

Department of Computer Science and Engineering Begum Rokeya University, Rangpur.

2nd Year 1st Semester Final Examination, 2013. Session: 2010-2011

Course Title: Object Oriented Programming

Course Code: CSE 2103

2011-12

2011-12 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)	Compare and Contrast Structured programming versus Object Oriented programming.	3
	(b)	What is the role of JVM? What does java and javac tools of JDK do?	2+1
	(c)	What is a token? List the various types of token supported by java.	1+1
	(d)	Describe the structure of a typical java program.	3
2.	(a)	What is type casting? Define various casting method with example.	1+2
	(b)	Rewrite the following statement using a conditional expression:	2
		if (temperature > 90) pay = pay * 1.5;	
		else	
		pay = pay * 1.1;	
	(c)	Suppose that x is 1. What is x after the evaluation of the following expression? $(x \ge 1) & (x++ \ge 1)$	2
	0.0	(x > 1) && (x++ > 1)	
	(d)	If a variable is declared in the for loop control, can it be used after the loop exits? Can you convert for	1+1+1
3.	(a)	loop to a while loop? List the advantages of using for loops. What is the output of the following program? Explain the reason.	2
		int $x = 80000000$;	
		while $(x > 0)$ x++;	
		System.out.println("x is " + x);	
	(b)	What would be wrong with not writing a return statement in a value-returning method? Can you have a	1+1+1
		return statement in a void method? Does the return statement in the following method cause syntax errors?	
		public static void xMethod(double x, double y) {	
		System.out.println($x + y$);	
		return x + y;	
	(c)	How is an argument passed to a method? Can the argument have the same name as its parameter?	1+1
	(d)	What is method overloading? Is it permissible to define two methods that have the same name but	1+1+1
		different parameter types? Is it permissible to define two methods in a class that have identical method names and parameter lists but different return value types or different modifiers?	
4.	(a)	What is class? How does it accomplish data encapsulation?	1+1
	(b)	What are the differences between constructors and methods?	2
	(c)	Can you invoke an instance method or reference an instance variable from a static method? Can you	1+1+2
		invoke a static method or reference a static variable from an instance method? What is wrong in the following code?	
		public class Foo {	
		<pre>public static void main(String[] args) { method1();</pre>	
		<pre>public void method1() {</pre>	
		method2();	
		public static void method2() {	
		System.out.println("What is radius " + c.getRadius()); Circle c = new Circle();	
		choice — new choice(),	

	(d)	What is wrong with the following program? public class ShowErrors { public static void main(String[] args) { ShowErrors t = new ShowErrors(); t.x(); }	\
5	(a)	Is an array an object or a primitive type value? Can an array contain elements of an object type as well as a primitive type? Describe the default value for the elements of an array.	1+1+2
	(b)	What is the benefit of using StringBuffer other than String in java? Show with a java code.	2
	(c)	What is the role of "String Literal Pool" while you are using String as Literal?	2
	(d)	To create a string "Welcome to Java", you may use a statement like this: String s = "Welcome to Java";	2
6.	(a)	or String s = new String("Welcome to Java); Which one is better? Why? "Method overloading and overriding facilitate the polymorphic behavior of methods." Justify this with	2
0.	(33)	iava code	211
	(b)	What is "this"? Give an example of when you would use "this". What is wrong in the following code?	2+1
		<pre>public class C { private int p; public C() { System.out.println("C's no-arg constructor invoked"); this(0); } public C(int p) { p = p; } public void setP(int p) { p = p; } }</pre>	
	(c)	How do you explicitly invoke a superclass's constructor from a subclass?	2
	(d)	How do you create an ArrayList? How do you append an object to a list? How do you insert an object at the beginning of a list? How do you find the number of objects in a list?	
7.	(a)	What are the benefits of using Generic types?	1.5
	(b)	Can you create an instance using new E() for a generic type E? Why?	1+1
	(c)	How do you sort the elements in a set using the compareTo method in the Comparable interface? How do you sort the elements in a set using the Comparator interface? What would happen if you added an element that could not be compared with the existing elements in a tree set?	1+1+1
	(d)	Write down the step by step process of creating and running multiple threads using Thread Class in java.	2
	(e)	Define and demonstrate the "try-catch-finally" block in Java.	1.5

Department of Compute Science and Engineering Begum Rokeya University, Rangpur.

2nd Year 1st Semester Final Examination, 2014 Session: 2011-2012

Course Title: Data Structure Course Code: CSE 2105

Full Marks: 50 Time: 3 Hours

Answer Any FIVE From the Given Ouestions

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

Describe in few sentences when using array is a bad idea.

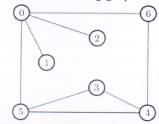
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Order these functions in order of asymptotic growth rate, with the most rapidly growing first. If two of them have the same asymptotic growth rate, state that fact. No proofs are needed. $\lg(n^2) \lg(2^n) 2^{2^n} 0.000001n \lg n$

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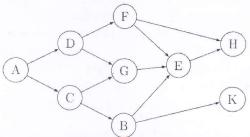
We use a stack to evaluate postfix expressions. Below is an expression consisting of 13 tokens. Show the contents of the stack after each token is processed. Your answer should therefore consist of 13 pictures of the stack.. 43 * 6 / 9 + 24 12 6 / / -

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



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.



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 tocompute the diameter of a tree, and analyze the running time of your algorithm.

(a) What is a Binary Search Tree (BST)? What is the difference between the binary-search-tree property and the min-heap property?

2

Draw the binary min heap that results from inserting: 77, 22, 9, 68, 16, 34, 13, 8 in that order into an initially empty binary min heap. You do not need to show the array representation of the heap. You are only required to show the final heap, although if you draw intermediate heaps, please circle your final result for ANY credit.

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(c) How can you represent a node of a BST in C/C++ or Java? Write recursive algorithms that perform preorder and postorder tree walks in $\theta(n)$ time on a tree of n nodes.

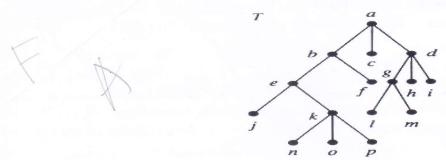
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(a) What is disjoint-set forest? How is it a faster implementation of rooted tree set representation?

2

In the usual arithmetic expressions the operator is written between the operands. Such operators are called binary operators. Such expressions are called infix expressions. Given values of the operand A, B, C and D, the problem is to evaluate an expression of the infix form: A+B*C-D. This problem can be solved using two stacks. Discuss the algorithm in your own word.

(c) Illustrate inorder traversal of the following tree, T



- 5. (a) Briefly explain the available data structures in C++ STL with examples.
 - (b) In this course we've seen many di fferent data structures, including the following: List (linked list or array) Tree

2-dimensional (or higher) array Binary search tree Stack Undirected graph

Stack Undirected graph
Queue Directed graph

Hash table Directed Acyclic Graph (DAG – a directed graph with no cycles)

For each of the following applications, indicate which of these data structures would be most suitable and give a brief jus tification for your choice. Fo r data structures like trees and graphs, describe what information is stored in the vertices and edges, and, if the edges are weighted, describe what information is stored in the weights.

- i) A list of the legal words in a Scrabble©®™ game. We want to be able to quickly check whether words used by players do, in fact, exist in the list.
- ii) Chess board an 8 x 8 board used for a game of chess. Each square on the board is either empty or contains a chess piece.

2

2

- iii) A computer model showing the dependencies between the steps needed to assemble a B787 airplane at Boeing's Everett plant.
- iv) The history list recording sites visited by the user of a web browser. As new sites are visited they are added to the list. The list also su pports the operation of going back to the web page that was previously visited before the current page and going forward to the next page visited.
- 6. (a) Define singly linked list. Explain singly linked list with an example.
 - (b) A priority queue is a data structure for maintaining a set S of elements, each with an associated value called a key. A max-priority queue supports the following operations:

INSERT(S, x) inserts the element x into the set S, which is equivalent to the operation S = S [f x g. M AXIMUM(S) returns the element of S with the largest key.

E XTRACT-MAX(S) removes and returns the element of S with the largest key.

I NCREASE –KEY(S,x,k) increases the value of element x 's key to the new value k,

which is assumed to be at least as large as x 's current key value.

Write pseudocode for these operations in max-priority queue.

- 7. (a) Explain the logic of Merge Sort with its algorithm. Also give its complexity analysis.
 - (b) Perform a quicksort on the following list of integers. Show your work. Make sure you specify what happens with the pivot at each step. 0, 15, 7, 27, 4, 5



Begum Rokeya University, Ran



Session:2011-2012



arbitrary constant.

Course Code: CSE2107



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

A

Full Marks: 50

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5



- (b) What do you mean by general solution of a differential equation? Show that the function $f(x) = c_1 e^{4x} + c_2 e^{-2x}$ is a solution of the differential equation $\frac{d^2y}{dx^2} 2 \frac{dy}{dx} 8y = 0$ where c_1 and c_2 are
- 2. (a) What do you mean by exact differential equation? Solve the following equation by method of grouping $(3x^2 + 4xy) dx + (12x^2 + 2y) dy = 0$.
 - (b) Define integrating factor. Solve the equation $\frac{dy}{dx} + \frac{3y}{x} = 6x^2$, y(0) = 3
- 3. (a) Define linear and homogeneous ordinary differential equations. Show that, if M(x, y) dx + N(x, y) dy = 0 is a homogeneous equation then the transaction y = vx transform the equation into a separable equation.
 - (b) Define orthogonal and oblique trajectories. Find the orthogonal trajectories of the family of curves $cx^2+y^2=1$.
- 4. (a) What do you mean b complementary function and particular integral? Find the general solution of the equation $\frac{d^3y}{dx^3} 3\frac{d^2y}{dx^2} \frac{dy}{dx} + 3y = 0$
 - (b) Solve the integral value problem: $3\frac{d^2y}{dx^2} + 4\frac{dy}{dx} - 4y = 0, y(0) = 2, y'(0) = -4$
- 5 (a) Find the general solution of the equation $\frac{d^2y}{dx^2} + 2 \frac{dy}{dx} + 4y = \cos 4x$ by the method of undetermined coefficients.
 - (b) Given that, y=x is a solution of $(x^2 + 1)\frac{d^2y}{dx^2} 2x \frac{dy}{dx} + 2y = 0$, find a linearly independent solution by reducing the order.
- Discuss the method of variation of parameters. Use this method to find the solution of the equation $\frac{d^2y}{dx^2} + 6 \frac{dy}{dx} + 9y = \frac{e^{-3x}}{x^3}$
- 7. (a) State Cauchy-Euler Equation. Find the general solution of $x^2 \frac{d^2y}{dx^2} 2x \frac{dy}{dx} + 2y = x^2$.
 - **(b)** Solve the Legendre's differential equation of order zero.

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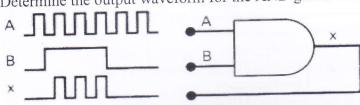
B.Sc. (Engg.) 2nd Year 1st Semester Final Examination – 2013 (Session: 2011–2012)

Course Code: CSE 2201 Course Title: Digital Logic Design
Time: 03:00 hrs.

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

- 1. (a) Write the maximum values of 12 bits number when it represents signed and unsigned value.
 - (b) How many bytes are needed to represent 5,463₁₀ in BCD.
 - (c) Represent the decimal value 37 in each of the following ways.

 (i) BCD, (ii) Hex, (iii) Straight binary, (iv) Octal.
 - (d) Why can't the parity method detect a double error in transmitted data?
 - (e) A small process control computer uses hexadecimal codes to represent its 16-bit memory address. (i) How many hex digits are required? (ii) what is the range of addresses in hex?, (iii) how many memory locations are there?
- 2. (a) Design the following equation by using NAND gates only: X=(A'B+CB')'.
 - (b) Determine the output waveform for the AND gate shown in bellow:

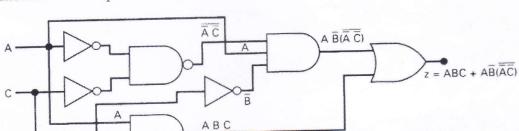


Also determine the output waveform if AND is replaced by XOR and OR gate.

- (c) State and prove Demorgan's theorems.
- (d) Explain NAND and NOR as an universal delay. 2.5
- 3. (a) Depict the functional diagram of a digital computer.
 - (b) Determine the minimum expression for K map for the map in (a)

	ĈĐ	СD	CD	CD
ĀB	0		0	0
ĀB	0		0	0
AB	0		1	0
ΑB	0	0	0	0

(c) Illustrate the simplified form of the following figure by K-map



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3

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2.5

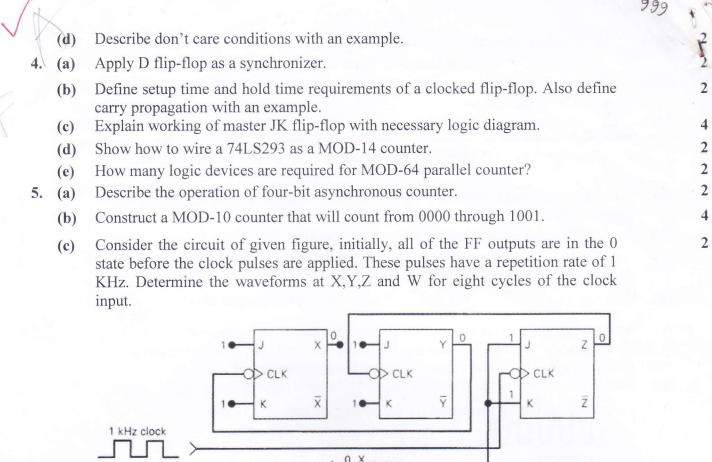
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- Illustrate the parallel and serial data transfer shift registers. 6. (a)
 - What is clock skew? How can it cause a problem? (b)
 - Define carry propagation. (c)
 - Describe the operation of 4bits parallel adder with registers. (e)

From

Write short notes on (i) Propagation delay; (ii) Noise margin; (iii) Current 2x5=107. (a) parameters; (iv) Figure of merit; (v) Fan out.

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