbers in the right margin indicate marks for each question.)

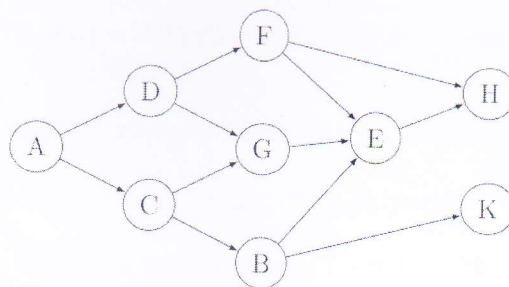
1. (a) Briefly discuss the role of algorithms in computing. 2
- (b) Order these functions in order of asymptotic growth rate, with the most rapidly growing first. If two of them have the same asymptotic growth rate, state that fact. No proofs are needed. 4  
 $\lg(n^2)$   $\lg(2^n)$   $2^{2^n}$   $0.000001n \lg n$
- (c) Write the algorithms for bubble sort and insertion sort and also discuss their big-Oh algorithm complexity. 4

2. (a) Illustrate the adjacency representation of the following graph- 2



What is the space complexity of adjacency representation of a graph,  $G=\{V,E\}$ . What is the cost of iterating over all neighbours of a given node?

- (b) Give 2 possible DFS traversals of the graph below, listing the nodes in the order they are discovered. A should be the starting vertex. 4



- (c) The diameter of a tree  $T= \{V, E\}$  is defined as  $\max_{u,v \in V} \delta(u, v)$  that is, the largest of all shortest-path distances in the tree. Give an efficient algorithm to compute the diameter of a tree, and analyze the running time of your algorithm. 4
3. (a) Given an adjacency-list representation of a directed graph, how long does it take to compute the out-degree of every vertex? How long does it take to compute the in-degrees? 2
- (b) How dfs search can be used to classify the edges of a input graph  $G= \{V,E\}$ , briefly explain. 4
- (c) Write a recursive procedure named **modPower(B,P, M)** that should return  $B^P \bmod M$ . Calculate  $2^{100} \bmod 7$  using the idea of this procedure. Illustrate your calculation using a tree. (Note- % is used in C language for mod operation) 4
4. (a) Describe the design paradigm of Dynamical Programming? Which problem does it address? In which situations can it be used? 4
- (b) With figure explain the algorithm development process. 3
- (c) Find GCD(60,24) by applying Euclid's formula. Estimate the number of times computation is done in Euclid's method and in algorithm based on checking consecutive integers from min (m, n) down to gcd(m,n). 4
5. (a) What is Computational Geometry? Mention its application areas. 2

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- (b) Explain how cross product can help to determine whether two line segments intersect with necessary illustrations. 4
- (c) What is convex hull? Describe an  $O(n \lg n)$  algorithm to find the convex hull of a given set of points. 4
- 6. (a) Briefly explain some algorithms that sort in linear time and their complexities. 2
- (b) Determine an LCS of  $X = \{A, B, C, B, D, A, B\}$  and  $Y = \{B, D, C, A, B, A\}$  4
- (c) Write a modified Breadth-first search (BFS) to find the existence of a cycle in an unweighted connected graph. 4
- 7. (a) Differentiate between backtracking and Branch-and-Bound algorithm. 3
- (b) Draw the space tree to generate first solution to 4 queens problem. With the first solution, generate another solution, making use of board's symmetry. 4
- (c) Explain P and NP problems. 3



Department of Computer Science and Engineering

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3<sup>rd</sup> Year 1<sup>st</sup> Semester Final Examination, 2013.

Course Title: Numerical Analysis

Course Code: CSE3109

Full Marks: 50

Answer Any Five from the Given Questions

(Note: Numbers in the right margin indicate marks for each question.)

1. (a) Write an algorithm to find a solution to  $f(x)=0$ , given an initial approximation  $P_0$ , by Newton-Raphson method 3  
(b) Find an approximation to  $\sqrt{3}$  correct to  $10^{-4}$  using Bisection method. 5  
(c) Explain Bisection Algorithm. 2
2. (a) Explain Newton-Raphson method to approximate the solution of  $e^x + 2^{-x} + 2\cos x - 6 = 0$  within  $10^{-5}$  5  
(b) Let  $p=0.54617$  and  $q=0.54601$ . Use four digit arithmetic to approximate  $p-q$  and determine the absolute and relative error using i) rounding and ii) chopping. 3  
(c) Find the sum 36490, 994, 557.32, 29500 and 86939, assuming that the number 29500 is known to only three significant figures. 2
3. (a) Derive the general formula for errors. 5  
(b) State the theorem which gives sufficient conditions for the existence and uniqueness of a fixed point iteration. 2  
(c) The equation has a unique root in  $[1,2]$ . Explain whether the function  $g(x) = [10/x - 4x]^{1/2}$  converges to a solution or not using fixed point iteration method. 3
4. (a) Drive <sup>Lagrange</sup> ~~language~~ polynomial of the function  $f$  for the points  $x_0, x_1, x_2, \dots, x_n$ . 5  
(b) Use the Lagrange Polynomial of degree three to approximate  $\cos(0.75)$  using  $\cos(0.698) = 0.7661$ ,  $\cos(0.773) = 0.7432$ ,  $\cos(0.768) = 0.7193$ ,  $\cos(0.803) = 0.6946$ . Find the error bound of the approximation. 5
5. (a) Define Newton Forward difference formula to construct a polynomial of degree  $n$  for the function  $f$ . 5  
(b) Use Newton backward difference formula to construct polynomial of degree three for the following data: 5  
 $f(-1)=0.86199480, f(-0.5)=0.95802009, f(0)=1.0986123, f(0.5)=1.2943767$   
Hence, find  $f(0.25)$ .
6. (a) Discuss the general Gaussian elimination procedure applied to a linear system of equations. 5  
(b) Use the Gaussian elimination with backward substitution and two digit rounding arithmetic to solve: 5  
$$\begin{aligned} 4x_1 + x_2 + x_3 &= 9 \\ 2x_1 + 4x_2 - x_3 &= -5 \\ x_1 + x_2 - 3x_3 &= -9 \end{aligned}$$
7. (a) Describe bisection method. 5  
(b) Find the root of the equation  $2x=\cos x + 3$ , correct to three <sup>decimal</sup> ~~dimensional~~ places. 5