BITS, Pilani – Dubai Campus, Knowledge Village, Dubai.

IV Year SECOND Semester 2003-2004

Degree: B.E.(Hons.). Branch: C.S.E.

Comprehensive Examination Question Paper

Course No : BITS UC461 Course Title: Software Engineering

Date: 03/06/2004 Thursday Time: 10 a.m.- 1 Noon Total marks: 60

Data provided are complete. ***Closed Book***.

---

Part A Answer **all** Questions. 4 * 2 = 8 Marks

1. Define **CMM Level 4**.
2. Distinguish between **Software Reliability** and **Software Safety**.
3. Mention the **names** of 4 different ***degrees of rigor*** in software project scheduling and tracking.
4. What is **Code Restructuring and Analysis** tool w.r.t. CASE ?

Part B. Answer **all** Questions

**5.**

**.Scargill Ltd**

Scargill Ltd is a distributor of imported ironmongery with a manual accounting system in which sales orders and invoicing are carried out as follows

1. Orders are received by the sales order/invoicing department, mainly by telephone.
2. On receipt, an official order form is prepared and passed to the sales ledger clerk to be vetted for creditworthiness of the customer.
3. From there it is passed to the despatch department to prepare prenumbered despatch documents and assemble the goods for despatch.
4. The despatch department then prepares a delivery schedule for delivering the various orders by its own transport. After delivery a copy of each delivery note, signed by the customer, is returned to the despatch department for matching with the original.
5. The despatch department accounts for all despatch note numbers and passes executed notes to the sales order/invoicing department for invoice typing.
6. The invoicing department despatches top copy invoices direct to the customers and the second copies go to the ledger clerk for entry into the sales journal and posting to the sales ledger.

It is proposed to develop a computer based information system for the above operations. As a Software Engineer, you are required to draw:

a) Context – level DFD.
b) Level 1 DFD.
c) Level 2 DFD. [2 + 3 + 5 marks]

6.

a). **DECISION TREE** to support the Make / Buy Decision

You are required to **DRAW a Decision Tree** for a Software Based System X and **calculate** the **expected cost** for **each** of the following **paths** of the **Decision Tree**:

i) *BUILD* ii) *REUSE* iii) *BUY* iv) *CONTRACT.*

You are provided with the following data related to the above four cases:

i) *BUILD*

| Development Effort | Probability | Estimated Cost |
|---|---|---|
| SIMPLE | 30% | $380K |
| DIFFICULT | 70% | $450K |

(Note: 1K = 1000)

ii) *REUSE*

| Development Effort | Probability | Estimated Cost |
|---|---|---|
| MINOR CHANGES | 40% | $300K |
| MAJOR CHANGES | 60% | $490K |

iii) *BUY*

| Development Effort | Probability | Estimated Cost |
|---|---|---|
| MINOR CHANGES | 70% | $250K |
| MAJOR CHANGES | 30% | $420K |

iv) *CONTRACT*

| Development Effort | Probability | Estimated Cost |
|---|---|---|
| WITHOUT CHANGES | 60% | $350K |
| WITH CHANGES | 40% | $500K |

[6 Marks]

b) **Which one** of the options [paths] gives the **Lowest Expected Cost** ? [1 Mark]

**Part C.** Answer any **FIVE** Questions. 5 * 7 = 35 Marks

7. a) In Software Design, What is **COHESION?** [1 mark]
   b) What does an **Essential View** of Software Requirements indicate? [1 mark]
   c) Define **Defect Removal Efficiency** (DRE) in a software project. [2 marks]
   d) Mention the names of any four categories of errors that you can find using BLACK-BOX TESTING. [2 Marks]
   e) A FLOW-GRAPH, **G**, has **11** flow graph edges and **9** flow graph nodes. CALCULATE the CYCLOMATIC COMPLEXITY **V(G)** for the above flow graph and write it. [1 mark]

8. Explain the METRICS for *Source Code* and the METRICS for *Maintenance*. [4 +3 = 7 marks]

9. Explain the following w.r.t. Debugging Approaches:
   a) Brute Force b) Backtracking c) Cause Elimination.
   d) Debugging Tools [7 Marks]

10. Explain ***Software Configuration Items*** and ***Version Control*** w.r.t. Software Configuration Management. [4+3=7 marks]

11. Develop a **Procedural Design** [ using **PDL** or **Pseudocode** ] to solve the following problem:
Given n, a positive integer, determine whether **n** is the sum of all of its **divisors**. [i.e., whether **n** is the sum of all **t** such that **1 <= t < n**, and **t** divides **n**.] [7 marks]

12. In UML CLASS DIAGRAM, explain each of the following terms, with an illustration:
   a) INHERITANCE relationships. [4 marks ]
   b) COMPOSITION Associations. [3 marks]

BITS, Pilani – Dubai Campus, Knowledge Village, Dubai.

IV Year SECOND SEMESTER 2003-2004

Degree: B.E. (Hons.) Branch: C.S.E.

TEST II Question Paper [MAKEUP]

Course No : BITS UC461 Course Title: Software Engineering

Date: 02, May, 2004 Time: 2.00 p.m.- 2.50 a.m. Total marks: 20

Data provided are complete. ***OPEN Book***.

Answer all Questions.

1. Compute the **Count** for each of the **measurement parameter** (ie. a)Number of ***user inputs***, b)Number of ***user outputs***, c)Number of ***user inquiries***, d)Number of ***files*** and e)Number of ***external interfaces***) for a project with the following characteristics:

   - ***Weighting Factor*** for each *Measurement Parameter = 4.*
   - each ***complexity adjustment value*** *= 5.*
   - FUNCTION POINTs (FP) = 486.
   - The **ratio** of **counts** for the **measurement parameters** is **1 : 2 : 3 : 2:1** respectively.
     (As mentioned above, a, b, c, d, e, in the same order).

   [4 Marks]

2. A computer system is required that will support the following small garage business.

   *Customers bring their cars to the garage for servicing and repair. The attendant must check the car in, record details about the owner and the car, along with any specific customer requests. The workshop manager inspects each car and creates a job specification for it. He then schedules the job and assigns a mechanic to complete the specified tasks. During this process, if any new problems are discovered a new job specification is created by the workshop manager before carrying out the work. When the job is finished the mechanic completes a report detailing the time spent, work done and materials used. This information is used by the attendant to create an invoice for the customer when they come to collect their car.*

   Construct a **Class Diagram** for the system using the UML notation.

   [7 Marks]

3. Use the Unified Modeling Language (UML) to draw a sequence diagram that models the interaction when a web browser gets an object from a web server and renders it on a user's computer. [3 Marks]

4. BITS Pilani, Dubai Campus is interested in developing a computer based information system for managing CAMPUS PLACEMENT related activities for final year students.

   As a Software Engineer, you are required to design a **System Image Model** . [6 Marks]

BITS, Pilani – Dubai Campus, Knowledge Village, Dubai.

IV Year SECOND SEMESTER 2003-2004

Degree: B.E. (Hons.) Branch: C.S.E.

TEST II Question Paper

Course No : BITS UC461 Course Title: Software Engineering

Date: 18, APR., 2004 Sunday Time: 9.30 a.m.- 10.20 a.m. Total marks: 20

Data provided are complete. **OPEN *BOOK*.**

Answer all Questions.

1. Compute the **function point value** for a project with the following information domain characteristics:
   Number of user inputs : 42 Number of user outputs : 50
   Number of user inquiries: 52 Number of files : 30
   Number of external interfaces: 3
   **Assume** that the
   *Weighting Factors* for all *Measurement Parameters* are COMPLEX
   and
   all *complexity adjustment values* correspond to *absolutely essential*..

   [5 Marks]

2. Consider the following interactive application:

"An Internet-Based POLLING BOOTH for PUBLIC ELECTIONS".
As a SOFTWARE ENGINEER, you are required to develop a set of SCREEN LAYOUTS (between 4 and 6 in number ) with a definition of MAJOR and MINOR MENU items.

[6 Marks]

3. What is the meaning of the following multiplicity indicators in Class Diagram?

   a) **0 .. 1** b) **1 .. *** [2 marks]

Course File



B. Vijayakumar

4.

# UML CLASS DIAGRAM

Description of the problem area

WWW-bookstore sells the following *products*: *books* and *DVD disks*. These products have the following common types of information (productid, name, unitprice, qtyinstore, qtyinorders). The product-specific information includes title, author, ISBNNO & Pages for books and Moviename & PlayingTime for DVD disks.

The registered customers can place orders for products. The ordered products are usually delivered together, but sometimes several shipments are needed (the store may run out of some product(s) for a while). An order may contain several duplicates of the same product.

The products are delivered to personal customers by C.O.D (collect on delivery). The business customers will get their orders directly, and they will be sent an invoice afterwards. Both customer types can make the payment also by using a network banking system. When registering, a customer is prompted to give contact and personal information needed for webstore authentication, delivery of the orders and invoicing.

As a Software Engineer, you are required to Design an UML class diagram which contains the key data structures and the related functionalities of the WWW-bookstore.

You must include in the class diagram all the classes, methods and attributes. The inheritance relations and the associations must be included in the class diagram. [3+2+2 Marks]

BITS, Pilani – Dubai Campus, Knowledge Village, Dubai.

IV Year SECOND SEMESTER 2003-2004

Degree: B.E. (Hons.) Branch: C.S.E.

TEST I Question Paper

Course No : BITS UC461 Course Title: Software Engineering

Date: 21, Mar., 2004 Sunday Time: 9.30 a.m.- 10.20 a.m. Total marks: 20

Data provided are complete. **Closed** ***Book***.

Answer all Questions.

1. What is Embedded Software ? [1]
2. Explain in brief the phases of RAD (Rapid Application Development) Model. [Diagram not required].
   When the technical risks are high, Can you recommend this model for software development ? [YES / NO] [2.5 + 0.5]

3. Define an USE-CASE ? [1]
4. Define FAN-IN and FAN-OUT in software design. [2]
5. What is TRANSFORM FLOW ? [2]

6. **Draw** the **DECISION TABLE** for the following problem:

***MEDICAL INSURANCE INFORMATION SYSTEM***

"No Charges are reimbursed to the patient until the DEDUCTIBLE has been met.

( Note: DEDUCTIBLE refers to a clause in Insurance Policy. It exempts the INSURER from paying INITIAL AMOUNT, in the event the INSURED sustain a LOSS.)

After the DEDUCTIBLE has been met, the amount to be reimbursed depends on whether or not the DOCTOR or the HOSPITAL is a "PREFERRED PROVIDER". For PREFERRED PROVIDERS, *DOCTOR's Office Visits* (D) are reimbursed at **65%** and *HOSPITAL Visits* (H) are reimbursed at **95%**. For other providers, reimburse **50%** for Doctor's Office Visits (D) or **80%** for Hospital Visits (H)." [4]

7. Draw the **CONTEXT-LEVEL** (LEVEL 0) DFD and **LEVEL 1 DFD** for the following problem:

***FAST FOOD DELIVERY SYSTEM in a TAKE-AWAY RESTAURANT***

The Supervisor takes the Order on a Carbon-Pad from the Customer. The Cost is calculated from the Menu. The Order is checked with the Customer for Items and Price. When the Customer says OK and pays the money to the Cashier, The Order is stuck on a Pin-Board. When the food is ready, The Order (original copy) becomes the Delivery Note for the Customer.

At the close of business everyday, Carbon-Copies are used to Update the Accounts. The Daily Sales Information is passed to the Manager. [2.5 + 4.5]