G 1133

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Reg. No...............................

Name......................................

M.TECH. DEGREE EXAMINATION, APRIL/MAY 2014

First Semester

Branch : Computer Science Engineering

Specialization : Computer Science and Engineering/Cyber Security

MCSCS 102/ MCSCB 102—ADVANCED DATA STRUCTURES AND ALGORITHMS

(Regular—2013 Admissions)

Time : Three Hours   Maximum : 100 Marks

Answer **all** *questions.*
Each question carries 25 *marks.*

1. (a) What is a threaded binary tree ? Explain with an algorithm, example and diagrammatic
illustrations the process of inserting a node into a threaded binary tree.

(15 marks)

   (b) What is a binary search tree ? Explain with an algorithm, example and diagrammatic
illustrations the process of inserting into a binary search tree.

(10 marks)

Or

2. (a) Why splay trees are very effective search trees ? Explain with an algorithm, example and
diagrammatic illustrations search operation on a splay tree.

(12½ marks)

   (b) What is a suffix tree ? Explain with an algorithm, example and diagrammatic illustrations
the process of building a suffix tree.

(12½ marks)

3. (a) What is a double-ended priority queue ? Explain with an algorithm, example and diagrammatic
illustrations the operations that can be performed on a double-ended priority queue.

(20 marks)

   (b) What is a binomial heap ? Give example.   (5 marks)

Or

4. (a) What are Fibonacci heaps ? Explain the structure of Fibonacci heaps with an example and
diagrammatic illustration.

(7½ marks)

   (b) When Fibonacci heaps are especially desirable ? Explain with an example and diagrammatic
illustration.

(7½ marks)

Turn over

(c) Explain with an algorithm, example and diagrammatic illustrations insert operation in a Fibonacci heap.

(10 marks)

5. (a) Explain worst-case analysis, best-case analysis and average case analysis of an algorithm with an example.

(5 marks)

(b) What are recurrence relations ? Give example.

(5 marks)

(c) Explain the substitution method of solving recurrence relations with an example.

(15 marks)

Or

6. (a) What type of problems dynamic programming is used to solve ? How dynamic programming works ? Discuss.

(5 marks)

(b) Explain with an algorithm and example dynamic programming approach for matrix-chain multiplication.

(15 marks)

(c) State and explain the longest common subsequence (LCS) problem.   (5 marks)

7. (a) What is network flow ? What are the conditions for network flow ? Discuss.   (5 marks)

(b) State and explain the maximum flow problem.   (5 marks)

(c) Explain with an example and diagrammatic illustrations Edmonds-Karp algorithm for the maximum flow problem.

(15 marks)

Or

8. (a) What is bipartite graph ? Explain with an example.   (5 marks)

(b) When a subset S of a plane is convex ? What is a convex hull? Explain with an example.

(5 marks)

(c) Explain with an algorithm, example and diagrammatic illustrations how to compute convex hulls.

(15 marks)

[4 × 25 = 100 marks]

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Reg. No..............................

Name.................................

M.TECH. DEGREE EXAMINATION, APRIL/MAY 2014

First Semester

Branch : Computer Science Engineering

Specialization : Computer Science and Engineering

MCSCS 103—WEB SECURITY

(Regular—2013 Admissions)

Time : Three Hours

Maximum : 100 Marks

Answer all questions.
Each question carries 25 marks.

1. (a) Explain how most web applications handle access using authentication, session management and access control.

(15 marks)

(b) What are cookies ? Explain why Cookies are a key part of the HTTP protocol that most web applications rely on with examples.

(10 marks)

Or

2. (a) How can data be transmitted via the client in a way that prevents tampering attacks ? Explain with examples.

(7½ marks)

(b) An application developer wants to stop an attacker from performing brute force attacks against the login function. Because the attacker may target multiple usernames, the developer decides to store the number of failed attempts in an encrypted cookie, blocking any request if the number of failed attempts exceeds five. How can this defense be bypassed ? Discuss.

(7½ marks)

(c) What are the various sources flaws in access control can arise from ? Discuss.   (10 marks)

3. (a) Explain with diagrammatic illustration and example how a SQL injection error happens and how the Web server deals with it.

(12½ marks)

(b) Explain with examples the process of extracting data through UNION statements with examples.

(12½ marks)

Or

Turn over

4. (a) Explain how least-privileged database login, segregated database logins and revoking public permissions can be used as techniques for restricting the scope of an SQL injection attack to the application database. Give examples.

(20 marks)

(b) What privileges should not be granted to the web application user while using an Oracle DBMS to ensure that PL/SQL injection problems cannot be used to run operating system commands or access files ?

(5 marks)

5. (a) What are cross-site request forgeries ? Explain the process of protecting against cross-site request forgeries.

(12½ marks)

(b) What are shell command execution attacks ? How Mod-Security handles shell command execution attacks ? Discuss.

(12½ marks)

Or

6. (a) What are directory traversal attacks and brute force attacks ? How Mod-Security handles these attacks ? Discuss.

(15 marks)

(b) Explain the process of detecting the real IP address of an attacker with an example.

(10 marks)

7. (a) What is canonicalization ? Explain the same with examples.   (10 marks)

(b) What is denial of service attacks? Explain the types of denial of service attacks with examples.

(15 marks)

Or

8. (a) What is web application hacking ? Suggest counter measures to prevent web application hacking.

(15 marks)

(b) Give examples for database vulnerabilities and discuss the same.   (10 marks)

[4 × 25 = 100 marks]

M.TECH. DEGREE EXAMINATION, APRIL/MAY 2014

First Semester

Branch : Computer Science Engineering

Specialisation : Information Systems/Computer Science and Engineering

MCSIS104/ MCSCS 104—OBJECT ORIENTED SOFTWARE ENGINEERING

(Regular—2013 Admissions)

Time : Three Hours   Maximum : 100 Marks

*Answer **all** questions.*
Each full question carries 25 marks.

1. (a) "The details of the project plan vary depending on the type of project and organization". List out and discuss the details that will be contained in almost all plans.

                (15 marks)

    (b) Explain with diagrammatic illustration the unified software development process.

                (10 marks)

Or

2. (a) Explain the Agile software development process.   (15 marks)

    (b) What is the goal of brainstorming ? Discuss.   (5 marks)

    (c) When to use the incremental model ? Discuss.   (5 marks)

3. (a) Why validation is a critical step in the development process ? How requirements are continuously validated with the client and the user ? Discuss.

                (15 marks)

    (b) What is a verifiability and traceability property of a system specification ? Discuss.

                (5 marks)

    (c) What is green-field engineering, re-engineering, and interface engineering ?   (5 marks)

Or

4. (a) Model a class diagram for the following scenario :—

        Hamen's bank manages a number of customer accounts. A customer can have one of three types of accounts, namely, a current account, a savings account or a loan account. Details that need to be stored for each customer include the customers ID number, name, address and telephone number. Each account has an account number and balance. Money can be withdrawn from an account or deposited into the account. In the case of both the savings and current accounts a withdrawal results in the balance being decreased while in the case of a

Turn over

loan account the balance is increased. Similarly, a deposit results in the balance being increased for the current and savings accounts and decreased for the loan account. For each current account the customer's profile, can be gold, silver or bronze. This information needs to be stored for each current account as accounts in these different categories have different benefits. Whenever a deposit is made into a savings account the customer earns interest on the updated balance at a given rate. The interest rate used needs to be stored for each savings account. Additional information needed for each loan account includes the duration of the loan in months, loan limit, and the monthly installments.

(15 marks)

(b) Model a use-case diagram for the following scenario :—

The purchasing department handles purchase requests from other departments in the company. People in the company who initiate the original purchase request are the "customers" of the purchasing department. A case worker within the purchasing department receives that request and monitors it until it is ordered and received. Case workers process the requests for purchasing products under Rs. 1 lakh, write a purchase order, and then send it to the approved vendor. Purchase requests over Rs. 1 lakh must first be sent out for a bid from the vendor that supplies the product. When the bids return, the case worker selects one bid. Then, the case worker writes a purchase order and sends it to the approved vendor.

(10 marks)

5. (a) Explain coupling and coherence with examples.   (10 marks)

(b) Explain the Model/View/Controller (MVC) architecture with diagrammatic illustration and examples.

(15 marks)

Or

6. (a) Present the template for system design document (SDD) and discuss the same.   (15 marks)

(b) What are invariants, preconditions, and postconditions ? Give examples for invariants, preconditions, and postconditions in object constraint language.

(10 marks)

7. (a) What is refactoring ? Explain with an example.   (12½ marks)

(b) Explain forward engineering and reverse engineering with examples.   (12½ marks)

Or

8. (a) Explain the integration testing strategies with examples.   (12½ marks)

(b) What is configuration management ? List and explain the activities configuration management includes.

(12½ marks)

[4 × 25 = 100 marks]

M.TECH. DEGREE EXAMINATION, APRIL/MAY 2014

First Semester

Branch : Computer Science Engineering

Specialization : Computer Science and Engineering

MCSCS 105-4—CLOUD COMPUTING

(Regular—2013 Admissions)

Time : Three Hours   Maximum : 100 Marks

Answer **all** *questions.*
Each question carries 25 marks.

1. (a) What is cloud computing ? Why use cloud computing ? Discuss with an example.

        (12½ marks)

  (b) Why organizations still hesitate to use cloud computing ? Discuss with examples.

        (12½ marks)

Or

2. (a) "A cloud system can be deployed using three main models namely public cloud, private cloud and hybrid cloud". Discuss the three models with examples for each.

        (15 marks)

  (b) What is software as a service ? Discuss with an example.   (5 marks)

  (c) What is infrastructure as a service ? Discuss with an example.   (5 marks)

3. (a) What is a web service? Highlight the features of Representational State Transfer (REST) web service standard with examples.

        (15 marks)

  (b) What is a virtual machine ? List and discuss the important uses of virtual machines with examples.

        (10 marks)

Or

4. (a) List and explain the types of virtualization with examples for each.   (15 marks)

  (b) List and explain the issues in virtualization for cloud computing.   (10 marks)

5. (a) List and discuss the threats and vulnerabilities in a cloud computing environment.

        (10 marks)

  (b) List and explain security and privacy issues in cloud computing with examples. (15 marks)

Or

6. (a) Explain with examples the process of managing information technology (IT) risk in a cloud environment.

(15 marks)

(b) List and discuss virtualization security features. (10 marks)

7. (a) Explain the issues related to managing cloud resources. (10 marks)

(b) Explain the impact of cloud computing on information technology (IT) ecosystem.

(15 marks)

Or

8. (a) Explain with an example how existing applications can be migrated to cloud environment.

(15 marks)

(b) What is mobile cloud ? Discuss. (10 marks)

[4 × 25 = 100 marks]

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M.TECH. DEGREE EXAMINATION, APRIL/MAY 2014

First Semester

Branch : Computer Science Engineering

Specialization : Computer Science and Engineering

MCSCS 106.1 : DATA MINING CONCEPTS

(Regular—2013 Admission)

Time : Three Hours　　　　　　　　　　　　　　　　　　Maximum : 100 Marks

Answer **all** *questions.*
Each question carries 25 marks.

1. (a) Apply the Apriori algorithm for discovering frequent item sets to the following data

　　set :

Trans ID	Items Purchased
101	Litchi, Hill Banana, Straw Berry
102	Litchi, Passion Fruit
103	Passion Fruit, Tomato
104	Litchi, Hill Banana, Straw Berry
105	Pears, Straw Berry
106	Pears
107	Pears, Passion Fruit
108	Litchi, Hill Banana, Water Melon, Straw Berry
109	Water Melon, Tomato
110	Litchi, Hill Banana

Use 0.3 for the minimum support value. Illustrate each step in the Apriori algorithm.

(15 marks)

　　(b) How multilevel association rules can be mined ? Discuss with examples.　　(10 marks)

Or

2. (a) Explain the architecture of a typical data mining system with diagrammatic illustration.

(10 marks)

　　(b) What is data reduction? List and explain the strategies for data reduction.　　(15 marks)

Turn over

3. (a) State Bayes' theorem of posterior probability and discuss the working of a Bayesian classifier with an example.

(15 marks)

(b) Explain rule based classification with an example. (10 marks)

Or

4. (a) What is associative classification ? Why is associative classification able to achieve higher classification accuracy than a classical decision tree method? Discuss with an example.

(12½ marks)

(b) Explain with examples classifier accuracy measures. (12½ marks)

5. (a) What is a data warehouse ? Explain with diagrammatic illustration the components of a data warehouse.

(10 marks)

(b) What is OLAP ? Give examples of typical OLAP operations and discuss the same with diagrammatic illustrations.

(15 marks)

Or

6. (a) Consider five points {X_1, X_2, X_3, X_4, X_5} with the following coordinates as a two dimensional sample for clustering:

X_1= (0.5, 2.5) ; X_2 = (0, 0) ; X_3 = (1.5, 0.25) X_4 = (5, 0.5) ; X_5 = (5, 2.5)

Illustrate the K-means partitioning algorithm (clustering algorithm) using the above data set.

(15 marks)

(b) What is constraint-based clustering ? Explain the same with an example. (10 marks)

7. (a) What is an outlier ? Explain outlier detection with an example and diagrammatic illustration.

(15 marks)

(b) What is a spatial data cube ? Discuss the same with an example. (10 marks)

Or

8. (a) What is information retrieval ? How can we determine if two documents are similar ? Explain with an example.

(12½ marks)

(b) What is keyword-based association analysis ? Discuss the same with an example.

(12½ marks)

[4 × 25 = 100 marks]