MCA (Revised)

Term-End Examination

December, 2009

06244

MCS-024 : OBJECT ORIENTED TECHNOLOGIES AND JAVA PROGRAMMING

Time : 3 hours *Maximum Marks : 100*

Note : *Q. No. **1** is **compulsory**. Attempt **any three** questions from the rest.*

1. (a) How does java handle event ? **8**

Write a program in Java to capture an event generated by keyboard.

(b) Write a program to generate a line in an applet ? **4**

(c) Explain Java Thread Model along with priorities **6**

(d) Write ***any four*** methods involved in output stream class. **8**

(e) Discuss the throwabte class hierarchy for handling exceptions in Java **6**

(f) Differentiate between superclass and subclass. Also write a program to show the reusability concept. **8**

2. (a) Explain the differences between Swing and AWT. Also, write the advantages of swing based GUI **10**

(b) Write a program describing the usage of multidimensional array. **6**

(c) Explain the usage of iterative statements (for, do-while) using programs. **4**

3. (a) Why the public and static keywords are used in "public static void main ()" ? Explain. **5**

(b) What are the benefits of OOPS ? **5**

(c) Explain Applet life cycle along with methods used with it, what are those components of an event used with AWT. **10**

4. (a) Explain the usage of Abstract classes. **5**

(b) What is the relation in interface and inheritance ? Also, explain how multiple inheritance can be implemented using interface. **8**

(c) Write a Java program to copy the text contents of one file into another file. **7**

5. (a) Explain access control used in Java with all types of specifiers characteristics. Also, give an example for each. **10**

(b) Write client and server programs in Java to show the tcp connection establishment and data transfer. **10**

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14594

MCS-031 : DESIGN AND ANALYSIS OF ALGORITHMS

Time : 3 hours *Maximum Marks : 100*

Note : ***Question No. 1 is compulsory.*** *Attempt* ***any three*** *questions from the rest.*

1. (a) (i) Write Euclid's Algorithm to find GCD of two positive integers. **4**

(ii) Differentiate between 'problem' and 'instance' with an example each. **4**

(b) (i) What is recursion ? Compare the recursive method and non recursive method to find factorial of an integer. **4**

(ii) Give asymptotic upper bound for **4**

$$T(n) = 2T\left(n/2\right) + n^3 \quad \text{for } n > 2$$
$$= 1 \qquad\qquad\quad n \leq 2$$

(c) Prove the equality **6**

$S(n) = 2^0 + 2^1 + .. \; 2^{n-1} = 2^n - 1$ for $n \geq 1$ using Mathematical Induction.

(d) (i) Given $f(x) = 2x^3 + 3x^2 + 1$ 4

Show that $f(x) = O(x^3)$

and $f(x) \neq O(x^2)$

(ii) Write an algorithm for insertion sort on an array of size n. Estimate the best case running time of insertion sort. 6

(e) (i) Give a regular expression for strings containing exactly two is over the alphabet $\Sigma = \{0, 1\}$. 4

(ii) Define Finite Automata. 4

2. (a) Explain the Divide and Conquer technique of solving problem with reference to merge sort algorithm. 10

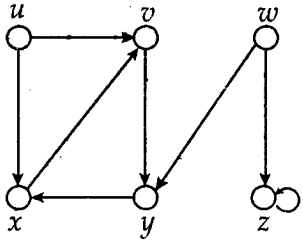
(b) Write an algorithm for finding spanning tree of a connected graph. 10

3. (a) Explain the Randomized quick sort algorithm. 10

(b) Find the number of comparisons for sorting A = [9, 7, 6, 8, 1, 2] using randomized quick sort. 5

(c) Give the average case analysis for running time of quick sort. 5

4. (a) Obtain the DFS tree for the following graph. Compute the discovery time and finishing time for each vertex. **10**



(b) Explain the Algorithm for topological sort. Can the topological sort be applied to the graph ? If yes obtain the topological ordering for the same. **10**

5. (a) Define NP-complete & problems. **5**

(b) Define vertex cover problem for a given graph G = (V, E). **5**

(c) Explain the general steps in establishing NP-completeness proof of a given problem. **10**

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