University of Asia Pacific

Department of Computer Science and Engineering

Mid-Semester Examination Fall-2021

Program: B.Sc. in CSE

Course Title: Software Engineering

Course No. CSE 321

Full Mark: 60

Credit: 3.00   Time: 1.00 Hour.

There are **Four** Questions. **Answer three questions including Q-1 and Q-2.**

1. a. Suppose your software company is assigned a project by a renowned Biology Lab for designing a software system for them, which will tract the RNA sequences of the Covid 19 virus and the changing symptoms of the patients. Then the system will predict the variant if given the symptoms of a patient. Which software process model will you use and why? Describe the model in accordance to your system. **[20]**

2. a. Draw the ER Diagram of the system mentioned in 1(a). **[10]**

   b. Do you think there is any privacy issue that you will face while building the system in 1(a)? Explain in detail. **[10]**

3. a. What is System? Explain different types of system with examples. **[10]**

   b. What is Scrum? Explain the process flow of Scrum methodology with example. **[10]**

OR

4. a. What are the six types of risks that can rise? Explain each of them. **[10]**

   b. What is software design? What are the objectives of software design? **[10]**

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University of Asia Pacific

Department of Computer Science & Engineering

Mid-Semester Examination Fall-2021

Program: B. Sc Engineering (3rd Year/ 2nd Semester)

Course Title: Peripheral & Interfacing   Course No. CSE 315

Time: 1.00 Hour.

Credit: 3.00

Full Marks: 60

There are **Three** Questions. Answer all of them. All questions are of equal value/Figures in the right margin indicate marks.

Please note that there are two question at number 3, answer only one of them.

*In Arduino environment, sketch and code are synonymous.

1.   **"Interfacing and Peripheral are referring to the same scheme and Ports can be used to interface."**

    a. What do you think, Is the statement fully/partially true/false? Explain your answer with detailed example.   [20]

       Your answer must include your stand to the above-mentioned statement.

2.   a. Solve the truth table below which represents a combinational circuit. Here X_0 & Y_0 are two different inputs and Z_0 is the output. Write the sketch. (You are not allowed to use any library defined function to solve.)   [20]

M	N	Z_0
0	0	$Y_0 + X_0 + $ **Bangla**
0	1	$Y_0 \oplus X_0 \oplus$ *Last bit of the number 21*
1	0	$Y_0 + (!X_0 + 1) - $ **Language**
1	1	Convert integer to binary with Serial.Print()'s dual parameter mode

Bangla= The last bit of the last digit of the number 96

Language= The second last bit of the last digit of the number 168

3. a. What is Shield in Arduino? Write short notes on any five shields of Arduino environment.   [10]

b. Simplify the equation using Boolean Algebra and write a sketch for the final equation. [10]

$$F = AB\bar{C}(D+\bar{D}) + A\bar{B}\bar{C}D + ACD(B+\bar{B}) + AC\bar{D}(B+\bar{B})$$

Or,

3. a. What is Cloudlet? How Cloudlet is being used in Edge Computing? [10]

   b. Discuss about Cloud Offloading where edge computing could shine to further illustrate our vision of edge computing? [10]

University of Asia Pacific

Department of CSE

Mid-Semester Examination Fall 2021

Program: B.sc in CSE

Course Title: Computer Architecture   Course No. CSE 317 / CSE331*

Credit: 3.00   Time: 1 Hour.   Full Mark: 60

There are **THREE** Questions. **Answer All questions.**

1. a. Show the relationship among Instruction Set, Software and Hardware that define computer architecture. [5]

   b. Two different compilers are being tested for a 2 GHz's machine with three different classes of instructions: [15]
   Class A, Class B, and Class C, which require two, three and four cycles (respectively). Both compilers are used to produce code for a large piece of software. The first compiler's code uses 5 million Class A instructions, 1 million Class B instructions, and 1 million Class C instructions. The second compiler's code uses 10 million Class A instructions, 1 million Class B instructions, and 1 million Class C instructions.

       i)   Which sequence has the higher MIPS rate?
       ii)   Which sequence will be faster according to execution time

2. a. **"Simplicity Favors Regularity"** discuss this principle according to MIPS instruction set Architecture. [5]

   b. For the following high-level statement write the MIPS machine Code. [15]
       i)   A [15] = C + A [20];
       ii)   X=Y+Z-I;

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a. Briefly explain all type of instruction format in MIPS. [5]

b. According to MIPS instruction set architecture convert the following high-level [15]
statement into MIPS machine code. [Hints: fig 1]

$$A [30] = x+ B[12]-Y:$$

High-level language program (in C)	swap(int v[], int k)
	{ int temp;
	temp = v[k];
	v[k] = v[k+1];
	v[k+1] = temp;
	}

Compiler

Assembly language program (for MIPS)	swap:
	muli $2, $5,4
	add $2, $4,$2
	lw $15, 0($2)
	lw $16, 4($2)
	sw $16, 0($2)
	sw $15, 4($2)
	jr $31

Assembler

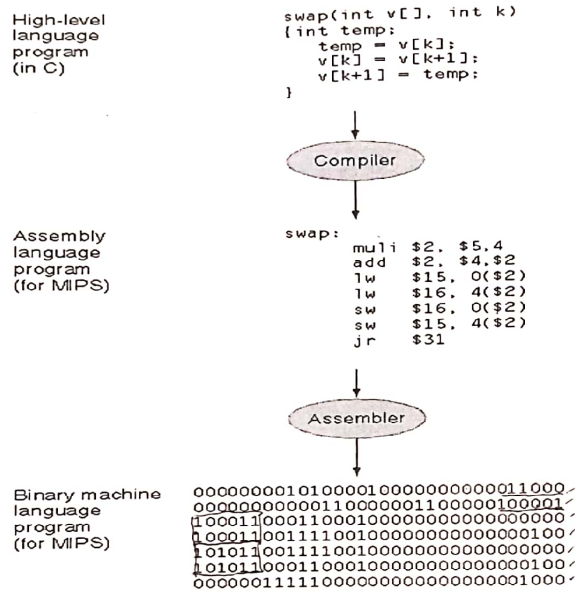| Binary machine language program (for MIPS) | 00000001010000010000000000011000 |
	00000000000110000011000001000001
	10001100011000100000000000000000
	10001100111100100000000000000100
	10101100111100100000000000000000
	10101100011000100000000000000100
	00000011111000000000000000001000

Fig1: C program compiled into assembly language and then assembled into binary machine language.

3.
   a. Solve the following using **Booth's** logic. 5*(−3) [15]
using 4 bits multiplier.

   b. Draw the flowchart of booth's logics according to 3a. [5]

Course Code: CSE 313/ CSE 209*   Course Title: Numerical Methods   Credit: 3.00

Time: 1 Hour   Full Marks: 60

Instructions: Answer **all** questions. All questions are of equal value. Part marks are shown in the margins.
 *Self-study.

Q. 1 a)   How relative true error minimizes the error while solving a mathematical   {8}
           model using numerical methods? Explain it with an example.

      b)   The distance x of a runner from a fixed point is measured (*in meters*) at   {12}
           intervals of half a second. The data obtained is

t	0.0	0.5	1.0	1.5	2.0
x	0.00	3.65	6.80	9.90	12.15

           Use the second order Lagrangian polynomial to approximate the runner's
           velocity at times $t = 1.25$ s.

Q. 2 a)   What do you mean by significant digits? Briefly explain.   {5}

      b)   Using a computer with four significant digits with chopping, find the values of   {15}
           $[x_1, x_2]$ using Naive Gauss elimination method with partial pivoting for

$$\begin{bmatrix} 0.0040 & 23.165 \\ 4.392 & -8.821 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 63.22 \\ 39.89 \end{bmatrix}$$

Q. 3 a)   Write down the advantages and drawbacks of Newton-Raphson method.   {5}

      b)   Use Newton-Raphson method to estimate the root of $f(x) = x^3 - x^2 + 2$.   {15}
           Conduct 3 iterations assuming that the root exists in the interval of
           $[-19, -21]$. Find the absolute relative approximate error and the number of
           significant digits at least correct at the end of each iteration. Use four decimal
           digit arithmetic to find a solution.

OR,

      a)   Write down the advantages and drawbacks of bisection method.   {5}

      b)   One of the UAP CSE students wishes to find a root of the function $f(x) =$ {15}
           $2x^3 - 2x - 5$. He/she will use $x_{i-1} = 1$ and $x_i = 2$ as initial approximations.
           He/she will halt after a maximum of N = 3 iterations. Consider four decimal
           digit arithmetic to find a solution using Secant method. Find the absolute
           relative approximate error and the number of significant digits at least correct
           at the end of each iteration.

University of Asia Pacific

Department of Computer Science & Engineering

Mid-Semester Examination, Fall 2021
Program: B.Sc. Engineering (3rd Year/2nd Semester)

Course Code: CSE 319   Course Title: Computer Networks   Credit: 3.00

Time: 1.00 Hours   Full Marks: 60

Instructions: There are Four Questions. Answer three questions including Q-1 and Q-2. All questions carry equal marks.

Q. 1 a) "Modern-day internet uses a packet switching mechanism." Analyze the statement with example. (10)

b) Most of the time, accessing websites between the web server and the access network occurs the bottleneck due to the speed of the access link since access link bandwidth is quite expensive. Therefore, in the access network, users encounter bad website browsing experiences. Propose the best possible solution to increase the performance of the access network. Your proposal must include the calculation for selecting the particular solution approach. (10)

Q. 2 a) In reliable data transmission (RDT) protocol, RDT version 3.0 ensures all the requirements of reliable data transmission. However, it has severe performance issues. Design a protocol on top of RDT 3.0, which will increase the performance of RDT 3.0. You must provide a proper explanation of your design architecture. (12)

b) The application layer provides various facilities to the developers to develop different types of network applications. Different applications require different types of transport layer services. Let you work with a network application development that requires the following services: (8)

- it is time-sensitive
- requires a minimum amount of data transmission rate
- can consider loss during transmission

Decide which transport layer service you will choose for your network application. Evaluate your choice with justification.

Q. 3 a) List the sub-network address, sub-net mask, and broadcast address for the following IP addresses: (12)
(i) 142.255.5.6/a
(ii) 100.100.100.100/b
(iii) 192.254.154.250/c
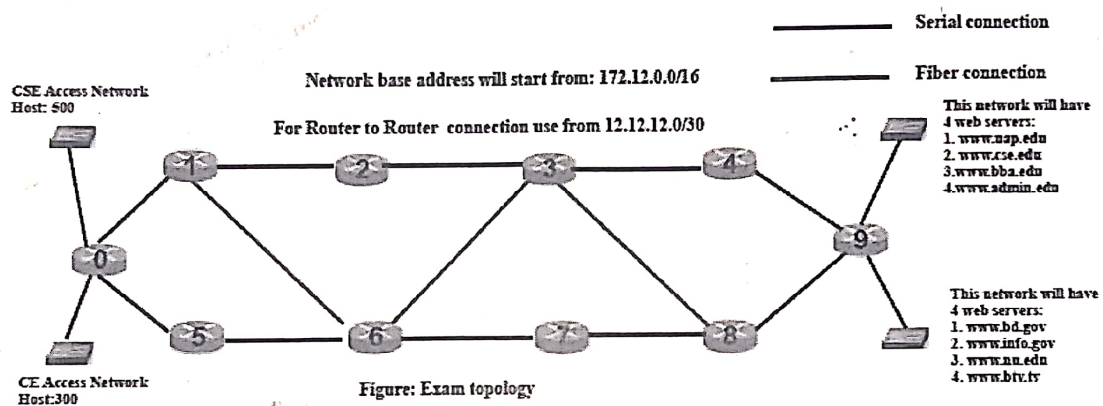Here, $a = 15 + YBM$; $b = 17 + YBM$; $c = 18 + YBM$
YBM = Your Birth Month

b) Let BTCL gets 140.150.128.0/17 address from the IETF, and it wants to (8)

distribute the address among the 32 ISP's of Bangladesh with the same number of host capabilities. Design the sub-network and list those addresses.

Or

Q.4   IT department of the University of Asia Pacific (UAP) plans to increase the network   (20) performance and divide the whole network into smaller sub-networks for better management as shown in the following Figure.

CSE Access Network
Host: 500

Network base address will start from: 172.12.0.0/16

For Router to Router connection use from 12.12.12.0/30

Serial connection

Fiber connection

This network will have
4 web servers:
1. www.uap.edu
2. www.cse.edu
3. www.bba.edu
4. www.admin.edu

This network will have
4 web servers:
1. www.bd.gov
2. www.info.gov
3. www.uu.edu
4. www.btv.tv

CE Access Network
Host:300

Figure: Exam topology

As a network engineer, your job is to design the UAP network with each sub-network's network address, sub-net mask, usable host range, and broadcast addresses from the above requirements.