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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2017/2018**

COURSE NAME : SOFTWARE ENGINEERING
COURSE CODE : BIT 10103
PROGRAMME CODE : BIT
EXAMINATION DATE : JUNE / JULY 2018
DURATION : 3 HOURS
INSTRUCTION : ANSWER ALL QUESTIONS

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THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

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Q1 (a) Discuss **TWO (2)** software design principles. (4 marks)

(b) One of the elements in design model is architecture element. List the other **FOUR (4)** elements. (4 marks)

(c) Questions **Q1(c)(i)** and **Q1(c)(ii)** are based on **Figure Q1**.

An asset management information system is proposed. The information system is developed to maintain information about assets owned by a utility company such as buildings, vehicles, equipment, etc. It is intended that this will be updatable by staff working in the field using mobile devices as new asset information becomes available. The company has several existing asset databases that should be integrated through this system.

Figure Q1

(i) Design a layered architecture for the information system. (6 marks)

(ii) Draw a user interface design for the mobile device. (6 marks)

Q2 Questions **Q2(a)** and **Q2(b)** are based on **Figure Q2**.

As a Software Engineer, you are assigned to develop a system. The system has 4 external inputs (1 low complexity; 2 medium complexity; 1 high complexity), 4 external outputs (medium complexity), fields 7 different external queries (1 low complexity; 4 medium complexity; 2 high complexity), manages 3 internal logical files with medium complexity, and interfaces with 2 different legacy systems with medium complexity. Assume that an adjusted project complexity factor(vaf) of 1.2 is appropriate for this project.

Formula:

- $FP = TUFP \times (0.65 + \text{value adjustment factor (vaf)})$
- Effort (in person months) = $1.4 \times \text{thousands of lines of code}$
- Schedule time (months) = $3.0 \times \text{person months}^{1/3}$

Figure Q2

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- (a) Compute Functional Point (FP) for the system using the format given in Table Q2(a).

(12 marks)

Table Q2(a)

Description	Complexity				Total
	Total Number	Low (l x weight)	Medium (m x weight)	High (h x weight)	
External Inputs	n(l, w, h)	l x 3	m x 4	h x 6	
External Outputs	n(l, w, h)	l x 4	m x 5	h x 7	
External Queries	n(l, w, h)	l x 3	m x 4	h x 6	
Internal logical Files	n(l, w, h)	l x 7	m x 10	h x 15	
Interfaces	n(l, w, h)	l x 5	m x 7	h x 10	
Total Unadjusted Function Points (TUFPP)					

- (b) Calculate the duration of the project if they use Visual Basic as the programming language for the system. Use Table Q2(b) as a guide.

(4 marks)

Table Q2(b)

Language	Approximate number of lines of code per function point
C	130
Cobol	110
Java	55
C++	50
Turbo Pascal	50
Visual Basic	30
Power Builder	15
HTML	15
Packages (e.g. Access, Excel)	10-40

- (c) Discuss **TWO (2)** benefits of estimation in any software development project.

(4 marks)

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- Q3** (a) Describe the term requirements. (2 marks)
- (b) Explain **FOUR (4)** generic activities of requirements engineering process. (8 marks)
- (c) Answer **Q3(c)(i)** and **Q3(c)(ii)** based on **Figure Q3**.

A prospective member fills in an application form. Then the librarian processes the application form and issues a library card member. The new member then browses the catalogue and finds a loan item (books, magazines, videos, DVDs and cassettes). The new member then borrows the loan item by giving his/her library card plus the loan items to the librarian. The librarian records the borrowings and returns the library card and loan items to the borrower. At some future date, the borrower returns the loan items to the library. The librarian checks in the items. The member may also reserves a loan item or arrange an interlibrary loan from another library. When these items become available at the library, the requesting member is notified. The librarian maintains the catalogue by getting a list of the latest items from book suppliers every month. At the end of each month the librarian creates an order for the book suppliers. When the items arrive the librarian labels them and makes them available in the catalogues.

Figure Q3

- (i) List **FIVE (5)** functional requirements. (10 marks)
- (ii) Develop a use case diagram. (10 marks)
- Q4** (a) Explain how software verification and validation are related to software testing. (4 marks)

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- (b) Requirements based testing is a systematic approach to derive a set of test for each requirement. Specify **FOUR (4)** related test for requirements statements in **Figure Q4**

Mental Care System Requirements:

- If a patient is known to be allergic to any particular medication, then prescription of that medication shall result in a warning message being issued to the system user.
- If a prescriber chooses to ignore an allergy warning, they shall provide a reason why this has been ignored.

Figure Q4

(8 marks)

- (c) Using Equivalence Class Partitioning (EC), write **THREE (3)** test cases for each valid and invalid ECs based on the format in **Table Q4(d)(i)** and scenario in **Table Q4(d)(ii)**.

(6 marks)

Table Q4(d)(i)

Test Type	Test case No.	Day of week	Entry Hour	Visitor's status	Visitor's Age	Test Case Result
Valid ECs						
Invalid ECs						

Table Q4(d)(ii)

Day	Mon., Tue., Wed., Thu, Fri.				Sat., Sun.			
Visitor's status	Ot	Ot	Mem	Mem	Ot	Ot	Mem	Mem
Entry hour	6.00-19.00	19.01-24.00	6.00-19.00	19.01-24.00	6.00-19.00	19.01-24.00	6.00-19.00	19.01-24.00
Age: 0.00-16.00	\$5	\$6	\$2.50	\$3	\$7.50	\$9	\$3.50	\$4
Age 16.01-60.00	\$10	\$17	\$5	\$6	\$15	\$18	\$7	\$8
Age: 60.01-120.00	\$8	\$8	\$4	\$4	\$12	\$12	\$5.50	\$5.50

- END OF QUESTION -

