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

SEMESTER FINAL EXAMINATION — WINTER SEMESTER, 2017-2018
DURATION: 3 Hours — FULL MARKS: 150

CSE 4105: Computing for Engineers

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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a) A CPU executes each instruction in a series of steps. Explain each of those steps with their functionalities and roles of different registers in those steps. 10

b) What is the importance of thorough problem analysis before deployment of any software project? Write down the six stages of program development cycle. 4+4

c) What is cache memory? Draw the hierarchy of different types of memory used in computer system according to speed, capacity, and cost. 2+5

a) What is Compiler, Assembler, and Interpreter? Explain them with detailed examples. 6

b) What are the stages of compiling a standard C program? Explain each of the stages mentioning the output at the end of each of them. 12

c) Observe the following C code. Find the syntax errors in this code and mention their type. 7

```
#include <stdio.h>
void Main()
{
    int a, b=1;
    for( a = 10; a>=0; a-- );
    {
        printf(b/a);
        continue;
    }
    if(a=b){
        printf("Equal");
    }
    return 0;
}
```

Figure 1

a) Suppose you own a super shop. Your super shop has only 20 items and you know their prices. You need software that will be able to calculate total bill of a customer. It is to be mentioned that there is a VAT (value added tax) of 7% attached with the total bill which is to be paid by the customer. Now write an IPO chart that depicts the input processing and output of the required software. 9

b) Write an algorithm to calculate the bill of a customer. You can use any of the methods to represent your algorithm. 8

c) Convert your algorithm into a NS diagram. 8

a) What is an operating system? Explain the key role played by operating system for user's interaction with the underlying hardware with appropriate diagram. 2+5+2

b) What do you understand by Real Time Operating System? Explain Soft real-time and Hard real-time systems with appropriate examples. 2+6

c) Explain the following terms with appropriate examples.
   i. Instruction
   ii. Program
   iii. Software
   iv. Process

5. a) Explain the Process Life Cycle with appropriate diagram.
   b) In a multiprogramming and time-sharing environment, several users share the system simultaneously. This situation can result in various security problems. Mention two such problems. What could be done to solve those problems?
   c) In a batch processing system, most of the time CPU remains idle. – Justify this statement with appropriate reason.

6. a) What is a register? Explain the purpose of different types of registers in CPU.
   b) Explain the difference between RISC and CISC architecture.
   c) Pipelining improves instruction execution speed by putting the execution steps into parallel. – Justify this statement with appropriate examples or diagram.

7. a) Observe the following assembly instruction:

```
LOAD  R1, A
```

   Explain the working procedure of this instruction. The contents of registers and buses should be clearly mentioned.
   b) There are a number of factors related to CPU that have an effect on the overall speed and performance of the computer. Explain those factors with appropriate examples.
   c) What do understand by Bus? Explain the function of Data Bus, Control Bus and Address Bus.

8. a) What is a computer network? Explain the basic network criteria.
   b) What do you understand by network topology? Name the four basic network topologies and cite an advantage of each type.
   c) What do you understand by protocols? Why protocols are needed? Mention key elements of a protocol in terms of computer networks.