University of Asia Pacific

Department of Computer Science and Engineering

Program: B.Sc. in CSE

Final Examination **Spring-2023** 3rd year 1st Semester

Course Code: CSE 311 Course Title: Microprocessors and Assembly Language Credit: 3

Time: 3.00 Hours Full Mark: 50

Instructions:

1. There are **five (5)** 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. Define the functions and elements of BIU and EU in 8086 architecture. [5] CO1

   b. Pipelining can speed up a processor function- explain from the 8086-architecture concept. [5] CO1

2. a. Write an assembly code to do the following actions: [5] CO1
   i. Input a number character and convert into digit
   ii. Display a prompt message "Good Luck!!!"
   iii. Display First letter of your Name
   iv. Find out the 2's complement of DL
   v. Subtract two values without using the SUB instruction

   b. Find out the status of flags (CF, SF, ZF, PF, AF, OF) after the execution of the following instructions: [5] CO2

   i. INC AL
   ii. NEG AL
   iii. XCHG AL, BL
   iv. ADD Al, BL
   v. AND AL, 01H

   [Consider AL= Last two digits of your registration number in Hex form and BL= 0FH]

3. a. Explain the functions of AX and DX during multiplication and division operations. [5] CO

   b. Mention the addressing modes of the following instructions and also calculate the physical address of the memory operands: [5] CO
   i. MOV AX, BX

ii. ADD AX, [BX]
iii. JMP L
iv. NOP
v. MOV AX, A[BX][SI]

Where, CS= 2344H, DS [last four digits of your ID in Hex], SS= 9887H, ES= 8787H, BX=0098H, SI= 0066H, L= 09h

4. a. What are the differences between SHL and SAL? Explain with appropriate examples. If DL= First two digits of your registration number in Hex (if required convert it into Binary), then find out the final value of DL after execution of the followings [5] CO3

i. ROL DL, 1
ii. SAR DL, 1
iii. MOV CL,2
RCR DL, CL

b. Write the logic instructions with appropriate mask bit pattern to do the followings for BL: [5] CO3

i. Clear Bit 1,5,7
ii. Set Bit 0, 4, 6
iii. Compliment Bit 1, 3, 5
iv. Complement BL
v. TEST LSB of BL is 1? 0000001

OR

a. Write an assembly program to Input two integer values from console (Byte form) X, C where [5] CO3

$0 < X <= 9$, and $C = 0$ or 1.

i. If C=1 then find out X is even number or not.
ii. If C=0 then find X is odd number or not.

b. Write an assembly program to count the number of characters until "New Line" character is pressed. [5] CO3

5. a. Why Main procedure needs no Return statement? Explain the application of stack during calling a procedure (e.g., CALL NAME) and returning to main procedure (e.g. RET), use appropriate diagram and SP. [5] CO4

b. Mention the advantages of a microprocessor. List out the features that you think can be used to evaluate the performance of a microprocessor. [5] CO4

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Program: B.Sc. in CSE

Final Examination | **Spring-2023** | **3rd year 1st Semester**

Course Code: CSE 309 | Course Title: Object Oriented Programming II: Visual and Web Programming | Credit: 3.0

Time: 3 Hours. | Full Mark: 50

There are **Five** Questions. Answer all of them. Part marks are shown in the margins.

1.	a.	Explain Django architecture with an appropriate diagram.	[7]	[CO1]
	b.	Define static files and explain their uses.	[3]	[CO1]
		OR		
	a.	Explain the Django project directory structure.	[7]	[CO1]
	b.	Define Cookies and explain limitations of Cookies.	[3]	[CO1]
2.	a.	Explain how Django handles user authentication and authorization processes using an essential program.	[5]	[CO1]
	b.	Describe the process with an example of how to build a custom middleware in Django.	[5]	[CO1]
3.		Design a web page using HTML, JavaScript that allows users to input a number within a specific range and provides instant validation feedback. The page should display a message indicating whether the input is valid or not.	[10]	[CO3]

Web page features

- **User Input Field**: Users are expected to input a numeric value into this field.
- **Validation Button:** There is a "Submit" button next to the input field. When clicked, this button triggers a JavaScript function for input validation.
- **Validation Logic:** The user-define JavaScript function, **myFunction()**, retrieves the user's input and checks if it meets the following criteria:
  - The input is a numeric value.
  - The input is greater than or equal to **1**.
  - The input is less than or equal to **100.**
- **Validation Result:** Depending on the outcome of the validation, a message is displayed below the input field:
  - If the input is not a number or falls outside the range (1 to 100), it displays **"Input not valid."**
  - If the input is a valid number within the specified range, it displays **"Input is Valid."**

4. Design a **Django model** to manage and store information about quiz to implement the following scenario using OOP concept: [6+2+2] [CO4]

The model (**FinalExam**) should capture essential details about final examination grading system that include student identification, name, section, obtained marks in Quiz & Mid-Term, Final and the date and time the marks were uploaded.

Design criteria:

I. student's identification(**std_id**) as an integer. This field will hold a unique identifier for each student.

II. student's name(**std_name**). This field should be a character field with a maximum length of 200 characters.

III. student's section(**sec**). This field should support text content.

IV. store the marks of Quiz and Mid- Term Exam (**QM**) obtained by the student. This field should allow fractional numbers to represent precise marking with up to 4 digits and 2 decimal places.

V. store the marks of final Exam(**final**) obtained by the student(**final**). This field similar to **QM**.

VI. record the date and time when the marks were uploaded(**uploaded_date**). This field should automatically capture the current date and time whenever quiz attempt is recorded.

Write the method name "**total_marks**" calculates the total marks for each student of ***FinalExam*** instance by adding the marks from the Quiz and Mid-Term examination (**QM**) to the marks from the final examination (**final**).

Write another method to provide a string representation of Final Exam instance. This string should include the student's identification, name and the total marks obtained.

5. a. Write a program [base template and inherited template only] to handle the template inheritance in Django. [5] [CO4]

b. Write the five most commonly used built-in middleware components when developing a Django based web-application. [5] [CO4]

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Program: B.Sc. in CSE

Final Examination | **Spring-2023** | **3rd year 1st Semester**

Course Code: CSE 307 Course Title: Theory of Computation | Credit: 3

Time: 3.00 Hour. | Full Mark: 50

There are **Five** Questions. Answer all of them. Part marks are shown in the margins.

1. a. Build a Turing Machine that will accept all stings consisting of x,*y* and *z* only and in the form $x^n y^n z^n$ **[5] [CO2]**

   b. Build a DFA that will accept all strings of only *a* and *b* that will start with '*abba*' or end with '*abba*' or both. **[5] [CO2]**

2. a. Define Regular Language with proper example. **[5] [CO1]**

   b. Illustrate the Pumpimg Lemma? Why is it used? **[5] [CO1]**

   OR

   a. Explain the formal definition of Pushdown Automata. **[5] [CO1]**

   b. Define alphabet in context of automata. Suppose if $\sum$ is an alphabet and $\sum=\{a,b,c\}$, then find out $\sum^3$ **[5] [CO1]**

3. a. Simplify the following DFA: **[5] [CO3]**

	0	1
→a	b	a
b	a	c
c	d	b
*d	d	a
e	d	f
f	g	e
g	f	g
h	g	d

b. Compare the leftmost and rightmost parse tree for 01010 for a context free grammar for palindromes. [5] [CO3]

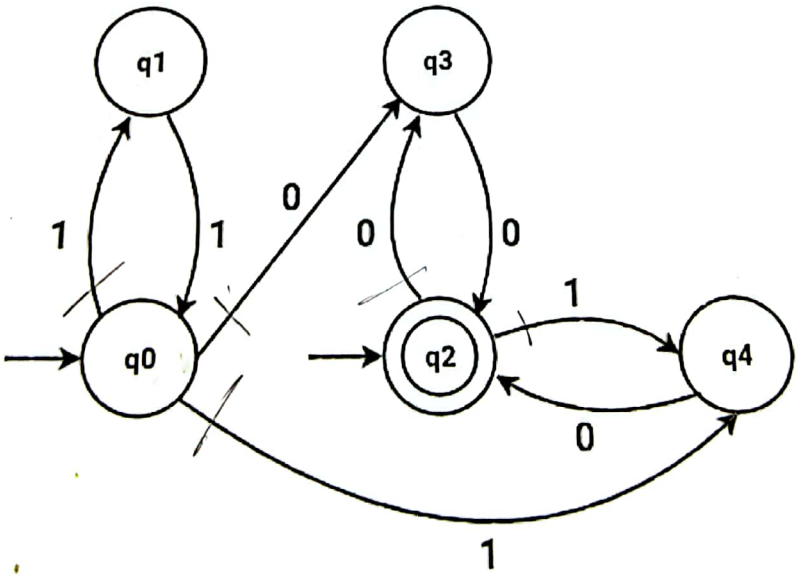
4. a. Build an NFA that will accept all strings of only 0 and 1 that will start with '010' and have '0101' as a substring. [5] [CO2]

b. Construct the DFA from the following ε-NFA: [5] [CO2]

	0	1	ε
→a	{b,c}	a	b
b	Θ	b	c
*c	c	c	Θ

5. a. Construct a ε-NFA from the following regular expression: [5] [CO2]
((0+1+0)01)*(1+0)1+1*

b. Develop a regular expression from the following NFA: [5] [CO2]



University of Asia Pacific

Department of Computer Science and Engineering

Program: B.Sc. in CSE

Final Examination | **Spring-2023** | **3rd Year 1st Semester**

Course Code: CSE 305 Course Title: System Analysis and Design | Credit: 3

Time: 3.00 Hour. | Full Mark: 50

There are Five Questions. Answer all of them. Part marks are shown in the margins.

1. a. Discuss the functions of swimlanes of activity diagram. [3] [CO1]

   b. Explain the purpose of using use-case diagram. [3] [CO1]

   c. Describe the major notations of class diagram. [4] [CO1]

2. a. Product manager has planned a list of activities to develop a software product as mentioned in the following table. Determine the critical path. [7] [CO2]

Activity	Predecessor	Duration
A	-	3
B	A	2
C	A	1
D	A, B	3
E	A, B	1
F	E	1
G	D, F	1

   b. The cost summary of business includes facilitation fees of Tk.5, 00, 000, materials costing Tk.1, 50, 000, salaries of staffs amounting Tk.2, 00, 000. The total annual benefit results as Tk.10, 00, 000. Calculate Return on Investment (ROI). [3] [CO2]

3. a. Analyse rules and requirement of Data Flow Diagram (DFD). [4] [CO3]

   b. Fill in the blanks of the following table considering the rules and requirement of DFD. [6] [CO3]

Items	Yes	No
A process to another process		✓
A process to an external entity	✓	
A process to a data store	✓	
An external entity to another external entity		✓
An external entity to a data store		✓
A data store to another data store		✓

4. Design a use-case diagram for online auction system considering the main 3 actors Admin, Bidder and Seller. All three actors will be interacting with the proposed system; each one can do the following: **[10] [CO4]**

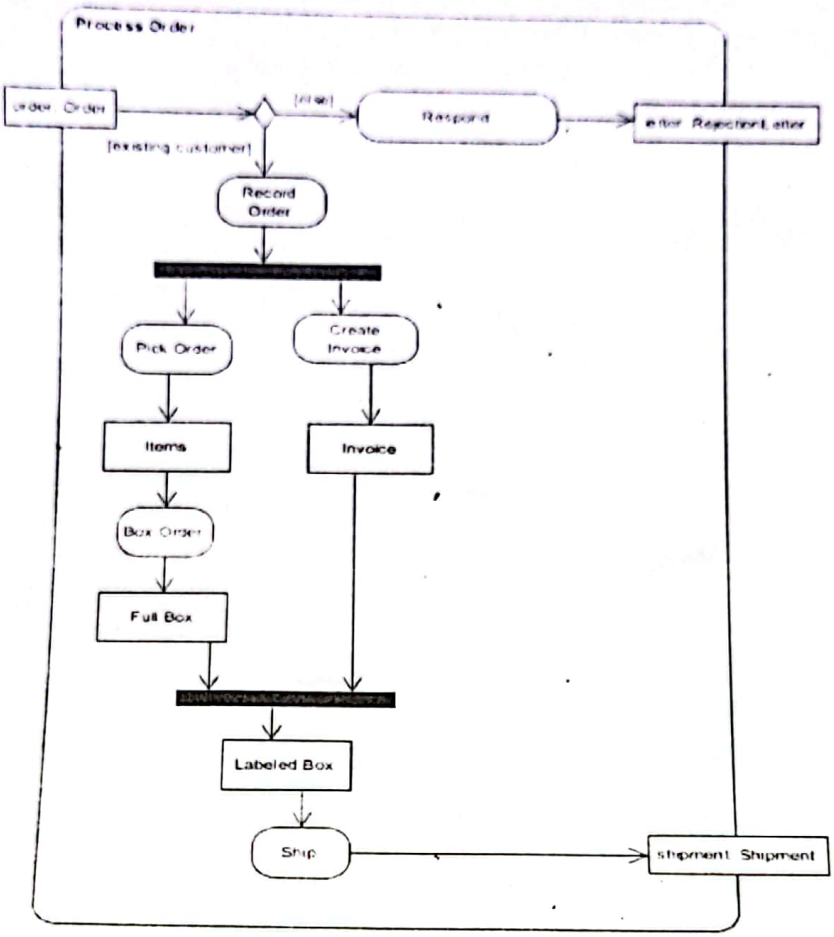
- Admin: Admin can manage products, Admin can manage the departments, Admin can manage users, Admin can manage bidding, and Admin can create reports.
- Buyer/ Bidder: Bidder can search for a product, Bidder can view product details, Bidder can make a bid for product, and Bidder can edit profile information.
- Seller: Seller can post a product, Seller can specify time and price of the bidding, Seller can view bidding information, and Seller can edit profile information.

5. a. There is a volume of students renting books from the library. To regulate this, it's essential for students to have online access to the record of available books. The system will also inform the student if they exceeded the allotted time for renting a book and a penalty will apply accordingly. **[10] [CO4]**

Design a library management system using sequence diagram.

OR

5. a. Answer the questions considering the following activity diagram. [10] [CO4]



i. Identify all of the activities in this diagram.

ii. Identify all of the object/data nodes in this diagram.

iii. Identify all of the actions in this diagram.

iv. Identify all of the decision nodes in this diagram.

v. Identify all of the fork nodes in this diagram.

vi. Identify all of the join nodes in this diagram.

vii. Identify a control flow in this diagram.

viii. Identify a data flow in this diagram.

ix. Can "Pick Order" and "Create Invoice" occur at the same time?

x. Can "Record Order" and "Ship" occur at the same time?

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Final Examination **Spring-2023** **3rd Year 1st Semester**

Course Code: CSE 303 Course Title: Data Communication Credit: 3

Time: 3.00 Hours Full Mark: 50

There are **Five** Questions. Answer all of them. Part marks are shown in the margins.

1. Consider a communication system that uses a Cyclic Redundancy Check (CRC) method with the polynomial function x^4+x^3+1 to detect errors in a data transmission. A sender generates a CRC code for a 10-bit message using the polynomial function and appends it to the message. The entire message, including the CRC code, is then transmitted to the receiver. The 10-bit message is represented as M = 1010101010. Now, apply the CRC method to identify the actual transmitted bit string. Calculate the final data bits for sender and receiver sides. [10] [CO3]

OR

Hamming (7,4) code is a linear error-correcting code that encodes four bits of data into seven bits by adding three parity bits. Suppose a receiver needs to send 4 bits of data (1011). Calculate the codeword that the sender will send using the 7-bit hamming code, assuming ODD parity. Now consider that the receiver received the code word 1110101. Determine whether it is correct or wrong (error detection). If wrong, locate the bit with the error and write the corrected code that was sent (error correction). [10] [CO3]

2. Suppose you have to send a data packet X of 12 bits to your friend using 4B/5B block coding. Here, X is the 12-bit binary representation of your student ID's last 3 decimal digits (4 bits for each decimal digit). If your student ID is 19101089, the binary representation will be 089 = 0000 1000 1001. [4+6 =10] [CO2]

Analyze the whole mechanism of 4B/5B block coding, and identify the encoded sequence of bits that you will send to your friend. 4B/5B mapping codes are given below:

Data Sequence	Encoded Sequence	Data Sequence	Encoded Sequence
0000	11110	1000	10010
0001	01001	1001	10011
0010	10100	1010	10110
0011	10101	1011	10111
0100	01010	1100	11010
0101	01011	1101	11011
0110	01110	1110	11100
0111	01111	1111	11101

3. a. A frequency band is how wireless data is transmitted between devices. These bands are radio waves that transfer the data, and they can be either 2.4 GHz or 5 GHz. Discuss with examples how to choose the right WiFi frequency for your business based on coverage area and data rate, speed, interference, congestion control, and cost. [7] [CO1]

b. Explain the differences between Near-Field Communication and Bluetooth. [3] [CO1]

4. a. Describe the concepts of ASK, FSK, and PSK in the context of digital modulation. You must include labeled diagrams or waveform illustrations that depict the modulation processes. [6] [CO4]

b. Explain the following concepts related to waves and signals: Wavelength, Amplitude, Frequency, and Hertz [4] [CO4]

5. a. On the basis of the following points, differentiate between FDM and TDM: [5] [CO4]

Topics	FDM	TDM
How the Bandwidth Is Occupied		
Signal Types		
Flexibilities		
Interferences		
Efficiencies		
Latencies		
Constructions		
Required Inputs		

b. In telecommunications, FDM is a system by which the entire ready bandwidth of a communication mechanism is arranged into a group of frequency bands that do not overlap. Suppose four channels, each with a 150-kHz bandwidth, are to be multiplexed together. Identify the minimum bandwidth of the link if there is a need for a guard band of 20 kHz between the channels to prevent interference. [5] [CO4]

University of Asia Pacific

Department of Computer Science and Engineering

Program: B.Sc. in CSE

Final Examination | **Spring-2023** | **3rd year 1st Semester**

Course Code: HSS (CSE) 301 | Course Title: English II: English for Communications

Time: 2 Hours | Full Mark: 50 | Credit: 2

There are seven questions. Answer all of them. Part marks are shown in the margins.

1. Read the passage carefully and answer questions a and b.

Materials to Take Us Beyond Concrete

(A) Concrete is the second most used substance in the global economy, after water, and one of the world's biggest single sources of greenhouse gas emissions. The chemical process by which cement, the key ingredient of concrete, is created results in large quantities of carbon dioxide. There will be 9.8 billion people living on the planet by mid-century. They will need somewhere to live. If concrete is the only answer to the construction of new cities, then carbon emissions will soar, aggravating global warming. So, scientists have started innovating with other materials, in a scramble for alternatives to a universal commodity.

(B) Not only are the ingredients of concrete relatively cheap and found in abundance in most places around the globe, the stuff itself has marvelous properties. Portland cement, the vital component of concrete, is moldable and pourable, but quickly sets hard. Also concrete and steel have similar thermal expansion properties, so steel can be used to reinforce concrete, making it far stronger and more flexible as a building material than it could be on its own.

(C) A possible alternative to concrete is wood. Making buildings from wood may seem like a rather medieval idea, but climate change is driving architects to turn to treated timber as a possible resource. Recent years have seen the emergence of tall buildings constructed almost entirely from timber. Vancouver, Vienna, and Brumunddal in Norway are all home to constructed tall, wooden buildings.

(D) Using wood to construct buildings, however, is not straightforward. Wood expands as it absorbs moisture from the air and is susceptible to pests, not to mention fire. But treating wood and combining it with other materials can improve its properties. Construction experts say that wooden buildings can be constructed at a greater speed than ones of concrete and steel and the process, it seems, is quieter.

a. Which paragraph above has the following information? Write the correct letter, A-D, in boxes i-iv on your answer sheet. **4x1 = 4**

i. Qualities of concrete _____

ii. Pros and cons of the alternative _____

iii. Importance of concrete _____

iv. Alternatives to concrete _____

b. Identify the most suitable synonym of the following words. **6x1= 6**

i. *Aggravate*
A. Acute B. Persistent C. Worsen D. Disaster

ii. *Commodity*
A. Endure B. Belonging C. Exist D. Material

iii. *Abundance*
A. Leave B. Exclusive C. Coarse D. Plentifulness

iv. *Expansion*
A. Extension B. Costly C. Reduction D. Economic

v. *Susceptible*
A. Doubtful B. Vulnerable C. Strong D. Immune

vi. *Emission*
A. Discharge B. Expedition C. Exclusion D. Concealment

2. Change the following sentences into interrogative sentences. **5x1 = 5**

a. The cat is chasing the mouse around the room. (WH question)
b. I have been to Europe twice. (Closed question)
c. The dinosaurs died out millions of years ago. (WH question)
d. I will travel to the moon in the year 2043. (WH question)
e. I have been to Europe twice. (Closed question)

3. Fill in the blanks with appropriate conditionals. **5x1 = 5**

a. If you worked harder, _____.
b. If you touch fire, _____.
c. If she had a car, _____.
d. If you don't wake up early, _____.
e. Had they taken my advice, _____.

4. Change the following sentences as instructed. **5x1 = 5**

a. Being sick, he went to the hospital. *(Transform into a complex sentence)*
b. Because she was working, I decided not to bother her. *(Transform into a compound sentence)*
c. I love ice-cream and chocolate. *(Transform into a complex sentence)*
d. I saw a girl who had brown hair. *(Transform into a simple sentence)*
e. She is too afraid to go alone. *(Transform into a compound sentence)*

5. First, identify the linking words from the passage. Then replace them with a synonymous linking word and rewrite the entire passage. **5x1 = 5**

The impact of social media on society is undeniable. It has profoundly reshaped the way people connect, communicate, and share information. Social media has become a powerful tool for individuals, businesses, and even governments to disseminate messages and reach a global audience. Nevertheless, this transformative technology comes with benefits as well as challenges

that need to be addressed. One of the most significant impacts of social media is its ability to foster connection and community. Individuals can now interact with people from different corners of the world, transcending geographical barriers. Social media platforms have facilitated the rekindling of old friendships and the formation of new ones. Moreover, they have become invaluable for businesses, allowing them to engage with customers, build brand loyalty, and reach a wider audience than ever before. Due to the rise of social media, the way information is shared and consumed has undergone a revolution. News spreads faster, and user-generated content has taken a central role in shaping public opinion. Hence, this democratization of information has allowed individuals to become active participants in discussions, sparking movements, and influencing public discourse.

6. Recently, UAP had arranged ***Inter-department Drama Competition 2023***. The competition took place in the UAP auditorium. Seven groups from seven different departments participated in the competition and English department became the champion while Department of Architecture and CSE became second and first runner ups respectively. Now, write a report on the event for the latest *Quarterly Newsletter* published by UAP. **10x1 = 10**

7. Imagine that you are a graduate with a degree in Computer Science and Engineering (CSE), applying for a position at a reputable tech company named Chroma Creations. Now, write a cover letter that effectively highlights your skills, experiences, and qualifications to secure the job interview. **10x1 = 10**

GOOD LUCK!