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[3464] - 348
B.E. (IT)
INFORMATION SYSTEM SECURITY
(2003 Course) (414441)

Time : 3 Hours] *[Max. Marks:100*

Instructions to the candidates:

1) *Answer 3 questions from Section I and 3 questions from Section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Your answers will be valued as a whole.*
6) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION - I

Q1) a) Show that the three security services confidentiality, integrity and availability are sufficient to deal with the threats of disclosure, disruption, deception and usurpation. **[8]**

b) Describe in detail how an executable infecting computer virus might append itself to an executable. What changes must it make to the executable, and why. **[8]**

OR

Q2) a) A computer system provides protection using the Bell-Lapadula policy. How would a virus spread if **[8]**

i) the virus were placed at the system low.

ii) the virus were placed at the system high.

b) Distinguish between **[8]**

i) active and passive attacks

ii) Authentication and Authrization.

Q3) a) Show that the enforcement rules of the clark-wilson model can emulate the Biba model. **[8]**

b) A security policy may use two types of access controls, alone or in combination. Name them and describe in brief. **[4]**

c) Discuss the role of trust in security policy. **[4]**

OR

Q4) a) Compare and contrast Confidentiality policies Vs Integrity policies. **[10]**

b) The security models do not discuss availability. What unstated assumptions about the service are they making. **[6]**

Q5) a) With an example of polyalphabetic ciphers explain the substitution technique of classical cryptography. **[8]**

b) A network consists of n host. Assuming the cryptographic keys are distributed on a per host pair basis, compute how many keys are required. **[10]**

OR

Q6) a) What type of information might be derived from a traffic analysis attack. **[4]**

b) With the example of Diffie-Hellman algorithm explain man-in-the middle attack. **[8]**

c) In a public key system using RSA, you intercept the ciphertext C = 10 sent to a user whose public key is e = 5, n = 35. What is plaintext M. **[6]**

SECTION - II

Q7) a) What is NAT, and when is it used. **[5]**

b) What is nonce? What is trap door one way function. **[4]**

c) Explain avalanche effect. **[4]**

d) Why is it important to study Feistal cipher. **[5]**

OR

Q8) a) What is Message authentication code. Explain. **[6]**

b) What is the difference between strong collision resistance and weak collision resistance. **[6]**

c) A TCP SYN flood attack is a form of DOS attack, which randomly opens up a number of TCP ports.

True or false explain. [6]

Q9) Consider the following threats to web security and describe how each is countered by a particular feature of SSL. [16]

i) Brute force cryptanalytic attack.

ii) Known plaintext dictionary attack.

iii) Replay attack.

iv) Man-in-the-middle attack.

v) Password sniffing.

vi) IP Spoofing.

vii) IP Hijacking.

viii) Syn flooding.

OR

*Q10)*a) What problem was kerberos designed to address. [4]

b) Describe kerberos Realm. [8]

c) List three design goals of Firewall. [4]

*Q11)*a) Give applications of IPSec. [2]

b) Distinguish between tunnel and transport mode. [8]

c) Explain X.509 authentication service. [6]

OR

*Q12)*a) List two weaknesses of the signature based IDS. [2]

b) Which IDS is not limited by bandwidth restrictions or data encryption. [4]

c) Which IDS is very challenging in a switched environment. [4]

d) What are the three main components of a network IDS. [2]

e) List three responses to events or alerts in IDS. [4]

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[3464]-349
B.E. (IT)
ADVANCED DATABASE MANAGEMENT
(2003 Course) (414442)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***
4) ***Section-I : Q1 or Q2, Q3 or Q4, Q5 or Q6.***
5) ***Section-II : Q7 or Q8, Q9 or Q10, Q11 or Q12.***

SECTION - I

Q1) a) Evaluate how well partitioning techniques support the following types of data access **[7]**

i) Scanning the entire relation.

ii) Locating tuple associatively.

iii) Locating all tuples such that the value of given attribute lies within a specified range.

b) Write a short note on Cache Coherency Protocol. **[5]**

c) Describe advantages and disadvantages of Shared Nothing Parallel Database Architecture. **[5]**

OR

Q2) a) Explain Parallel Processing of Relational Operations. **[10]**

b) Describe Query Optimization in Parallel Databases. **[7]**

Q3) a) Describe advantages and disadvantages of Data Replication and Fragmentation. **[5]**

b) Describe different schemes of Concurrency Control in Distributed Database Environment. Assume that each site participate in the execution of commit protocol to ensure global transaction atomicity. **[12]**

OR

Q4) a) Explain Bully Algorithm in distributed databases. **[5]**

b) Why not use database protocol like ODBC/JDBC, when directories are to be accessed across an organization. Describe different alternatives to access directories in distributed databases. **[6]**

c) Explain Heterogeneous Databases in details. **[6]**

Q5) a) Describe different issues in order to able to evaluate queries efficiently. **[8]**

b) Describe Web Architecture and XML as Database. **[8]**

OR

Q6) a) Explain any two mechanisms for specifying XML schemas. **[6]**

b) Write short notes on : **[10]**

i) Web services.

ii) XQuery and FLOWR.

SECTION - II

Q7) a) Describe Kimball's nine steps for Data Warehouse Design. **[12]**

b) Describe the following w.r.to Data Warehouse **[5]**

i) Subject Oriented.

ii) Integrated.

iii) Non-Volatile.

iv) Time Variant.

OR

Q8) a) Design any one conceptual schema of Data Warehouse for Financial Service application. **[5]**

b) Write short notes on : **[12]**

i) OLAP.

ii) ETL.

Q9) a) Describe different issues in design of classifier. **[5]**

b) Write short note on : **[12]**

i) Text Mining.

ii) A priori Algorithm.

OR

Q10) a) Describe different types of Clustering Techniques. **[7]**

b) Describe Decision Tree construction algorithm and best split with suitable example. **[10]**

Q11) a) Explain the following terms in Information Retrieval with suitable example. **[8]**

i) Synonyms.

ii) Homonyms.

iii) Proximity.

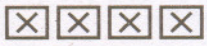
iv) TF-IDF.

b) Explain similarity based Retrieval and Relevance using Hyperlinks Retrieval. **[8]**

OR

Q12) a) Explain Information Retrieval and structured and unstructured data. **[6]**

b) Describe Web crawler and Web search engine in details. **[10]**



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DEC - 2008

[3464] - 350
B.E. (IT)
SOFTWARE TESTING AND QUALITY ASSURANCE
(2003 Course)

Time : 3 Hours] *[Max. Marks:100*

Instructions to the candidates:

1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in saparate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Make suitable assumptions wherever necessary and relevant.*

SECTION - I

Q1) a) Answer ANY TWO of the following:

i) Testing can only prove the presence of defects, never their absence. Why? A defective test is more dangerous than a defective product. Why?

ii) The probability of the existence of more defects in a section of a program is proportional to the number of defects already found in that section. Give reason why this statement looks counterintuitive. Give practical reasons why this causes problems in testing.

iii) Compare defect detection and defect prevention with reference to their focus. **[8]**

b) Give objectives, examples and when to use ANY TWO of the following testing techniques.

Stress testing, Recovery testing, Security Testing, Requirements Testing, Regression Testing. **[8]**

OR

Q2) a) Identify fallacies if any in the below statements made by people in a product development company and relate it to the principles of testing.

i) "The code for this product is generated automatically by a CASE tool – it is therefore defect-free".

ii) "We are certified according to the latest process models – we do not need testing".

P.T.O.

iii) "We need to test the software with dot matrix printers because we have never released a product without testing with dot matrix printer"

iv) "I have run all the tests that I have been running for the last two releases and I don't need to run any more tests". **[8]**

b) Distinguish between:

i) Structural versus Functional testing.

ii) Dynamic verses Static testing. **[8]**

Q3) a) Explain in detail a test plan template. **[8]**

b) Explain what is test case database, defect repository and configuration management repository in context of test infrastructure management. **[8]**

OR

Q4) a) i) Define different types of white box techniques.

ii) Write briefly the code review checklist. **[8]**

b) i) Given below is a C program for deleting an element from a linked list. Suggest a set of test data to cover each and every statement of this program.

```
struct llist {
        int value ;
        llist *next ;
        llist *prev;
              }
void delete_list(llist *list, int value_to_be deleted)
{
        llist *temp;
        for (temp=list; temp! = NULL ; temp=temp->next)
        {
          if (temp-> value = = value_to_be_deleted)
              if(temp-> prev !=NULL)
                    temp->prev->next = temp->next;
              if(temp->next ! = NULL)
                    temp->next->prev=temp->prev;
        return(0) ;
        }
        return (1) ; /* Value to be deleted is not found at the end */
}
```

ii) In each of the following cases ; identify the most appropriate black box testing technique that can be used to test the following requirements

1) The number of days of leave per year an employee is eligible is 10 for the first three year, 15 for the next two years and 20 from then on.

2) Each purchase order must be initially approved by the manager of the employee and the head of purchasing. Additionally if it is a capital expense of more that Rs. 1,00,000 it should also be approved by the CFO.

3) A file name should start with an alphabetic character, can have upto 30 alphanumeric characters optionally one period followed by upto 10 other alphanumeric characters.

4) A person who comes to bank to open the account may not have his birth certificate in English ; in this case, the officer must have the discretion to manually override the requirement of entering the birth certificate number. **[8]**

Q5) a) Define and explain following metrics that show the effectiveness of testing

i) Design phase testing effectiveness

ii) Untested Change Problems

iii) Test efficiency

iv) Loss value of test **[9]**

b) We commonly use ordinal measurement scale. For example we can use an ordinal scale to rank the understandability of programs as either trivial, simple, moderate, complex and incomprehensible. For each of the other two common measurement scales types, give an example of a useful software measure of that type. State exactly which software entity is being measured and which attribute. State whether the entity is product, process or resource. **[9]**

OR

Q6) a) How do you calculate defect density and defect removal rate? Discuss ways to improve these rates for a better quality product. **[9]**

b) Explain briefly the idea behind the GQM paradigm. Suppose software reliability is your major concern. You discovered in the testing phase that the software will not be of sufficient quality by the shipping deadline. Construct a GQM tree that helps you to make an informed decision about when to ship the software. **[9]**

SECTION - II

Q7) a) What are quality management principles? How do they apply for software quality? **[8]**

b) Define and explain ANY FOUR of the following quality attributes
Usability, Reliability, Integrity, Correctness,
Portability, Testability, Modifiability, Interoperability. **[8]**

OR

Q8) a) What are the factors that affect the SQA effort? **[8]**

b) Explain in brief the QA Techniques.
What are the characteristics of a **reliability** tested product? **[8]**

Q9) a) What are objectives of the management review process in ISO 9000?
What are the inputs for a management review?
What is the management review output? **[9]**

b) Compare ISO 9000 and CMM with reference to their weaknesses. **[9]**

OR

*Q10)*a) Explain the OPD , QPM and RM , KPA's of CMM in details. **[9]**

b) To which KPAs do the following activities map in the CMM and explain how?
Testing , Defect reporting & Corrective action, Tools & Techniques, Code Control, Media Control, Training (ANY THREE). **[9]**

*Q11)*a) Why classes have to be tested individually first? **[8]**

b) Consider a class that is nested five levels deep and each level just redefines one method. What kind of problems do you anticipate in testing such classes and instantiated objects? **[8]**

OR

*Q12)*a) Explain the 3 important tasks in testing the Client/Server systems. **[8]**

b) What are the eight primary functional vulnerabilities to computer abuse? **[8]**

Total No. of Questions : 12] [Total No. of Pages :4

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[3464] - 335

B.E. (Computer & Information Technology) (Common)

OBJECT ORIENTED MODELING AND DESIGN

(410443) (2003 Course)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:-

1) *Figures to the right indicate full marks.*
2) *Answers to the two sections should be written in separate answer books.*
3) *From Section - I, answer (Q1 or Q2) and (Q3 or Q4) and (Q5 or Q6).*
4) *From Section - II, answer (Q7 or Q8) and (Q9 or Q10) and (Q11 or Q12).*
5) *In design questions you are encouraged to make further suitable assumptions on scope of the systems given wherever felt necessary and do state your important assumptions if any.*

SECTION - I

Q1) Write on the following in brief: **[18]**

a) Inception phase (W.r.t RUP) its importance, scope.
b) Platform Independent Model.
c) Design View in 4 + 1 view of architecture.
d) Object Oriented feature: Encapsulation.
e) Iterations in software development life cycle.
f) Booch Methodology as precursor to UML.

OR

Q2) a) Write short notes on UML profiles (illustrate with examples from web development as a domain to extend UML). **[18]**

b) Illustrate new UML 2.0 features: input and output PINS, manifest.

c) UML 2.0 helps model LARGE and complex systems better. Especially the concepts of packages, REF in sequence and interaction overview diagrams, Illustrate with examples.

Q3) a) Compare and contrast CLASS and COMPONENTS. **[4]**

b) How does one forward engineer an object diagram. Illustrate. **[4]**

c) Give an example WEB application. How is a deployment diagram useful to describe web applications. **[4]**

d) In context of deployment diagrams what are components, Artifacts. **[4]**

OR

P.T.O.

Q4) a) An application has two components. We have defined one Interface called ICompareStrings. There is only one service defined which compares two given strings. The MYSTRINGS component implements the interface. We have a SEARCHBOOKS component that needs to search based on title, author names. The SEARCHBOOKS component can actually reuse the capabilities of comparing strings. Show a fragment of a component diagram showing components and interfaces and various dependencies. **[8]**

b) Explain the following concepts with examples briefly: **[8]**

i) Import in package diagram.

ii) Stubs in package diagrams (Hint: Testing).

Q5) a) What do these terms mean OCL,OCL invariant, ForAll. **[6]**

b) Why does a civil architect model before constructing a house, and why do software developers need to model in UML before constructing software. **[6]**

c) What do you understand by UML goals: executable UML, Extensibility. **[4]**

OR

Q6) a) Consider a software Personal Diary application described below. We can use the diary to manage our daily To-Do tasks, our personal appointments, personal contacts. The application will run on our mobile phone. Add further appropriate assumptions about the scope of the application. Draw a use case diagram for this description using full UML notation for use case diagrams. **[6]**

b) Illustrate through self explanatory diagrams, use of following stereotypes:

i) Extends in use case diagrams. **[6]**

ii) Instantiate in class diagrams.

c) What are structural and behavioral diagrams, list down diagrams in each category. **[4]**

SECTION - II

Q7) a) Draw a class diagram for a Garage system. Make suitable assumptions about scope and working of your Garage (write down the scope too). The garage is for different types of four wheelers. The advanced booking/appointment is done on phone. On the day of appointment as soon as a customer arrives, a job card is created to note all the problems, requirements for the vehicle. An Engineer is assigned based on availability to service a vehicle. On completion of the repair/maintenance/service the engineer prepares a report based on which a Bill is created. The payment is accepted in cash against the bill. Your class diagram must show relevant attributes, methods, relationships. **[10]**

b) How do you show an Exception in a class diagram, give an appropriate example, and give Notation in UML. **[4]**

c) How do you implement an association relationship in C++. **[4]**

OR

Q8) a) What is a derived attribute, class scope variable and how to model them in class diagram. **[4]**

b) Describe a technique for identifying classes/objects in a system. **[4]**

c) Draw a class diagram for system described here. Make suitable assumptions about the scope. An Editor has to be implemented in C++ or java. The documents to be edited will be organized as sentences and words forming the sentence. For each word we would like to keep information on font, color. There has to be a class that helps apply the editing changes and style (font, color) changes to the text.

The user can interact with the editor in a small GUI window to give a search term which the editor has to locate in the text and highlight.

And draw classes, attributes, operations, and relationships between classes. Show which classes are entity, controller, GUI classes. **[10]**

Q9) a) Draw an ACTIVITY diagram for a system process described below. A college has different student associations like sports, literary, science club etc. A student can login to college website, look at the various available associations, and choose one of them to join. All the associations expect you to be a valid student first. The joining process could be different for different associations for example sports association expects you to undergo a fitness test too. The associations organize various events. A member can register for the event online for free. Nonmembers need to pay nominal fees by credit card to register and in either case one gets a confirmation of registration of event. The registrations information needs to be passed onto the activity that sends the email confirmations. **[10]**

b) Compare "join and merge" versus "fork and join" with a good example. **[6]**

OR

Q10) Draw neat fragments on one of the (/interaction overview/state/activity) diagrams to represent the following. Explain the concept too: **[16]**

a) Concurrent sub states and sequential sub states.

b) Activity with actions and parameter node.

c) Working of a traffic signal with help of a timing diagram.

d) Precondition and postcondition in an activity diagram.

*Q11)*a) In the context of sequence diagrams show how to model the following concepts with meaningful examples: **[8]**

i) A parallel frame.

ii) An iteration like a do while loop.

b) Compare, with examples from UML to differentiate the concepts: **[8]**

i) Synchronous and asynchronous call.

ii) ALT and OPT.

OR

*Q12)*a) Consider a Use Case "Take backup of machine data". The possible actor in the system is machine owner. The owner interacts with the application to choose the directories to be backed up. The application then proceeds to take back up of directories one by one. The files in the chosen directories are also backed up one by one. For each file a decision is taken to backup only if file has changed from last backup time. The status of the file change is maintained for each file separately. Once the backup is completed a report is shown to the user about the number of files backed up, total time taken etc. A log of all the backup activities is maintained for reference in future. Please make additional assumptions if relevant and appropriate. Identify classes, actors and model a SEQUENCE diagram for above system with best use of UML Notation. **[8]**

b) Draw a simple COMMUNICATION diagram fragment to show that a communication diagram can show message nesting, show the nature of link between objects (Hint global). **[4]**

c) In the context of interaction diagrams with examples: explain the concept of **[4]**

i) signal.

ii) transient objects.

Total No. of Questions : 12] [Total No. of Pages :3

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[3464] - 351
B.E. (I.T.)
BIOINFORMATICS
(Elective - I)

Time : 3 Hours] *[Max. Marks:100*

Instructions to the candidates:

1) *Answer 3 questions from Section I and 3 questions from Section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) Explain various protein databases with suitable examples of each. **[9]**

b) What is the scope of Bioinformatics? Why is it a multidisciplinary field. **[7]**

OR

Q2) a) Elaborate the difference between structural and functional genomics. **[9]**

b) What is the central dogma of molecular biology? Explain how it is an information science. **[7]**

Q3) a) Classify visualization tools comparing them with examples. List various visualization techniques. **[8]**

b) State and explain the sources of variability in microarray preparation and reading. Explain how statistical analysis can be used to reduce variability. **[8]**

OR

Q4) a) What are microarrays? Explain spotting with the help of process flow diagram for microarray analysis. **[8]**

b) What is clustering? Explain the methods of clustering of gene expression data. **[8]**

Q5) a) Describe data mining methods and their usefulness with the help of neat diagrams. **[6]**

P.T.O.

b) Write notes on

i) Statistical methods for data mining.

ii) Variety of techniques in NLP processing phase. **[12]**

OR

Q6) a) Explain major steps in pattern recognition and discovery process. **[6]**

b) Write notes on

i) Phases in Text mining with NLP (Natural language processing).

ii) Dynamic programming method for sequence alignment. **[12]**

SECTION - II

Q7) a) Discuss different phases of comparative modeling process for protein sequence data visualization. Also specify example tools for each of the phases. **[8]**

b) Write brief notes on :

i) Collaboration and communication model.

ii) Issues of collaboration in Bioinformatics. **[10]**

OR

Q8) a) Explain in detail the Ab initio method of protein structure prediction process with the help of neat diagrams. **[8]**

b) Write brief notes on :

i) Collaboration and communication Hierarchy.

ii) Technologies and processes for collaboration in Bioinformatics. **[10]**

Q9) a) Explain the significance of E (.) value with suitable examples. **[6]**

b) Explain FASTA Algorithm. **[5]**

c) Explain recommended steps for FASTA search. **[5]**

OR

Q10) a) Explain BLAST Algorithm. **[5]**

b) What is the function of BLAST filter for programs for low complexity in BLAST search. **[6]**

c) Discuss Gapped BLAST with its major refinements. **[5]**

*Q11)*a) What is Genetic Engineering? Explain genetic markers. What are the dangers of genetic engineering? **[8]**

b) What is the significance of biotechnology? What is the future scope of bioinformatics in biotechnology? **[8]**

OR

*Q12)*a) Discuss various factors responsible for degradation of ecosystem. **[8]**

b) Explain briefly

i) Polymerase chain reaction

ii) DNA Arrays. **[8]**

Total No. of Questions : 12] [Total No. of Pages : 2

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[3464] - 352
B.E. (IT) (Elective - I)
MOBILE COMPUTING
(414445) (2003 Course)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:-

1) *Answer 3 questions from Section - I and 3 questions from Section - II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*

SECTION - I

Q1) a) Explain the various types of mobilities used in mobile computing environment. **[8]**

b) Explain the 3 tier architecture of mobile computing. **[8]**

OR

Q2) a) Explaining the role of context manager, describe various informations and relevances in the mobile computing environment. **[8]**

b) Explain various applications and services used in mobile environment. **[8]**

Q3) Explain various features, architecture and security algorithms used in GSM. **[16]**

OR

Q4) a) Explain the strengths and architecture of SMS. **[8]**

b) Write short notes on: **[8]**

i) Java Card.

ii) Mobile IP.

Q5) a) How do you enhance GSM architecture to use it for GPRS? **[8]**

b) Explain in detail the WAP protocol stack. **[10]**

OR

P.T.O.

Q6) a) Explain the IS-95 architecture model. **[8]**

b) Explain the two spread spectrum technologies in detail. **[10]**

SECTION - II

Q7) a) What are the advantages and disadvantages of wireless LAN? Under what situation is a wireless LAN desirable over LAN. **[8]**

b) Explain SS#7 Network architecture. **[8]**

OR

Q8) a) Explain various internal components of PDA. **[8]**

b) Explain in general WLAN architecture. **[8]**

Q9) a) Describe the architecture of Palm OS. **[8]**

b) Explain the three-prong approach used in JAVA. **[8]**

OR

*Q10)*a) Explain the functions of various layers used in Symbian OS architecture. **[8]**

b) Explain various security issues used in Symbian OS. **[8]**

*Q11)*a) Explain various flavors of Windows CE. **[8]**

b) Explain the 3 real time protocols in brief. **[5]**

c) Compare SIP and H.323. **[5]**

OR

*Q12)*a) Explain various attacks on static and dynamic assets. **[8]**

b) Explain various components of information security. **[10]**