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

IV Year FIRST SEMESTER 2004-2005

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

TEST I Question Paper

Course No : BITS UC461 Course Title: Software Engineering

Date: 26, SEP., 2004 Sunday Time: 9.30 a.m.- 10.20 a.m. Total marks: 20

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

Answer all Questions.

1. Define an USE-CASE . Mention an USE-CASE for a WEB-BASED ORDER PROCESSING SYSTEM for a COMPUTER STORE. [1+1]
2. What are the Contents of a DATA DICTIONARY? [2]
3. Explain ESSENTIAL VIEW and IMPLEMENTATION VIEW w.r.t. software requirements with an example. [1+1+1]
4. What is AI software? Mention any two applications in this category. [1+1]
5. Explain the features of the Concurrent Development Model. Mention any two applications that belong to this category. [4+1]
6. Draw the **CONTEXT-LEVEL** (LEVEL 0) DFD and **LEVEL 1 DFD** for the following problem:

BPDC ADMISSIONS SYSTEM

It is proposed to develop a computer based Information System for keeping track of the whole admission procedure for candidates seeking admission to BITS PILANI-DUBAI Campus [BPDC] in engineering stream. The branches offered include: CSE, EEE, EIE and Mechanical Engg. Selection is based on candidates' merit and preferences. The normal input for admission is a pass in 10+2 from a recognized board/university with Physics, Chemistry, Mathematics and adequate proficiency in English and at least 60% aggregate of all marks in the subjects of the qualifying examination. The Admissions Committee looks after admissions process.

The system is mainly concerned with the issue of advertisement for admission [in newspapers and website], Receiving applications from interested candidates, scrutiny of applications, shortlisting of the deserving candidates, rejection of invalid applications [due to incomplete data], maintenance of a waiting list and sending admission confirmation letters to selected candidates.

As a software engineer, you are required to draw **CONTEXT-LEVEL** (LEVEL 0) DFD [data flow diagram] and **LEVEL 1 DFD.** **[2+4]**

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B. Vijayakumar

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

IV Year FIRST SEMESTER 2004-2005

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

TEST I Question Paper [MAKEUP]

Course No : BITS UC461 Course Title: Software Engineering

Date:4/10/04 Time: 2-2.50 noon Total marks: 20

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

Answer all Questions

1. What is Embedded Software? [1]
2. Explain the features of Spiral Model with an example application. [2.5+2.5]
3. As a Software Engineer,**Draw** the **CONTEXT-LEVEL** (LEVEL 0) DFD and **LEVEL 1 DFD** for the following problem:

   "The Workers of a PRIVATE COMPANY are paid weekly in arrears. Each Monday, the time cards for the previous week are collected by the production control department and sent to the wages office, included with them are any overtime authorizations.

   Information on adjustments to wage rates, new starters and leavers is supplied by the personnel department. The time cards are checked for validity against the current employee file. This file is updated with the personnel changes supplied by the personnel department.

   Any queries about time cards, overtime or personnel changes are returned to the appropriate department.

   Valid time cards are used to produce a payroll. In doing this, Reference is made to the Wage Rates file, and also to the cumulative deductions file which shows Pay-to-date, tax-to-date & PRSI-to-date. This file is updated after the payroll is produced. This file is also used to produce P45s to LEAVERS and an annual P60 to all employees.

   The Payroll is used to create payslips and cheques which are issued to each employee. A copy of the payroll is sent to the accounts department, where it is used to update the Nominal Ledger."

   [3+5]

Note: For your easier understanding, some key terms are defined below:

P45 : A form which must be given to you if you leave your employment during the tax year and tax has been deducted from your pay. You should retain part 1A of the form for your records but give parts 2 and 3 to your new employer.

P60 : A certificate detailing your income, tax deducted and national insurance for your current employment, as well as any earlier employments in the same tax year. The P60 is given to you by your employer at the end of the tax year.

PAYROLL: The records of wages or salaries, gross pay, deductions, and net payments to employees.

PRSI: Pay Related Social Insurance

4. Explain the features of Quality Function Deployment (QFD) in Requirements Analysis. [4]
5. Mention the names of the key process areas for CMM Process Maturity Level 5. [2]

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

IV Year FIRST SEMESTER 2004-2005

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

TEST I Marking / Answering Scheme [MAKEUP]

Course No : BITS UC461 Course Title: Software Engineering

Date:4/10/04 Time: 2-2.50 noon Total marks: 20

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

Answer all Questions

1. What is Embedded Software? [1]
   resides in PROM; used to control products and systems for consumer and industrial markets.
2. Explain the features of Spiral Model with an example application.
   Task regions explanation + appropriate example 2.5+2.5
3. As a Software Engineer,**Draw** the **CONTEXT-LEVEL** (LEVEL 0) DFD and **LEVEL 1 DFD** for the following problem:
   Level 0 DFD : INPUT , SINGLE PROCESS, OUTPUT 1+1+1
   Level 1 DFD: Correct Sequence of Processes, Labelled Data Flow, Data Stores. [2.5+1.5+1]
4. Explain the features of Quality Function Deployment (QFD) in Requirements Analysis. [4]
   normal, expected, exciting reqts, deployments for function, information, task, value analysis
5. Mention the names of the key process areas for CMM Process Maturity Level 5.
   Level 4 kpas + process change mgt, technology change mgt, defect prevention. [2]

BITS, Pilani – Dubai Campus, Knowledge Village, Dubai
IV Year FIRST SEMESTER 2004-2005
Degree: B.E. (Hons.) Branch: C.S.E.

TEST II Question Paper

Course No : BITS UC461 Course Title: Software Engineering

Date: 24/11/ 2004 wednesday Time: 9.00 a.m.- 9.50 a.m. Total marks: 20

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

Answer all Questions.

1. 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]

2. BITS Pilani, Dubai Campus is interested in developing a computer based information system for managing CAMPUS PLACEMENT related activities for final year engineering students belonging to different branches.
As a Creative Software Engineer, you are required to design a **System Image Model**. [6 Marks]

3. Draw a UML Class Diagram for the following scenario:

A zoo keeps records of the animals in its care. Each animal has a reference number, a common name, and a cage. An animal may have a pet name.

- An *animal* is a carnivore, herbivore or omnivore.
- A *reference number* is a serial number (eg 258) which distinguishes one animal from all other animals in the system.
- A *common name* is a character string (eg "Orangutan") which is a common name for the kind of animal.
- A *cage* identifies the enclosure where the animal is held in the zoo.Each cage has its own name (eg "Elephant Compound" or "Fish tank A-CW-45"). A cage may be inside a larger cage (eg a fish tank, inside an aquarium building, inside the zoo). Ultimately every cage is contained within a single top level cage, corresponding to the whole zoo.
- A *pet name* is a character string (eg "Jumbo") which is a name for the animal for purposes of zoo publicity.

In your class diagram, show classes, inheritance, associations and attributes, but no methods. [5 marks]

FOR Course File B. Vijayakumar

4. Draw a DECISION TABLE for the following problem:

Triangle classification: Given **three lengths** [say **a, b, c** in centimetres], determine whether they can be the lengths of the three sides of a triangle; If so, Is the triangle so formed equilateral (all lengths are equal), isosceles (two lengths are equal) , or scalene (all lengths are distinct).

Note: In a triangle, the sum of lengths of two sides is greater than the length of third side.

[4 Marks]

5. Answer the following statements with either TRUE or FALSE:

a) Given the same set of requirements, the EFFORT to develop an individual software module does increase as the total number of modules increases.

b) In Software Design, Program Structure does not represent procedural aspects of software.

c) Within a DFD (data flow diagram) for a large system, only TRANSACTION FLOW is present.

d) Architectural Design focuses on the representation of the structure of software components, their properties, and interactions. [4 * 0.5 =2 marks]

For course file

Campus, Knowledge Village, Dubai.
First Semester 2004-2005
B.E.(Hons.) Branch: C.S.
Examination Question Paper
Course Title: Software Engineering
Time: 10 a.m.- 1 Noon Total marks: 60
Data provided are complete. *Closed Book*.

Part A Answer **all** Questions. 10 * 2 = 20 Marks

1. Distinguish between Normal Requirements and Expected Requirements.
2. Define Stamp Coupling and Control Coupling.
3. What is TRANSFORM MAPPING?
4. What is Concurrent Development Model? Where is it often used?
5. Mention the names of the framework activities in the USER INTERFACE DESIGN Process.
6. What are the measurement parameters that you will consider in computing the FUNCTION POINTS?
7. What does a TIMELINE (GANTT) chart indicate?
8. What is Equivalence Partitioning in Software Testing?
9. What is software availability? Write the formula for computing Software Availability.
10. In CASE, What is a Dynamic Analysis Tool? Mention the names of 2 types of dynamic analysis tools.

Part B Answer **all** Questions. 4 * 5 = 20 Marks

11. **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*.
Which one of the options [paths] gives the **Lowest Expected Cost** ?
You are provided with the following data related to the above four cases:

i) *BUILD*

Development Effort	Probability	Estimated Cost
SIMPLE	35%	$380K
DIFFICULT	65%	$450K

(Note: 1K = 1000)

ii) *REUSE*

Development Effort	Probability	Estimated Cost
MINOR CHANGES	20%	$300K
MAJOR CHANGES	80%	$490K

course file

iii) *BUY*

Development Effort	Probability	Estimated Cost
MINOR CHANGES	50%	$250K
MAJOR CHANGES	50%	$420K

iv) *CONTRACT*

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

12. Explain CHANGE CONTROL process in Software Configuration Management.

13. Explain the following Technical metrics for software:

a) Program Length b) Program Volume c) Software Maturity Index. [1.5+1.5+2]

14. Explain UNIT TESTING in software testing strategies.

Part C Answer **all** Questions. 2 * 10 = 20 Marks

15. **UML CLASS DIAGRAM: Automated Teller Machine**

It is required to support a computerised banking network, which includes both human cashiers and automated teller machines (ATMs) to be shared by a consortium of banks. Each bank provides its own computer to maintain its own accounts and process transactions against them. Cashier stations are owned by individual banks and communicate directly with their own bank computers. Human cashiers enter account and transaction data. ATM's communicate with a central computer which clears transactions with the appropriate banks. an ATM accepts a cash card, interacts with the user, communicates with the central system to carry out the transaction, dispenses cash and prints receipts. The system requires appropriate record keeping and security provisions. The system must handle concurrent accesses to the same account correctly. The banks will provide their own software for their their own computers;. The cost of the shared system will be apportioned to the banks according to the number of customers with cash cards. You are to draw an appropriate UML Class Diagram for this problem.

16. 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 innovative Software Engineer, you are required to perform the following software design steps:

a) Program Structure (Hierarchy Diagram) [3]
b) Data Design [3]
c) System Image Model [4]