Rangamati Science and Technology University

Department of Computer Science and Engineering

3rd Year 1st Semester B.Sc.(Engg.) Final Exam-2022

Course Title: Computer Peripheral Device and Interfacing

Course Code: CSE-3101; **Session:** 2019-2020

Time: 3 Hours **Marks:** 60

NB: 1. Answer any **FOUR (4)** questions out of **SIX(6)** questions.
2. Figures in the right margin indicate marks.
3. All parts of a question must be answered serially.

1. (a) Define Bus system and relate the bus system to peripheral connections. 06
   (b) Define Centronics. Illustrate the handshaking scheme to control the flow of data with proper description. 04
   (c) Differentiate between Block Data Transfer and Direct Memory Access. Why DMA I/O technique is used? 03
   (d) Write notes on: IEEE488 and SCSI. 02

2. (a) Define Interrupt and explain the purpose of Interrupt. 2.5
   (b) Define Interrupt vector and describe the Intel dedicated interrupts. 3.5
   (c) Illustrate a simple parallel interface with appropriate definition and purposes. 04
   (d) Describe the process of interfacing a stepper motor to 82C55 and write the assembly language procedure that controls the stepper motor. 05

3. (a) Describe the principle of serial interfacing briefly. Differentiate between synchronous and asynchronous data transmission. 04
   (b) Define Protocol in synchronous interfacing and describe the process of bit stuffing for character synchronization. 04
   (c) Differentiate between EISA and VESA local bus. 03
   (d) Draw and briefly explain PCI interface. 04

4. (a) How does the sensor work? Write down advantages of IC sensors. 05
   (b) Briefly describe RS-232C connection with a simple example. 06
   (c) Define von Neumann machine. Write a short report detailing the features of the Itanium 2 microprocessor. 04

5. (a) Describe the basic operation of LCD with appropriate figures. 04
(b) Differentiate electrostatic and Ink jet Printers. Which type of printer seems more useful-explain in your own way. 04
(c) Describe the process of ADC with appropriate figures. 03
(d) Describe how the clocking signal for ADC0804 can be generated with an RC circuit. 04

6. (a) Define port. Differentiate between fixed port and variable port. 03
(b) Describe the reason of Bus buffering. 03
(c) Describe the pins of PIC 8259A. Draw the flowchart of programming sequence of ICW. 05
(d) Write notes on: Optical mark, Barcodes, MIDI interfaces. 04

Rajshahi Science and Technology University

Department of Computer Science and Engineering

3rd Year 1st Semester B.Sc. (Engg.) Final Exam-2022

Course Code:CSE-3103; **Session:** 2019-20

Course Title: Operating Systems

Time: 3 H **Marks:** 60

NB: 1. Answer any **FOUR(4)** questions out of **SIX(6)**questions.
2. Figures in the right margin indicate marks(15*4=60).
3. All parts of a question must be answered serially.

1. **(a)** Define operating system. Explain key features of batch processing and multi programming OS with neat diagram. 04

(b) What is a process. Explain the process fundamental state transition or life cycle with diagram. 03

(c) Write a short note on following topic: 06

i. **Batch Systems**
ii. **Clustered Systems**
iii. **Virtualization**

(d) What are advantages of threads over process? Explain the types of Threads. **02**

2. **(a)** What is interrupt handling? Derive any Three types of computing environment based on operating system. **04**

(b) Describe the various mechanism of structuring an operating system with example. **03**

(c) Define a scheduler. Explain in brief the difference between pre-emptive and non-preemptive scheduling. **04**

(d) Briefly describe space allocation techniques. Point out the limitations of each space allocation technique with appropriate example. **04**

3. **(a)** Write a short note on following topic: **06**

i. **Process Control Block**
ii. **Solaris Synchronization**
iii. **Resource-Allocation Graph Scheme**

(b) Consider 5 processes arriving at time 0 as **04**

Process	Burst Time
P1	9
P2	25
P3	4
P4	8
P5	12

Calculate minimum average waiting time for Round Robin cpu scheduling where, (Q=10) CPU scheduling.

(c) Analyze the dining philosopher problems, and select the conditions for which it can avoid the deadlock problem altogether. **05**

4. (a) Define deadlock. Explain the deadlock handling techniques in the Operating System. **05**

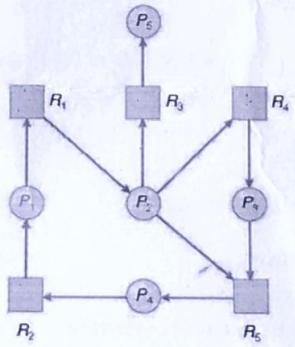
(b) Consider the following set of processes with the length of the CPU burst time given in milliseconds: **10**

Process	Burst Time	Priority	Arrival Time
P1	10	3	0
P2	1	1	1
P3	2	3	2
P4	1	4	3
P5	5	2	4

i) Draw the Grantt chart illustrating the execution of these processes using preemptive priority scheduling, SJF, and non-preemptive priority scheduling.
ii) What is the average turnaround time and average waiting time for each of the scheduling?

(c) Define safe state? Give an example. **03**

Consider the following resource allocation graph. Find out if there deadlock exists or not.



5. (a) Define context switch. Describe how many ways a process can be terminated and what are the problems may occur during process termination. **03**

(b) Mention how multiprogramming differs from multitasking. Explain where you get all the information of a process and what types of information. **04**

(c) Briefly discuss about IPC with proper diagram. **03**

(d) What is the critical section problem? Explain how you handle critical section problem in process synchronization. **05**

6. (a) What are Paging and Segmentation?. Explain why paging is required. What are the limitations of page table and how do you overcome them? Explain with appropriate diagram. 05

(b) Explain the concept of virtual memory with proper example. 02

(c) What is page fault. Explain belady's anomaly. 06

Consider the following reference string:

7,0,1,2,0,3,0,4,2,3,0,3,0,3,2,1,2,0,1,7,0,1

Now, find the number of page faults using

i) FIFO
ii) LRU
iii) Optimal page replacement algorithm

(d) Calculate the number of bits required in the address for memory having size of 16 GB. Assume the memory is 4-byte addressable. 02

Rangamati Science and Technology University
Department of Computer Science and Engineering
3rd Year 1st Semester B.Sc.(Engg.) Final Examination-2020
Session: 2019-2020

Course Title: Theory of Computation; **Course Code: CSE-3105**

Time: 3 Hours Full Marks: 60

[Answer any Four of the following questions. Figures in the right-hand margin indicate full marks.]

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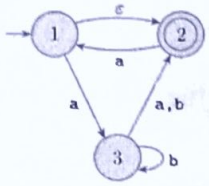
1. a) Give the formal definition of Finite automation. Briefly describe the purpose and motivation of the theory of computation. 3

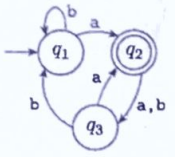
   b) Define Language, String, Alphabet and Symbol. 2

   c) Convert the following non-deterministic finite automata to equivalent deterministic finite automata 5

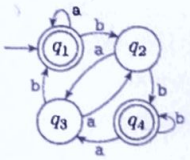


   d) Design an NFA (non-deterministic finite automata) to accept the set of strings of 0's and 1's that either end in 010 and have 011 somewhere preceding, or end in 101 and have 100 somewhere preceding. 5

2. a) The following are the state diagrams of two DFAs, M1 and M2. Answer the following questions about each of these machines. 5



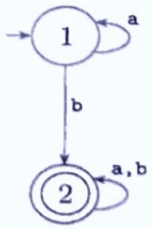
M_1



M_2

   i) What is the start state?
   ii) What is the set of accept states?
   iii) What sequence of states does the machine go through on input aabb?
   iv) Does the machine accept the string aabb?
   v) Does the machine accept the string ϵ?

   b) Converting following DFA to the regular expression. 4



   c) Show that $\sqrt{2}$ is irrational. Construct DFA for the following languages 6

   ii. L(M)= {w| w starts with '10'}

   iii. L(M)= {w| w starts with 'aab'}

3. a) What is a PDA? Draw a PDA that accepts {0^n 1^n | n>=0}. 7

b) Convert the following CFG into an equivalent CFG in Chomsky Normal Form. 8

$$A \Rightarrow BAB|B|\epsilon$$
$$B \Rightarrow 00|\epsilon$$

4. a) Define Regular Expression. For the following regular expression, find an equivalent NFA. 7

i. (ab U a)*

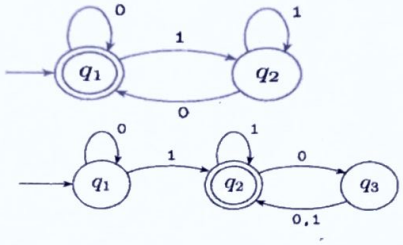
ii. (a U b)*aba

b) Produce a sketch of proofs to establish that the class of regular languages is closed under (i) union and (ii) concatenation 5

c) Give the formal definition of finite automata for the following state diagram. 3

i)

ii)



5. a) State and prove pumping lemma for context-free languages. Mention the application of the pumping lemma. 5

b) Design PDA's that accept the following languages. 5

i) $L = \{a^n b : n \geq 3\}$

ii) $L = \{0^n 1^n | \geq 0\}$

c) Proof Pumping lemma for context-free grammar. 5

6. a) Formally define a Turing Machine. Write down the Pigeon Hole Principle. 3

b) Does a Turing Machine designed to decide the membership of strings to a particular language correspond to an algorithm? Produce precise definitions, preferably with examples of problems, of the complexity classes **P**, **NP**, **NP-Hard** and **NP-Complete**. 7

c) Briefly describe Ambiguity. Show that 1+2+3.....+n=$\frac{n(n+1)}{2}$ for the positive integers n. 5

Rajshahi Science and Technology University

Department of Computer Science and Engineering

3rd Year 1st Semester B.Sc. (Engg.) Final Exam 2022

Course Code: CSE-3107; **Session:** 2019-2020

Course Title: Compiler Designing

Time: 3 Hours **Marks:** 60

NB: 1. Answer any **FOUR (4)** questions out of **SIX (6)** questions.
2. Figures in the right margin indicate marks (15*4=60).
3. All parts of a question must be answered serially.

1. (a) What is compiler? Write down the differences between compiler and interpreter. **4**

(b) How does Lexical Analyzer work? Explain with suitable examples. **4**

(c) What are the applications of compiler technology? **4**

(d) What is ambiguity in CFG? State your opinion with example. **3**

2. (a) Describe the functions of a lexical analyzer? **4**

(b) Which types of possible error-recovery actions are taken for lexical errors? **4**

(c) Give two examples of Non-Context-Free Language & Context-Free Language and explain why? **4**

(d) Define token, pattern, lexeme with example. **3**

3. (a) Construct DFA for the following languages over *{a,b}*: **4**

(i) $L(M) = \{w | w$ *contains the substring 'baba'}*

(ii) $L(M) = \{w | w$ *starts with 'aab'}*

(b) Consider the following grammar **G** which is ambiguous. Show that the string **S: aabbccdd** has two parse tree and two leftmost derivations. **4**

G:
$S \rightarrow AB \mid C$
$A \rightarrow aAb \mid ab$
$B \rightarrow cBd \mid cd$
$C \rightarrow aCd \mid aDd$
$D \rightarrow bDc \mid bc$

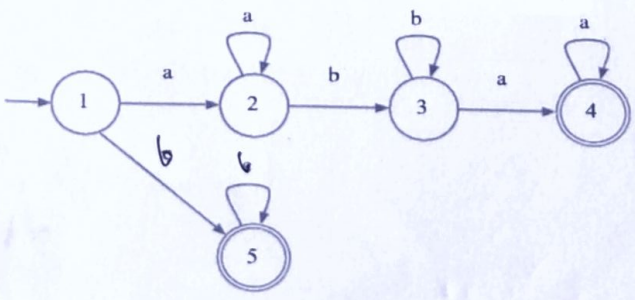
(c) By considering the algorithm of left-factoring, find the left-factored of the following grammar: **4**

$S \rightarrow iEtS \mid iEtSeS \mid a$

$E \rightarrow b$

(d) Explain with example: "Every DFA is an NFA but every NFA is not a DFA." **3**

4. (a) State the formal definition of a DFA for the following machine. **5**



(b) Describe the Error recovery strategies in Parsing with examples. 5

(c) Draw the block diagram of the phases of a compiler and explain it. 5

5. (a) Let L ={a, b} Suppose you have constructed the following language: 6
"The set of all strings consisting of zero or more instances of a or b, that is all set of a's and b's and starting with a, ending with bb.

(i) Draw the corresponding NFA
(ii) Show the transition table as well DFA diagram

(b) Consider the following grammar: 4

$S \rightarrow ABCDE$
$A \rightarrow a \mid \varepsilon$
$B \rightarrow b \mid \varepsilon$
$C \rightarrow c$
$D \rightarrow d \mid \varepsilon$
$E \rightarrow e \mid \varepsilon$

Find out the FIRST and FOLLOW of all non-terminals.

(c) Construct DAG for the following expression: 3

(a + b * c) + d + (a + b * c) – d + e

(d) Define handle with example. 2

6. (a) Explain the concept of basic blocks and flow graphs in compiler optimization. Discuss how basic blocks are identified and how they are represented using flow graphs. 5

(b) Describe the significance of register allocation in code generation. Briefly discuss common register allocation strategies used in compiler design. 4

(c) Explain Dead-code Elimination techniques in details. 3

(d) Discuss the concept of Peep Hole optimization in compiler design with suitable example. 3

Rangamati Science and Technology University

Department of Computer Science and Engineering
3rd Year 1st Semester B.Sc. (Engg.) Final Exam- 2022
Session: 2019-2020; **Course Code:** SCO-3109
Course Title: Sociology and Ethics and Legal Aspects of Information

Time: 3 Hours | Full Marks: **60**

Answer any 4 (four) questions
(Figure in the right hand margin indicates marks)

1. a) Discuss the relations between Sociology and Computer Science and Engineering. **07**

b) How has sociology originated and developed as an academic discipline? **08**

2. a) What is social structure and what are its components? Illustrate. **07**

b) Review Karl Marx's concept of basic structure and superstructure. **08**

3. a) What do you mean by socialization? What are the agents of socialization? Which is the most important agent of socialization and why? **08**

b) Define social stratification and discuss its types? **07**

4. a) What is culture and what functions culture does in human society? **07**

b) Enumerate the contents and dimensions of culture. **08**

5. a) What do you understand by social problem and how is it traced? **07**

b) Indicate some social problems of information that can be legally solved. **08**

6. a) Write short notes on (any three)- **3x3=09**

A. August Comte

B. Max Weber

C. Culture and Technology

D. Globalization and Computer Science

b) What is ethics and how is it related to cybercrime? **06**