ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

SEMESTER FINAL EXAMINATION   SUMMER SEMESTER, 2016-2017
DURATION: 3 Hours   FULL MARKS: 150

CSE 4601: Software Engineering and Object Oriented Design

Programmable calculators are not allowed. Do not write anything on the question paper.
There are **8 (eight)** questions. Answer any **6 (six)** of them.
Figures in the right margin indicate marks.

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1. a) Define Software. How does software increase the productivity of a system? — 3+3
   b) What is a Legacy Software? How can you connect legacy software with modern software system? — 3+3
   c) Briefly describe Service Oriented Architecture (SOA) with an example scenario. — 7
   d) What is 80-20 rule? How does it help in software engineering? — 6

2. a) What is a software process? What are the generic framework activities that are present in every software process? — 3+3
   b) What are the quality attributes that 'FURPS' emphasize on? How can you ensure that the quality attributes are being fulfilled by your software engineering process? — 5+5
   c) What are Quality Control (QC), Quality Assurance (QA) and Total Quality Management (TQM)? How can you advance your organization from QC to TQM? — 3+3
   d) One of the anti-patterns that prohibit code reuse is copy-paste programming. An example of copy-paste programming is given in the code snippet below. Refactor the code. — 3

```
class Controller{              int logic1(Person p){
int logic1(Student s){         int a=p.my_age;
int a=s.age;                   int b=s.advantage_factor;
int b=s.some_parameter;        //logic
//logic                        int c=a+b;
int c=a+b;                     return c;
return c;                      }
}                              }// class Controller
```

3. a) 'Classes are nouns and methods are verbs' - Use the analysis technique to find the classes and methods in a Smart Classroom with attendance system. During analysis keep in mind that the Smart Classroom also has a feature of e-Learning (i.e. Virtual Classroom). — 13
   b) Discuss the architectural issues for the system in Question 3(a) with necessary diagrams, classes, components, servers, clients, hardware etc. — 12

4. a) What do you understand by Cohesion and Coupling? Discuss the use of Façade to reducing the coupling and increase cohesion. — 10
   b) In modern days, applications are having at least two different client versions; one web client and another mobile client. If you are developing a Student Information System, what architecture (s) will you consider to allow two different clients without compromising the integrity and atomicity of the system? — 15

5. a) What is Process based Quality Assurance (QA)? Briefly discuss on Capability Maturity Model (CMM) which indicates the process quality of a software organization.   12

   b) Suppose you are to develop a keyboard application that may use EEG signal based Brain Computer Interaction (BCI) or an Eye pointer (image processing based) for impaired people. Both BCI and image processing mechanism will help the impaired person to choose a character and eventually a word using the keyboard. As the mechanisms are slow, there is a need to develop letter prediction tool and a word prediction tool embedded within the keyboard application. As you are new to the development of special keyboard applications, you will need to do some research on BCI or Eye pointer though there are few APIs available. Write an iteration plan of your development if you following SCRUM agile development process.   13

6. a) What is cyclomatic complexity? What is its role in software testing effort? What are the other techniques that may help you achieve the same objective in testing effort?   10

   b) Suppose the mobile market is Bangladesh is being double every year. Walton, Symphony and Samsung brands are possessing the 50%, 20%, 30% of the market. However, there are dissatisfied customers with all the brands. Walton and Symphony mobile have bad quality battery and touch panel; though Walton has many service centers to compensate, Samsung mobile phones are superior in touch quality but Samsung has only few service centers. The three brands have 20%, 30% and 5% dissatisfied customers respectively. If the initial market size is just 1000, what will be the market share of Walton, Symphony and Samsung in the mobile market in (i.e. after) two years?   15

7. a) Suppose you are developing a log-in interface for a web based system which will also be integrated with the total system. You are asked to quote the price for your development effort. How much price will you ask if each Line of Code (LOC) costs you only $5 dollars? Provide justification for your price quote.   7

   b) What is a test case? Write two critical test cases for a smart card based system.   2+4

   c) What are a driver and a stub? Write a real scenario in 'admission system' development where you might be forced to use a stub.   6

   d) What is code coverage? '100% code coverage does not necessarily always mean fully tested software' – Explain.   6

8. a) What is static analysis? Is it an alternative to dynamic testing? Write a short note on Memory Leak.   6

   b) What is XSS? How can you prevent XSS vulnerability in your web based system?   6

   c) Write a short note on Communication Diagram with an example.   6

   d) Write a short note on Factory Pattern.   7