University of Asia Pacific

Department of Computer Science & Engineering

Semester Final Examination, Fall-2019

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

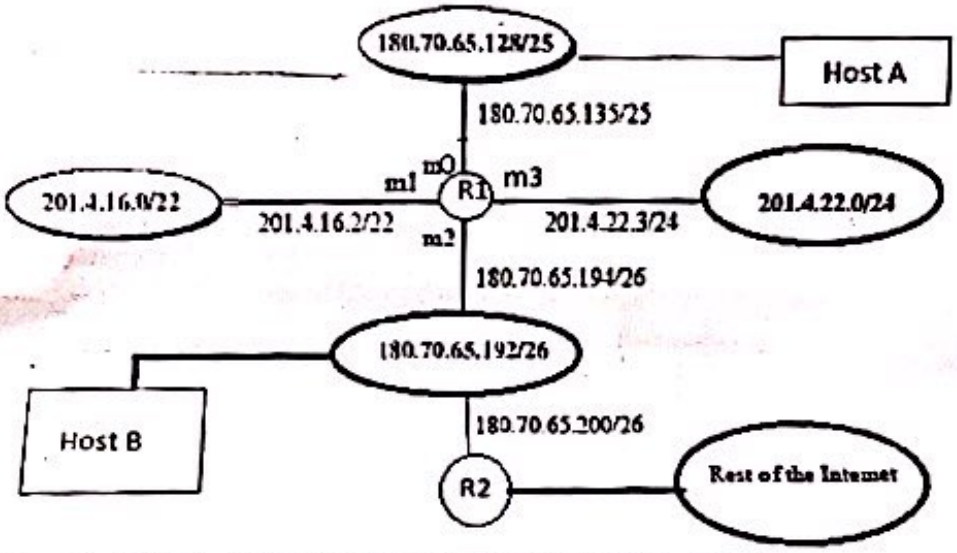
Course Title: Computer Networks Course No. CSE 319 **Credit: 3.00**

Time: 3.00 Hours. **Full Mark: 150**

Instructions:

1. There are Six (6) Questions. Answer all of them. All questions are of equal value. Part marks are shown in the margins.
2. Non-programmable calculators are allowed.

1. Consider the following network



Host A : 180.70.65.139/25 (MAC: ACAA.AAAA.A2AA)

Host B : 180.70.65.197/26 (MAC: BABB.BBDB.B1BB)

M0 interface of Router R1 : 180.70.65.135/25 (MAC : AABB BBCC 1234)

For the above network, answer the following-

a) What are the default gateway of Host A and Host B? 3

b) Write the routing table for Router R1 indicating the gateway(s) of next hop. Assume the metric value(s). 10

c) For each of the following destination IP addressed (in an IP packet received by the router), what does the router do? 12

i. 201.4.16.45 (TTL=7)

4. a) Suppose Host A and Host B want to establish a TCP connection for data transfer. Show how Host A and Host B can initiate communication and terminate the transmission after the data transfer with the corresponding illustration and explain RTT as well. 6+6+3

b) What are the main components in an IoT system? Explain the basic architecture and security concern of the IoT network. 3+4+3

5. You are the system analyst of XYZ software development firm. In the last annual meeting, you have been assigned as the head of the innovation group. Your company makes desktop software and provides services to clients. However, the development of networking infrastructure improved a lot and can be deployed network-dependent software at the server where clients can get uninterrupted service with payment.

In addition, your boss has pointed out that, from the Farmgate Ananda Cinema Hall to Panthopath crossing, no shops are using any software or IT services for their daily sales and management. Therefore, it is quite difficult for the business owner to predict and get the sales report instantly. Moreover, the government of Bangladesh cannot get the actual sales of the shop; therefore, they lose the VAT and tax from the business owner.

a) As the innovation head, what service will you bring that can be viable for your company and the clients as well? 5

b) How will you manage the workloads of the provided services? 10

c) How will you make sure of the security issue and reliability of your services? 10

OR

5. a) How can cloud computing affect positively in the business? Justify your answer. 10

b) What are the different services that can be provided in cloud computing? Explain all kinds of services with examples. 5+10

6. CEO of XYZ ICT systems and solutions is planning to adopt the new technology and expanding its business area for real-time service automation and management. A digital revolution is currently advancing. Technology permeates every aspect of our society, i.e., communication, education, medicine, transportation, farming, and manufacturing, whereas blockchain technology i.e., cryptocurrencies are disrupting the traditional banking systems. Hyperconnectivity through communication systems, sensors, wearables, and smart devices has blurred the boundary between the physical and digital worlds.

Professionals who understand the implications of cloud computing, big data, and more importantly, how to leverage it, can help their companies connect to customers and stakeholders with efficiency and precision, creating new opportunities and staying ahead of the competition. Digital platforms offer fundamental improvements

to traditional business models, can transform entire industries, and are key drivers of growth. Web-based enterprises that leverage digital infrastructure can enter markets quickly and move with agility in the new digital economy.

a) Identify the key business concept of making trust between different entities of the business? Write and explain these key concepts for business process. 10

b) How can blockchain introduce a frictionless business network? Describe with examples. 10

c) List some business industries where blockchain can be heavily implemented in a couple of years. 5

ii. 201.4.23.2 ((TTL=5)
iii. 77.48.39.5 (TTL=1)

2. a) Why does Router keep a routing table? How do the entries in this table get updated? 3+3

b) What is the importance of TTL value in an IP Packet? How this value updated? 2+1

c) Why IP is not reliable? Explain with the various field of IP datagram. 12

d) IP is non-reliable but we are using it regularly. Why? 4

OR

2. a) While tracing route from a host having IP address 10.168.0.11 to core.smile.com.bd, the following output was observed. 15

C:\ User> Tracing Route to core.smile.com.bd [206.190.36.45]

1	<1 ms	<1 ms	<1 ms	10.168.0.99
2	<1 ms	<1 ms	<1 ms	113.11.18.65
3	*	<1 ms	*	113.11.126.53
4	1 ms	1 ms	1 ms	113.11.32.1
5	153 ms	154ms	153 ms	103.15.245.233
6	288 ms	1ms	1 ms	206.190.32.31
7	1 ms	1ms	1 ms	206.190.36.45

Draw the network diagram for the above connected network(s) with clear identification of the gateway(s).

b) Suppose you are running an ISP in a rural district of Bangladesh and conserve your bandwidth by using a Proxy server. However, you have only one real (public) IP to connect with your upstream ISP. How you can provide concurrent connection to 50 users to internet with this setup. Explain with a diagram. 10

3. a) Consider an e-commerce, e.g., daraz.com wants to keep a purchase and visiting records for each of its customer. Describe how this can be done with cookies. 12

b) Why do HTTP, FTP, SMTP, and PoP3 run on top of TCP rather than on UDP? 3

c) What is IPV4 addressing? Suppose UAP wants to design its own network and divide the LAN based on departmental and administrative functionality. Consider the following requirements in Table 1 to calculate the IP address for UAP. You may choose the base network address your_birthday.month.exam_date.0 /21. 10

Table 1: Requirements of each LAN

Department	Number of Hosts
EEE	100
CSE	200
Civil	130
Architecture	70
Pharmacy	32
Admin	15

2 4 8 16 32 64 128 256 512

Department of Computer Science & Engineering
University of Asia Pacific (UAP)

Final Examination Fall 2019 3rd Year 2nd Semester

Course Code: CSE317 Course Title: Computer Architecture Credits: 3

Full Marks: 150 Duration: 3 Hours

Instructions:

1. There are Six (6) Questions. Answer all of them. All questions are of equal value. Part marks are shown in the margins.
2. Non-programmable calculators are allowed.

1. Design and Implement the single cycle data path for the following instructions and write down the procedure of data path for following MIPS instructions: (consider all the functional units of Data path according to MIPS architecture) [25]
   i) A [6] =Y + A [8];
   ii) Add $to , $s1 , $s2;

2 a. Draw and Explain all the instruction format for the MIPS instruction set architecture. [10]

b. Draw and explain the basic components of computer and Layer of a computer. Show the relationship among Instruction Set, Software and Hardware that define computer architecture. [15]

OR

a. What is the objective of memory hierarchy? According to cost, size, distance and speed compare among the levels of memory. [10]

b. What are the four questions about cache design? Show and explain the hardware implementation of block identification.(data may be Hit OR miss). [15]

3. a. Solve the following using Booth's logic. [15]
   3 *(-7) using 5 bit multiplier. Consider -7 as multiplier.

b. Suppose we have two implementation of same instruction set architecture. Computer A has a clock cycle time of 300 PS and a CPI of 1.8 for some program, and computer B has a clock cycle time of 550 PS and a CPI of 1.4 for the same program. Which computer is faster and how much? [10]

OR

[25]

Instruction and Opcode/Function: lw 100011, sw 101011, sub 100010, add 100000

i) Analysis the following high level statement according to MIPS instruction format and write the MIPS machine Code.

X[4] = Z + X[3] ;

ii) Analysis the following MIPS machine Code to identify the instruction and write the high level statement.

00198820(hex)

4. Consider a non-pipelined machine with 6 execution stages of lengths 20 ns, 25 ns, 30 ns, 35ns, 20 ns, and 25 ns. [25]

- Find the instruction latency on this machine.
- How much time does it take to execute 68 instructions?

Suppose we introduce pipelining on this machine. Assume that when introducing pipelining, the clock skew adds 3ns of overhead to each execution stage.

- What is the instruction latency on the pipelined machine?
- How much time does it take to execute 68 instructions?

Also calculate the speedup for this implementation.

5. This question considers the basic MIPS, 5-stage pipeline (IF, ID, EXE, MEM, WB). [25]

Assume that you have the following sequence of instructions:

lw $s2, 0($s1)

add $s3, $s4, $s2

Sub $s6, $s2, $s3.

Show the implementation through 5 stages and explain the implementation for both pipelined and non-pipelined design.

6. [25]

CPU request the following Block addresses 20, 16 and 25.
There are 16 blocks in cache. Design and Show the memory mapping for the following cache configurations.

I. Direct mapped
II. 2- Way, 4-way 8-way and 16 way set associative mapped.

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Final Examination Fall 2019 3rd Year 2nd Semester

Course Code: CSE 321 Course Title: Software Engineering Credits: 3

Full Marks: 150 Duration: 3 Hours

Instructions:

1. There are Six (6) Questions. Answer all of them. All questions are of equal value. Part marks are shown in the margins.
2. Non-programmable calculators are allowed.

1. a. What is defect analysis? Why it is important? [5]

b. Suppose in a software project actual effort is 10 (in person days) and estimated effort is 14(in person days).Also the actual size of the project is 80 FP and estimated size is 100 FP. What is the effort variance and size variance? In the reviewing phase, the number of review defects is 20. Total number of testing defect including customer reported test defects is160. What is the review efficiency? [10]

c. Answer the following: [10]

i) You have developed a schedule to start a project on 1st January 2018. You are a project manager of a project to develop and implement an enterprise application for manufacturing industry. You are planning to start the Requirement Analysis phase on March 01, 2020 and with you team have develop a schedule accordingly. In an internal meeting on February 28, 2020, you have declared that you are planned to complete this phase on March 20, 2020. However, one of your key stakeholders from customer who was supposed give you requirements is not available for seven days and it make 4(four) days delay to start the requirement analysis phase. Finally, this phase of the project has completed on 24th March 2020.

Calculate the schedule variance?

ii) Suppose you have a software product which has been integrated with the 4 modules and you found the
following bugs in each of the modules.

Module 1 = 20 bugs
Module 2 = 30 bugs
Module 3 = 50 bugs
Module 4 = 60 bugs

Calculate the defect density.

OR

a. What are the four types of risk you need to deal with for a project to manage risk. [5]

b. You are working on a project that is scheduled to completed by 20 months. Your allocated budget for the project is BDT 5,00.0000. After one year, 60% of the work should be [10]

completed as per project initial plan. But 12 months you find that only 40% of the work has completed so far and BDT 3000000 has been already spent.

Determine the value for each of the terms below:

i) What is the planned value?
ii) What is the earned value?

c. Consider the situation in question 1(b). Now Determine the value for each of the terms below: [10]

i) What is the schedule performance index? Is the project ahead or behind the schedule?
ii) What is cost performance index? Is the project within the budget or over budgeted?

2. a. Define and compare system testing, unit testing and UAT. What is white box testing? [6+4]

b. Suppose you are a project lead of a software development team and assigned to develop a system where requirements are very clear, defined and no ambiguous requirement in place. Which software process model you will follow and why? Also describe the model. [10]

c. Write the deference between Bug and Defect. [5]

OR

a. Define following quality factor [10]
i) Reliability
ii) Usability
iii) Portability
iv) Durability
v) Interoperability

b. Suppose your friend is a project lead of a software development team and assigned to develop a system where requirements are not clearly defined and ambiguous. Which software process model you recommend your friend to follow and why? Also describe the model. [10]

c What is software quality? [5]

3. a. What is risk? What is risk registrar? [5]

b. What is risk management? Draw the graph showing the project risk during the software life cycle. What is the difference between re-active and pro-active risk management? [2+3+5]

c. What is Risk Breakdown Structure? Describe the factors for risk identification. 10

4. a. Write the difference between project scope and product scope. Mention elements of project management process. [6+4]

b. Who are project stakeholders? What are the six constraints you need to manage concurrently to make a project success [10]

c. 35 defects were found during UAT at the production site by the end users and 140 defects were found during the whole QA process including both the testing site and the production site. Comment on the defect leakage. [5]

5. a. Why software architecture is important? Describe layered architecture. [10]

b. Define product backlog and user stories. What are the discussion points of daily stand-up meeting? [10]

c. Write the manifesto for agile software development? [5]

6. a. What is SCM respiratory? What are the respiratory features? [10]

b. You have developed a schedule to start a project on 1st February 2020. You declared in the kick off meeting that you are planned to complete the project on 29th February 2020. However, due to lack of resources, you made two day delay to start the project and you have completed the project on 2nd March 2020. Comment on the schedule variance. [15]

Department of Computer Science & Engineering
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Final Examination | Fall 2019 | 3rd Year 2nd Semester

Course Code: CSE 315 | Course Title: Peripheral and Interfacing | 1 credit 1

Full Marks: 150 | Duration: 3 Hours

Instructions:

1. There are Six (6) Questions. Answer all of them. All questions are of equal value. Part marks are given in the margins.
2. Non-programmable calculators are allowed.

a. Discuss the relationship between interfacing and parts of the system? [05]

b. Discuss the types of ports in computer science with proper explanation and diagram (if any) [20]

OR

Write the properties of secondary memory. [05]

How many types of Arduino are there in Computer Science? Discuss all of them with their features and diagram (if any). [20]

a. Describe the types of scope in Arduino environment. [05]

b. What is Function Prototyping in Arduino? Write different modules of Serial.Print() with proper explanation and example. [5+15]

OR

a. "max = (a > b) ? a : b"- What does the code statement mean? [05]

b. What is Shield in Arduino? Describe the importance of Arduino shield and describe five Arduino shields. [5+15]

3. a. What is the difference between Internet of Things (IoT) and Edge Computing? [05]

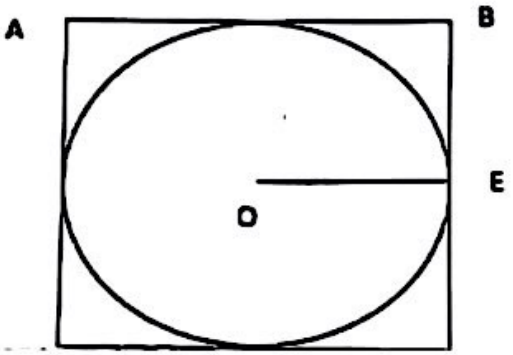
b. Design a Full adder and subtractor which will contain selector, and we will be able to select the operation through switch S. [S could be 0 or 1] If we input 0 it will perform Addition operation and if we input 1 it will perform Subtraction operation. [20]

a. Write the differences between scanner and camera. [05]

b. Discuss the anatomy of Flatbed scanner with proper operational description and diagram. [20]

Suppose, you are an engineer of Samsung R&D Bangladesh. Your team is dealing with a storage related problem of Samsung Active 2 watch. Through this watch user from all over the country (Bangladesh) send the data to the cloud for analyzing their health status of a week/month. Now, you have to make a decision about the technology your team will use between Internet of Things (IoT) and Edge Computing.
Discuss which of the technology you will use in this scenario and why with proper logical explanation and diagrams? [25]

Suppose, ABCD is a square in the Figure below. Here, you have a Sonar sensor at the center O, of the circle in ABCD. Now, you have to measure the Area of the square through Arduino Sketch. Please explain the calculation procedure briefly. [25]
[Note: Area of a circle is measured by the formula πr^2. The figure is drawn to scale.]



Department of Computer Science & Engineering
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Final Examination | **Fall 2019** | **3rd Year 2nd Semester**
Course Code: CSE 313 | **Course Title: Numerical Methods** | **Credits: 3**
Full Marks: 150 | **Duration: 3 Hours**

Instructions:
1. There are Six (6) Questions. Answer all of them. All questions are of equal value. Part marks are shown in the margins.
2. Non-programmable calculators are allowed.

1. a. What is False Position method? How does it work? [6]

   b. Derive the formula for False Position method using relevant diagram. [6]

   c. Find an approximate solution of the equation, $6x^8 - 8x^5 + 1 = 0$, by using False Position method, where the root is located between 0.1 and 0.9. [13]

OR

   a. What is Bisection method? How does it work? [6]

   b. Derive the iterations for Bisection method using proper graphical depiction. [6]

   c. Find an approximate solution of the equation, $6x^8 - 8x^5 + 1 = 0$, by using Bisection method, where the root is located between 0.15 and 0.85. [13]

2. a. What is Newton-Raphson method? How does it work? [6]

   b. Derive the formula for Newton-Raphson method using relevant diagram. [6]

   c. Find an approximate solution of the equation, $6x^8 - 8x^5 + 1 = 0$, by using Newton-Raphson method, where the initial guess is 1.6. [13]

OR

   a. What is Modified Secant method? How does it work? [6]

   b. Derive the formula for Modified Secant method by approximating Newton-Raphson method's formula. [6]

   c. Find an approximate solution of the equation, $6x^8 - 8x^5 + 1 = 0$, by using Modified Secant method, where the initial guess is 1.7 and small perturbation fraction is 0.01. [13]

3. a. Describe the concepts of accuracy and precision by drawing relevant figure. [12]

   b. Differentiate between Roundoff Errors and Truncation Errors in terms of cause, impact and improvement. [13]

4. a. Show the differences between the following with proper examples: [1

(i) Row Vector and Column Vector

(ii) Square Matrix and Symmetric Matrix

(iii) Upper Triangular Matrix and Lower Triangular Matrix

b. Derive a Permutation Matrix from an Identity Matrix and show how rows or columns of a matrix can be switched through multiplying. [13

5. Find the solution of the following equations by using Naïve Gaussian Elimination: [25]

$$18x_1 - 6x_2 + 6x_3 + 12x_4 = 72$$
$$72x_1 - 48x_2 + 36x_3 + 60x_4 = 324$$
$$9x_1 - 39x_2 + 27x_3 + 9x_4 = 48$$
$$-36x_1 + 24x_2 + 6x_3 - 108x_4 = -402$$

6. a. Use the six-segment Simpson's 1/3 rule to estimate the integral of [10]

$f(x) = 0.9 + 25x - 230x^2 + 645x^3$ from a = 0.1 to b = 1.3.

b. Use Simpson's 3/8 rule in conjunction with Simpson's 1/3 rule to integrate [15]

$f(x) = 0.9 + 25x - 230x^2 + 645x^3$ from a = 0.1 to b = 2.8 for nine segments.