

University of Asia Pacific

Department of Computer Science & Engineering

Mid-Semester Examination Spring 2020

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

Course Code: CSE 313

Course Title: Numerical Methods

Credit: 3.00

Time: 1.30 Hour

Full Marks: 60

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

- Q. 1 a) What is relative true error? How the relative true error is calculated? {5}
- b) Use forward divided difference approximation of the first derivative of $f(x) = 3e^{2.5x} + 2$ to calculate the derivative at $x=2.12$ with a step size of 2. Find the exact value and absolute relative true error. Use four decimal digit arithmetic to find a solution. {15}
- Q. 2 a) What is truncation error? Give an example. {5}
- b) Assuming an initial bracket of $[-3, -4]$, what would be the second (at the end of 2 iterations) iterative value of the root of the function $f(x) = x^{3/2} + 9x^2 + 7x + 5$ using the bisection method. 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. {15}
- Q. 3 a) How relative approximate error minimizes the error while solving a mathematical model using numerical methods? {5}
- b) Use Newton-Raphson method to estimate the root of $2 - x^2 = \sin(x)$. Conduct 3 iterations with an initial guess **-1.5**. 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. {15}

OR,

- a) Write down the advantages and drawbacks of Newton-Raphson method. {5}
- b) One of the UAP CSE students wishes to find a root of the function $f(x) = \cos(x) - x$. He/she will use $x_i = \pi/4$ and $x_{i-1} = 0.5$ 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 {15}

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 Spring-2020
Program: B. Sc Engineering (3rd Year/ 2nd Semester)

Course Title: Peripheral & Interfacing

Course No. CSE 315

Credit: 3.00

Time: 1.00 Hours.

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. ***“Peripheral and Interfacing, refers to the same thing in Computer Science.”***
 - a. Here what do we understand by the two afore-mentioned terms? Write some examples: [05]
 - b. What do you think, Is the statement true/false? Explain your answer with detailed example. [15]
 - 2 a. What is the functionality of **analogWrite()**? Write an example sketch to show the functionality briefly. [10]
 b. What is Function Prototyping in Arduino? Write different modules of **Serial.Print()** with proper explanation and example. [10]
 3. a. You will have to operate some variables of Arduino sketch bit by bit. In this situation, which type of operator will you use? Write a description upon that. (Describe all operators with example of that group.) [10]
 b. What is Shield in Arduino? Describe the importance of L293D and Relay Module with appropriate examples. [10]
- Or,
3. a. What does the term IoT means? Mention some of the applications of IoT in modern life with Example. [10]
 b. Suppose, you want to design a solution for healthcare and want to use IoT for it. Which domain will be used in that case? Explain the groups of that domain. [10]

University of Asia Pacific
Department of CSE
Mid-Semester Examination Spring 2020
Program: B.sc in CSE

Course Title: Computer Architecture

Course No. CSE 317

Credit: 3.00

Time: 1.30 Hour.

Full Mark: 60

There are **four** Questions. **Answer three questions including Q-2 and Q-3.**

1. a. Draw the basic components of computer and Layer of a computer. Show the relationship among Instruction Set, Software and Hardware that define computer architecture. [5]
 - b. Suppose we have two implementation of same instruction set architecture. Computer A has a clock cycle time of 300 ns and a CPI of 1.8 for some program, and computer B has a clock cycle time of 550 ns and a CPI of 1.4 for the same program. Which computer is faster and how much? [15]
 - or
 - a. Define the following terms: [5]
 - Response time/ execution time
 - Bandwidth/ throughput
 - Relative performance
 - Measuring performance
 - Clock cycle
 - b. Compiler designer is trying to decide between two code sequences for a particular machine. Based on the hardware implementation, there are three different classes of instructions: Class A, Class B, and Class C, and they require three, two, and four cycles (respectively). [15]
The first code sequence has 9 instructions: 4 of A, 2 of B, and 3 of C.
The second sequence has 11 instructions: 6 of A, 3 of B, and 2 of C.

Which sequence will be faster? How much?
2. a. How many instruction classes are in MIPS architecture? Why R-type class instructions are faster than I- type instruction class. [5]

- b. For the following high-level statement write the MIPS machine Code. [15]

$X[i] = Z + X[i+5] - W$; Where i = last two digits of your registration number.

3. a. Solve the following using **Booth's** logic. [15]

$m * (-mx)$ using 5-bit multiplier.

Where m = multiplicand = $\{(\text{last digit of your registration}) \bmod 5\} + 4$.

Mx = multiplier = -4 .

- b. Also draw the required hardware for the solution of question 4. a.

[5]

Instruction	Opcode/Function
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lw	100011
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sw	101011
----	--------

sub	100010
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add	100000
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University of Asia Pacific

Department of Computer Science & Engineering

Mid-Semester Examination Spring 2020

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.

All questions are based on your registration ID. Therefore, to answer the question, you have to use your registration ID and other necessary information.

- Q. 1 During this lockdown, we have to stay at home and use the internet to communicate with each other. We are living in different regions of the country, and the Internet Service Provider (ISP) of each area provides different speeds to its customers. Suppose you are Host A, and your friend is Host B, and between A and B, there are three communication links, namely, $R1$, $R2$, and $R3$. The speed of the connection depends on your registration ID, and you have to calculate the link speed based on the following equations:

$$R1 = (\text{your Id}) \bmod 49 \text{ mbps}$$
$$R2 = (R1 + \text{your birth day}) \text{ mbps}$$
$$R3 = \frac{R1 + R2}{2.0} \text{ mbps}$$

For example, your id is 14201041 and birthday is 12 April, then $R1 = (14201041) \bmod 49 = 8 \text{ Mbps}$; $R2 = 8 + 12 = 20 \text{ Mbps}$; $R3 = (8 + 20) / 2 = 14 \text{ Mbps}$

Based on the above scenario, answer the following questions:

- a) Assume that there is no other traffic in the network, what is the throughput between you and your friend for file transfer? (8)
- b) Suppose you want to send a zip file, which is the double size in Gigabit (Gb) of your birth year (i.e., for the birth year 2001, the file size will be 4002 Gb) to your friend. How long will it take to transfer from you to your friend? (12)
- Q. 2 a) You and your friend want to transfer data, and both are decided on the following data transmission properties which should be incorporated in the transport layer service: (10)
- no bit errors; no packet loss; encryption at the sender and decryption at the receiver.

Now design the Finite State Machine (FSM) for you and for your friend.

- b) Due to coronavirus and lockdown, most people stay at home and use the internet for necessary communications. However, many people are watching movies and videos, which have increased the traffic on the network. In this situation, what will you propose to improve the performance of the network? Explain with evidence. (10)

- Q. 3 a) Suppose IP address of your computer is as your registration ID (**exception for id number 17201100, you will use 17201122**), i.e., 14.20.10.41 where the network mask is based on the following formula
Netmask = 16+your birth month; for example, your birth month is April, and the netmask will be 16+4=20. Therefore, the address will be 14.20.10.41/20. Now do the following: (5+5)
- Find the broadcast address of the network
 - The address range of the network

- b) In data transmission, it is necessary to check the data at the receiving end that it has any error or not. Suppose we want to send your registration id (14201041), and it is breaking into two parts A=1420; B=1041. Now we will convert it into binary based on the following rules: (10)
- The number between 0 to 4 will be binary 1
The number between 5 to 9 will be binary 0
Therefore, A and B will be A=1111; B= 1111
However, now you have to send the data and do the process that at the receiving side we can detect if there is any error or not.

Or

- Q. 4 You are appointed as the network designer of the University of Asia Pacific. From your experience, you have identified that for better performance of the network, it should break in small LANs based on functionality. Therefore, you have planned to set the individual LAN for each department, and it is described in Table 1. To calculate each department's subnetwork address packages, choose the base network address from your registration id's first six numbers (considering your id is 14201010) for the first three octets as like 14.20.10, and for the last octet, choose 0 with the subnet mask 23, i.e., 14.20.10.0/23. (20)

Table 1: Requirements of each LAN

Department	Number of Hosts
CSE	100
CSE	150
CE	130
Architecture	70
Pharmacy	32
Admin	15

University of Asia Pacific
Department of Computer Science and Engineering
Mid-Semester Examination Spring-2020
Program: B.Sc. Engineering

Course Title: Software Engineering

Course No.: CSE 321

Credit: 3.00

Time: 1.00 Hour.

Full Mark: 60

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

1. a. What are the problems and challenges that software engineers are likely to face in the 21st century? How to overcome those challenges? [10]

b. To help counter terrorism, many countries are planning the development of computer systems that track large numbers of their citizens and their actions. Clearly this has privacy implications for citizens. On other hand, tracing system helps to protect terrorism. [10]
Discuss the ethics according to software engineering of developing this type of system.
2. a. Draw a use case diagram for Online Examination System. The system includes the following information: [10]

The University of Asia Pacific (administrator) has a facility to conduct an online exam by providing questions to the students and the administrator to verify the details of the students are correct or not. Then, the administrator provides authentication to write the exam of the verified students. After conducting the exam the administrator needs to pay attention to manage the examination. Finally, the admin gets the result details.

Every student has permission to login the system, before that the student needs to complete the registration process. After that student needs to select the required exam from the list and gets the selected question paper from the administrator. After answering each question the student submits the answer script of the predefined procedure and gets the result instantly.

b. According to question no. 2 (a) to register Online Examination System, every student needs to fill up following information: Name, Roll, Gender, Department, university provided E-mail address and Password. [10]

Create an object of registration class using your personal information according to UML object diagram.

3. a. Giving reasons for your answer based on the type of system being developed, suggest the most appropriate generic software process model that might be used as a basis for managing the development of the following systems: [10]
- A virtual reality system to support software maintenance
- b. What are the industry based examples of Prototyping Model? Give an explanation on behalf of your example. [10]

OR

4. a. Giving reasons for your answer based on the type of system being developed, suggest the most appropriate generic software process model that might be used as a basis for managing the development of the following systems: [10]
- A university accounting system that replaces an existing system
- b. What are the industry based examples of Agile Model? Give an explanation on behalf of your example. [10]