CSE-D

Spring-Mid

2020

CSE

DAY

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Port City International University

Mid Term Examination, Spring 2020

Course Code: CSE 323 **Course Title:** Computer Networks

Department: CSE **Batch:** CSE-13-D-B

Time: 2.00 hours **Full Marks:** 30

[N.B.: Answer any **Five** (5) Questions. *Including Question no. 7*]

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1. a) What is computer network? Write the uses of computer network. 3

   b) Classify computer network on the basis of structure. 3

2. Differentiate between: 6

   i) LAN and WAN,

   ii) Repeater and hub, and

   iii) Router and bridge.

3. a) Define the following: 3

   i) Intranet

   ii) Internet, and

   iii) Extranet,

   b) What is handoff in cellular system? Briefly describe mobile communication system. 3

4. Briefly explain OSI reference model. 6

5. Distinguish between: 6

   i) Connection oriented and connectionless service

   ii) OSI and TCP/IP model

   iii) Circuit switching and packet switching model

6. a) What is hamming distance? Give an example. 2

   b) A bit stream 10011101 is transmitted. The generator polynomial is $x^3 + 1$. Using CRC method, show which is the actual bit string transmitted? 4

7. a) The following data fragment occurs in the middle of a data stream for which the byte-stuffing algorithm described in the text is used: A B ESC C ESC ESC FLAG FLAG D. What is the output after stuffing? 2

   b) Seven-bit messages are transmitted using a Hamming code. How many check bits are needed to ensure that the receiver can detect and correct single bit errors? Show the bit pattern transmitted for the message 1001000. Assume that even parity is used in the Hamming code. 3

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c) A bit string, 01111011111011111110, needs to be transmitted at the data link layer. What is the string actually transmitted after bit stuffing?

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Mid Term Examination, Spring 2020

Course Code: CSE 413 **Course Title**: Microprocessor & Assembly Language

Department: Computer Science & Engineering **Batch**: CSE-15-B(Day)

Time: 2 hours **Full marks-30**

[N.B.: Answer any **Five** Questions including **Question no.7**. Figures in right margin indicate full marks]

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1. What do you mean by microprocessor? Write about the description of major components of microprocessor which are similar to every microprocessor except some special microprocessor. 6

2. Elaborately describe the classification of microprocessor. 6

3. a) Write the differences between RISC and CISC. 4

   b) What are the main advantages of assembly language over machine language. 2

4. a) What is addressing mode? Describes the following addressing modes: 4
   - i) Register Addressing Mode,
   - ii) Register Indirect Addressing mode,
   - iii) Relative Addressing Mode, and
   - iv) Base Register Addressing Mode.

   b) Select an instruction for each of the following tasks: 2
   - i) Copy BL into CL,
   - ii) Copy SI into BX,
   - iii) Copy DS into AX, and
   - iv) Copy BX into CX.

5. a) Describe different types of registers which are used in microprocessor for various purposes. 4

   b) What are the special purpose segments registers? Write the short notes of three types of segment registers. 2

6. Describe elaborately the architecture of 8085 microprocessor with necessary figure 6

7. Suppose you have given the following value of program counter, Base, index register, and accumulator according to the below figure 1. Find out the effective addressing of operand and operand value using following addressing mode: 6

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PC	200
R1	400
XR	100
AC	

Address	Memory	
200	Load to AC	Mode
201	Address = 500	
202	Next Instruction	
399	450	
400	700	
500	800	
600	900	
702	325	
800	300	

figure 1

i) Direct Addressing mode,
ii) Relative Addressing mode,
iii) Indexed Addressing Mode,
iv) Base register Addressing Mode,
v) Auto-decrement Addressing Mode, and
vi) Register Addressing mode.

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Port City International University
Mid Term Examination, Spring 2020

Course Code: CSE 111
Course Title: Computer Fundamentals & Progg. Tech.
Department: CSE
Time: 2 hours
Batch: CSE-21-D-A
Full marks-30

[N.B.: Answer any **Five** Questions including **Question no.**7.Figures in right margin indicate full marks]

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1. a) What is data processing cycle? Discuss the elements of the cycle. 2
   b) What are the components of computer system? Describe the components of computer system. 4

2. Classify computer system on the basis of capacity. Briefly describe the classification of computer system based on purpose. 6

3. a) Briefly describe four popular number systems. 4
   b) How can decimal numbers 735.53 and 1278 be expressed in expanded notation? 2

4. a) Perform the following operation: 3

   i) 0011010 + 0011001,
   ii) 0011010 – 001100, and
   iii) 0011010 * 001100.

   b) Evaluate the difference Y=B-A using 2'S complement. Compare the result of 2's complements and ordinary subtraction. 3

   where

   A=1001110, and

   B=11110000.

5. a) Simplify the following expressions using boolean algebra: 3

   i) $\overline{\overline{WXY}} + Z$, and

   ii) $\overline{A}BC + A\overline{B}C + AB\overline{C} + ABC$.

   b) Draw the logic circuits for the following expression using basic logic gates: 3

   i) X=AB + CD, and

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$Y = \overline{A}B\overline{C} + BC + \overline{A}.$

6. a) Convert the following binary numbers to decimal numbers: 2

i) $(10101)_2$, and

ii) $(101.101)_2$

b) Convert the following hexadecimal numbers to decimal numbers: 2

i) $(129B4)_{16}$,

ii) $(73E5)_{16}$

c) Convert the following binary numbers to decimal numbers: 2

i) 10110100101110_2, and

ii) 10101010110100_2.

7. Suppose you have three basic gates such as AND gate, OR gate and NOT gate. You may also know the universal gate such as NAND gate and NOR gate. With the help of three basic gate (AND, OR and NOT gate) showing the implementation of the logical operations AND gate, OR gate and NOT gate and prove the universality of NAND gate and NOR gate. 6

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Port City International University

Mid Term Examination, Spring-2020

Course Code: CSE 217
Department: CSE
Time: 2.00 hours

Course Title: Data Structure
Batch: CSE-18-D-(B+C)
Full Marks: 30

[N.B.: Answer any **Five** (5) Questions including **Question no.** 7. Figures in the right margin indicate full marks]

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1. a) Define Data Structure. List some of the data structures. 2
   b) Briefly explain stack and queue with examples. 3
   c) What is the difference between linear data structure and nonlinear data structure? 1

2. a) Let DATA be the following sorted 13-element array: 4
   11,22,30,33,40,44,55,60,66,77,80,88,89
   Apply the binary search to DATA for the value of 44.
   b) Write the linear search algorithm. 2

3. a) What information's are required for accessing a substring from a given string? 2
   b) Determine the Substring from the followings: 2
      (i) SUBSTRING('TO BE OR NOT TO BE',4,7)
      (ii) SUBSTRING('WE ARE CSEPCIU',5,3)
   c) Determine the index from the followings: 2
      (i) INDEX('WE ARE CSEPCIU','CSE')
      (ii) INDEX('HELLO WORLD','THE')

4. a) Find- 2
      (i) INSERT('WE ARE PCIU',7,'CSE')
      (ii) DELETE('ABCDEFGH,2,4)
   b) Find the table and corresponding graph for the second pattern matching algorithm where the pattern is *P=ababab*. 4

5. Write the first pattern matching algorithm and explain step by step with an example. 6

6. a) Using the bubble sort algorithm, find the number of comparisons and the number of interchanges which alphabetize the n=6 letters in PEOPLE. 4
   b) What are the limitations of the binary search algorithms? 2

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7. a) Suppose a data set S contains n elements. Compare the running time T_1 of th linear search algorithm with the running time T_2 of the binary search algorithm when n=1000.

b) Consider the linear array INFO in figure 2.1. The values of START and LINK[K in the figure determine a linear ordering of the names as follows. START gives the location of the first name in the list, and LINK[K] gives the location of the name following INFO[K], with 0 denoting the end of the list. Find the linear ordering of the names.

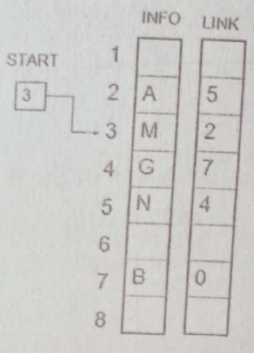

Figure 2.1

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Mid Term Examination, Spring 2020

Course Code: CSE 447 **Course Title:** Multimedia System Design

Department: CSE **Batch:** CSE-10-D-A

Time: 2.00 hours **Full Marks:** 30

[N.B.: Answer any **Five** (5) Questions. *Including Question no.* 7]

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1. a) What is multimedia system? Write different applications of multimedia system. 3
   b) Write short notes on: Interactive media system 3

2. a) Differentiate between: 3
      i) Hypermedia and multimedia., and
      ii) Normal text and hypertext
   b) Briefly explain the research area of multimedia system. 3

3. a) Define the following: 6
      i) Binary image ,
      ii) Bitmap ,
      iii) Alpha channel ,
      iv) Frame buffer ,
      v) Intensity resolution , and
      vi) Spatial resolution

   Remove

4. a) What is dithering? Write an algorithm for ordered dither. 3
   b) Describe the standard specification of GIF file format. 3

5. a) Write median-cut algorithm for color reduction problem. 3
   b) Write Ostu's method. Give an example. 3

6. a) Write short note on: 4
      i) Quality factor ,
      ii) Thresholding ,
      iii) Histogramming , and
      iv) Binary image analysis
   b) Write an algorithm for counting object in binary image. 2

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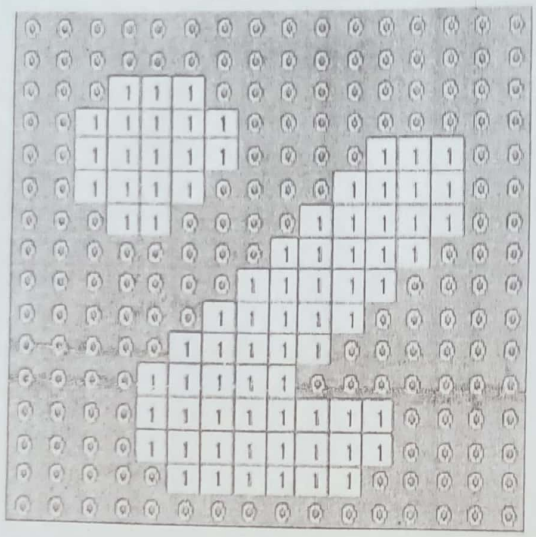
7. Perform erosion and dilation in the following binary image.



Structuring element

1	1	1
1	1	1
1	1	1

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Port City International University

Mid Term Examination; Spring-2020

Course Code: ENG 101 | **Course Title:** Composition
Department: Computer Science & Engineering | **Batch:** CSE 21A (Day)
Time: 2 Hours | **Full Marks:** 30

[Answer any five from the following questions including Q. no.7. You must write answer in complete sentence.]

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1. **Use the right form of verbs:** 0.5×12=6

   a. Shamim (write) a novel at this moment. He (recite) a poem yesterday.
   b. Fatema just (went) there with her father. Rahela already (come) here with her friends.
   c. It was raining while Adhora (sing) on the stage. It (rain) since morning.
   d. Once Anny (go) to that place in search of her friend. Once there was a king in England who (to be) very cruel to his subjects.
   e. The manwill have reached at the station before the sun (set). The patient (die) after the doctor had come.
   f. Manik (completed) the work within 10am. We (play) football in the field before the teacher comes.

2. **Use modals in the gap below:** 1×6=6

   a. I do believe that we_____ obey our honorable teachers.
   b. _____you like to have a cup of coffee with me?
   c. It is raining cats and dogs. Mohona _____ take an umbrella.
   d. Mitu _____die than beg from door to door.
   e. If Nishi studied well, she _____ make a bright result.
   f. Abraham _____walk every morning on the bank of the Meghna.

3. **Use pronouns in the following gaps:** 0.5×12=6

   a. Noman and Nahida hate _____. Anik, Anika and Monika hate_____.
   b. _____ should do one's duty. This is the baby_____ is crying.
   c. This is the pen _____ I wanted yesterday. _____ loves you here?
   d. Susmita killed_____. Each boy and _____ girl has won the prize.
   e. Susmita_____ killed. This is the place _____ I was born.
   f. _____ loves him for his eloquent behavior. Rahim is _____ friend.

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4. **Use articles in the following gaps:** 0.5×

a. I saw a nice bird. _____ bird was very beautiful. _____Jamuna is a large river.

b. Nazrul is called _____ Byron of Bengal. Adamjee was _____ Dandee of Bengal.

c. Fahima lived in _____ UAE. Sara is _____MA.

d. _____French can speak French fluently. The English can speak _____English language fluently.

e. _____President of India will come in Bangladesh. _____ Daily Star is a national newspaper in Bangladesh.

f. Afnan is _____ university student. I saw_____ one-eyed man while crossing the road.

5. **Complete the following sentences:** 1×6

a. If Rahim studies attentively,_____

b. If Bangladesh won Champion's Trophy,_____

c. If you had gone,_____

d. _____, I would have helped the poor and bright students in our country.

e. If Atom bomb is dropped on Bangladesh,_____

f. _____, you would get A^+ in the exam.

6. **Fill in the gaps according to the direction in the brackets:** 1×6

a. I ate a _____ mango. (Adj.)

b. Shafik reads very_____(Adv.)

c. It is 1971_____ I was born. (Pron.)

d. _____ ! We have won the game. (Interj.)

e. Arafat walk fast _____ he should miss the train. (Conjun.)

f. The boy was beaten _____ Karim. (Prep.)

7. Write a paragraph on the following clues on **Digital Bangladesh** within 100-150 words.

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Mid-Term Examination, Spring-2020

Course Code : CSE 113 | **Course Title:** Electrical Engineering
Department : CSE | **Batch:** CSE-20-D-A
Time : 2 Hours | **Marks:** 30

[N.B. Answer any five (5) questions. Give Labeled diagram wherever necessary]

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1. (a) Find the indicated voltage and current for the network on Fig.01. 3
   (b) Determine the I_1, I_2 and V_1.V_2 circuit for Fig.02. 3

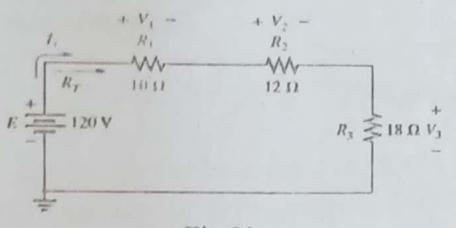

Fig.01

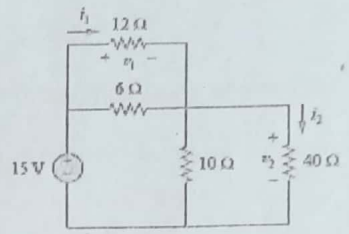

Fig.02

2. (a) Find the R_{eq} for the circuit in Fig.03. 2
   (b) Determine the indicated voltage and currents for the network in Fig.04. 4

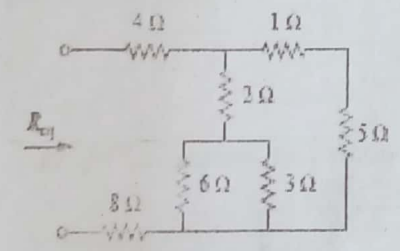

Fig.03

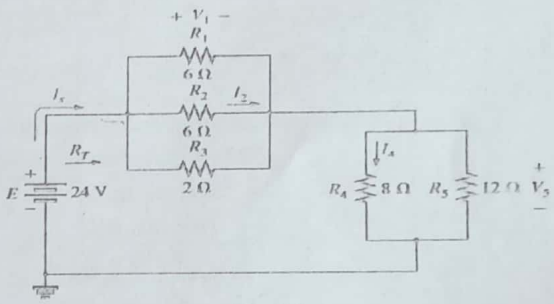

Fig.04

3. (a) Determine the indicated currents for the network in Fig.05. 2
   (b) Determine the indicated voltages for the network in Fig.06. 4

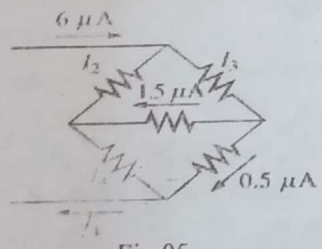

Fig.05

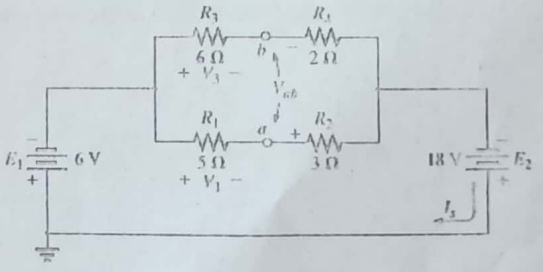

Fig.06

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4. (a) Determine the voltage across the open end of Fig.07.

(b) Determine R_T, I_1, I_2, I_3 & R for the network in Fig.08.

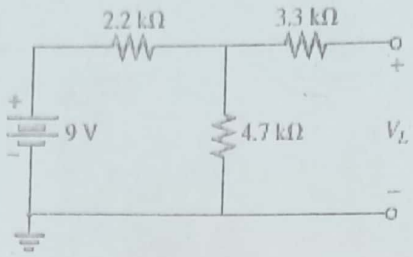

Fig.07

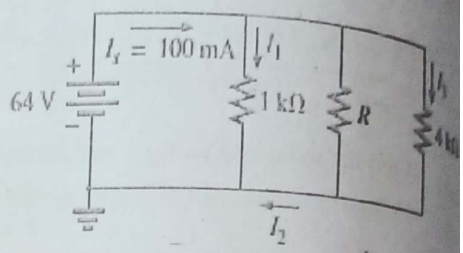

Fig.08

5. Determine nodal voltages of the network in Fig.09.

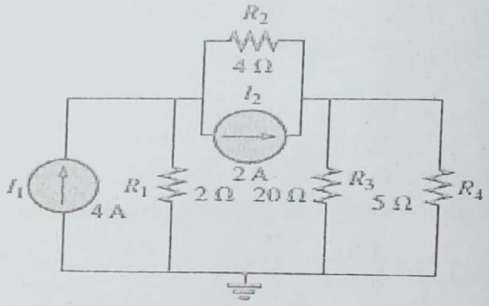

Fig.09

6. Apply branch current analysis to find the current through each branches of Fig.10.

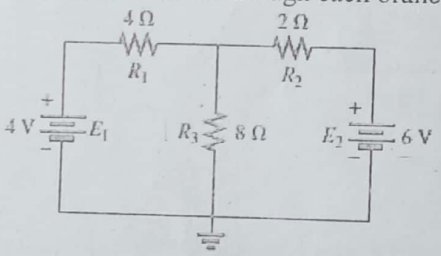

Fig.10

7. Apply Mesh analysis to find current of each loop in Fig.10.

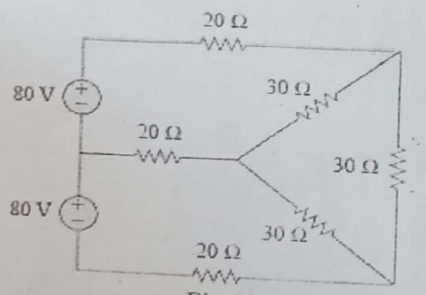

Fig.11

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Port City International University

Mid Term Examination, Spring-2020

Course Code: CSE 423 **Course Title:** Simulation & Modeling
Department: CSE **Batch:** CSE-11-D-A
Time: 2.00 hours **Full Marks:** 30

[N.B.: Answer any **Five** (5) Questions including **Question no.** 7. Figures in the right margin indicate full marks]

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1. a) Define simulation. 1
   b) When simulation is the appropriate tool and when not? 5

2. Construct the table with two columns, Clock and Future Event List for five customers using the following interarrival and service times. (Here, Stopping Event at time 60). 6

   Interarrival Times: 8 6 1 4
   Service Times : 4 1 4 3 2

3. Consider the following tables for Able-Baker Call-center problem where Able has more service giving priority than Baker: 6

Table: Service distribution of Able

Service Time	Probability	Cumulative Probability	Random-Digit Assignment
1	0.30	0.30	1-30
2	0.28	0.58	31-58
3	0.25	0.83	59-83
4	0.17	1.00	84-100

Table: Service distribution of Baker

Service Time	Probability	Cumulative Probability	Random-Digit Assignment
2	0.35	0.35	1-35
3	0.25	0.60	36-60
4	0.20	0.80	61-80
5	0.20	1.00	81-100

Inter-arrival times are:

space 2,5,2,6

Random digits for service time:

95,21,51,92,38

Find the service begin time, service time, and service end time for both able and baker for 5 Callers.

4. a) Explain dynamic simulation model with example. 2
   b) What is the difference between system and model? 1
   c) Define activity, state, and event of a system. 3

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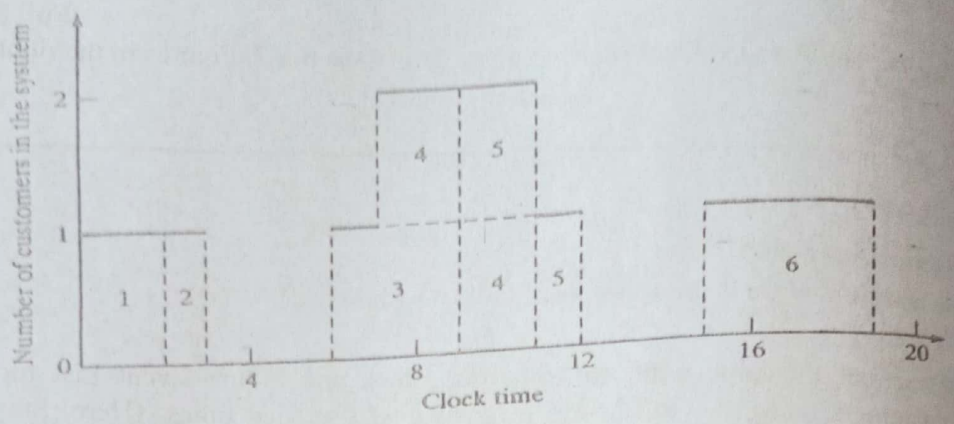
5. a) Derive a simulation table from the following simulation timing diagram for a Single Channel Queue:



b) What is an entity?

6. A classical inventory problem concerns the purchase and sale of newspapers. The paper seller buys the papers for 33 cents each and sells them for 50 cents each. Newspapers not sold at the end of the day are sold as scrap for 5 cents each. Find the total profits for 8 days.

Simulation Table for purchase of 70 newspapers

Day	R.D. for type of Newsday	Type of Newsday	R.D. for demand	Demand
1	58	Fair	93	80
2	17	Good	63	80
3	21	Good	31	70
4	45	Fair	19	50
5	43	Fair	91	80
6	36	Fair	75	70
7	27	Good	84	90
8	73	Fair	37	60

7. a) The life of a device used to inspect cracks in aircraft wings is given by X, a continuous random variable assuming all values in the range x>=0. The pdf of the device's lifetime in years is as follows:

$$f(x) = \begin{cases} \frac{1}{2}e^{-x/2}, & x \geq 0 \\ 0, & \text{otherwise} \end{cases}$$

Find the probability of the device that will last for less than 2 years.

b) A production process manufactures computer chips on the average at 2% nonconforming. Every day, a random sample of size 50 is taken from the process. If the sample contains more than two nonconforming chips, the process will be stopped. Compute the probability that the process is stopped by the sampling scheme.

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Port City International University

Mid Term Examination, Spring 2020

Course Code: CSE 213 **Course Title:** Digital Logic Design

Department: CSE **Batch:** CSE-18-D-A

Time: 2.00 hours **Full Marks:** 30

[N.B.: Answer any **Five** Questions including **Question no.**7. Figures in right margin indicate full marks]

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1. a) Convert the following numbers from the given base to base indicated: 3

   Decimal 222.205 to binary, octal, and hexadecimal.

   b) Write short notes on following logic families of digital ICs: 3

   TTL, ECL, and CMOS.

2. a) find out the 1's and 2's complements of the following binary numbers: 3

   i) 0111000,
   ii) 0000001, and
   iii) 100000.

   b) Perform the subtraction with the following binary numbers (11010-1101) using 2's complement. Check the answer by straight subtraction. 3

3. a) Write down the step of 9's complements. Perform the subtraction with the following decimal numbers (81.2-98.3) using 9's complement. Check the answer by straight subtraction. 3

   b) Write down the step of 10's complements. Perform the subtraction with the following decimal numbers (72532-3250) using 10's complement. Check the answer by straight subtraction. 3

4. a) Find out complement of the following functions and reduce them to a minimum number of literals: 4

   i. (x+y)(x+y)`, and
   ii. [(AB)`A][(AB)`B].

   b) Perform the truth table of the following function: 2

   E= xy+xy`+y`z.

5. a) Convert the following Boolean function into Standard SoP form: 3

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$$f = p'qr + pq'r + pqr' + pqr$$

Convert the following Boolean function into Standard PoS form:

$$f = p+q+r \cdot p+q+r' \cdot p+q'+r \cdot p'+q+r$$

6. a) Let the Boolean function:

$$F = A'C + A'B + AB'C + BC$$

i) Express this function as a sum of minterrms, and

ii) Find the minimal sum of products expression.

b) Draw logic circuit diagram for the following Boolean functions:

i) $F_1 = x`y`z+x`yz+xy`$, and

ii) $F_2 = xy`+x`z$.

7. a) Write about the Karnaugh map method. Minimize the following function using K-map method, $F(x,y,z) = \sum (0,2,4,5,6)$.

b) You have given the Boolean function and don't-care conditions. According to the Karnaugh map method, Simplify the Boolean function:

$$F(w, x, y, z) = \Sigma(1, 3, 7, 11, 15)$$

Which has the don' t-care conditions:

$$d(w, x, y, z) = \Sigma(0, 2, 5)$$

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Port City International University
Mid Term Examination, Spring– 2020

Course Code: CSE 211 **Course Title:** Object Oriented Programming
Department: Computer Science and Engineering **Batch:** CSE-19-A(Day)
Time: 2.00 Hours **Full Marks:** 30

[N.B. : Answer Five Questions (**including question** 7). Figures in the right margin indicate full marks]

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1. a) What is object-oriented programming? How is it different from the procedure-oriented programming? 2
   b) Differentiate between data abstraction and data encapsulation. 2
   c) Why is java known as platform neutral language? 2

2. a) Illustrate the basic concepts of OOP. 4
   b) What will be the output of the following program? 2

```
publicclass Operators {
        publicstaticvoidmain(String[] args) {
                int number=6;
                System.out.println(number>>2);
                System.out.println(++number);
                System.out.println(number<<3);
                System.out.println(number++);
        }}
```

3. a) Describe the structure of typical java program. 3
   b) Write a short note on JDK. 1.5
   c) "An object is a specific instance of a class"-Do you agree with this statement? Justify your answer. 1.5

4. a) What do you mean by instance variable hiding? How can you access the hidden instance variables? 2
   b) What is the benefit of using constructor? Illustrate the special properties ofconstructor. 2
   c) Mention the usage of java this keyword. 2

5. a) Differentiate between method overloading and method overriding. 2
   b) Write a java program to find out the area of square, triangle and circle using overloaded methods. 4

6. a) Explain the concepts call by value and call by reference with a java program. 4
   b) How many types of variable are there in java language? Write a java program which includes all types of variable. 2

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7. Assume that a bank maintains two kinds of accounts for customers, one called as savings account and the other as current account.The saving account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed.

Create a class **Account** that stores customers name,account number and type of account.From this derive the classes **Cur-Acct** and **Sav-Acct** to make them more specific to their requirements.Include necessary members functions in order to achieve the following tasks:

i. Accept deposit from a customer and update the balance,
ii. Display the balance,
iii. Compute and deposit interest, and
iv. Permit withdrawal and update the balance.

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Port City International University

Mid Term Examination, Spring-2020

Course Code: MATH 135 | **Course Title**: Discrete Mathematics

Department: Computer Science & Engineering | **Batch**: CSE-19-D-A (Day)

Time: 2.00 hours | **Full Marks**: 30

[N.B.: Answer Question 7 and any 4(Four) from the remaining.]

1. a) What is proposition? Determine whether the followings are propositions or not: 3
   i. Dhaka is the capital of Bangladesh.
   ii. What time is it?
   iii. Answer this question.
   iv. $2 + 3 = 6$.

   b) For propositions p and q, find out the truth table for $p \oplus q$ and $p \rightarrow q$. 3

2. a) Let p and q be the propositions: 3
   p: it is below freezing
   q: it is snowing

   Write the following propositions using p, q and logical connectives:
   i. It is below freezing and snowing.
   ii. It is below freezing but not snowing.
   iii. It is not below freezing and it is not snowing.

   b) What are the contrapositive, the converse, and the inverse of the conditional statement "The home team wins whenever it is raining."? 3

3. a) Find the bitwise OR, bitwise AND, and bitwise XOR of each of these pair of bit strings. 4
   i. 11110000, 10101010,
   ii. 0001110001, 1001001000,
   iii. 1111111111, 0000000000, and
   iv. 1011110, 0100001.

   b) What is the truth value of $\forall x P(x)$ & $\exists x P(x)$, where $P(x)$ is the statement "$x^4 < 100$" and the domain consists of the positive integers not exceeding 5? 2

4. Let S(x) be the predicate "x is a student," F (x) the predicate "x is a faculty member," and A(x , y) the predicate "x has asked y a question," where the domain consists of all people associated with your university. Use quantifiers to express each of the following statements: 6
   i. Lois has asked Professor Michaels a question.
   ii. Every faculty member has either asked Professor Miller a question or been asked a question by Professor Miller.
   iii. Some student has not asked any faculty member a question.
   iv. There is a faculty member who has asked every other faculty member a question.
   v. Some student has never been asked a question by a faculty member.
   vi. Every student has asked Professor Gross a question.

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5. a) Use quantifiers to express the following statements:
   i. There is a woman who has taken a flight on every airline in the world,
   ii. Everyone has exactly one best friend, and
   iii. The sum of two positive integers is always positive.

   b) Translate the statement $\exists x \forall y \forall z((F(x,y) \wedge F(x,z) \wedge (y \neq z)) \rightarrow \neg F(y,z))$ into English, where $F(a,b)$ means a and b are friends and the domain for x, y, and z consists of all students in your school.

6. a) Let A(c, n) denote the statement "Computer c is connected to network n ," where c is a variable representing a computer and n is a variable representing a network. Suppose that the computer MATH 1 is connected to network CAMPUS2, but not to network CAMPUS 1. What are the values of A(MATH 1 , CAMPUS 1) and A(MATH 1 , CAMPUS2)?

   b) Show that $(p \wedge q) \rightarrow (p \vee q)$ is a tautology.

   c) Find the cardinality of the following sets:
   A= { 1, 2, 5, 0}, B= {2, 4, 6}, C= {0, 7, 1, 14, ...}, and D= {2}

7. The police have three suspects for the murder of Mr. Cooper: Mr. Smith, Mr. Jones, and Mr. Williams. Smith, Jones, and Williams each declare that they did not kill Cooper. Smith also states that Cooper was a friend of Jones and that Williams disliked him. Jones also states that he did not know Cooper and that he was out of town the day Cooper was killed. Williams also states that he saw both Smith and Jones with Cooper the day of the killing and that either Smith or Jones must have killed him. Can you determine who the murderer was if:
   i. One of the three men is guilty, the two innocent men are telling the truth, but the statements of the guilty man may or may not be true?
   ii. Innocent men do not lie?

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Port City International University

Mid Term Examination, Spring- 2020

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Course Code: CSE 317 **Course Title**: Theory of computing

Department: Computer Science & Engineering **Batch**: CSE-13B(Day)

Time: 2.00 hours **Full Marks:** 30

[N.B.: Answer any **Five** (5) Questions including Ques. No. 7]

---

1. a) Define Automata theory, Language, and Sequence. 3

   b) Why study of automata is important? Describe with examples. 3

2. a) Write down the differences between DFA and NFA. 3

   b) Write regular expressions for the following languages : 3

   i. The set of all strings of 0's and 1's containing 101 as a substring.

   ii. The set of all strings of 0's and 1's starting and ending with same symbol.

   iii. The set of all strings of 0's and 1's containing a single 1.

3. For each of the following languages, construct a DFA that accepts the language where $\sum = \{a,b\}$. 6

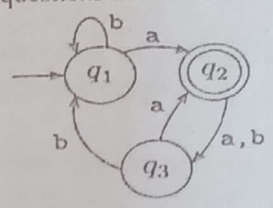
   i. {w : the length of w is divisible by three}

   ii. {w : w contains the substring "abb"}

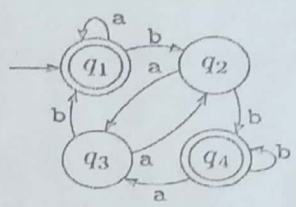
   iii. {w : w starts and ends with different symbol}

4. Design an NFA that accepts all strings that end in 01.Construct equivalent DFA using the concept of subset construction. 6

5. The following are the state diagrams of two DFAs, *M*1 and *M*2. Answer the following questions about each of these machines: 6



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 €?

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6. a) Design an NFA to recognize occurrences of the word **cse.**

b) Prove that every nondeterministic finite automaton has an equivalent deterministic finite automaton.

7. Convert the following NFA to an equivalent DFA and informally describe the language it accepts.

	0	1
$\rightarrow p$	$\{p, q\}$	$\{p\}$
q	$\{r, s\}$	$\{t\}$
r	$\{p, r\}$	$\{t\}$
$*s$	$\emptyset$	$\emptyset$
$*t$	$\emptyset$	$\emptyset$

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Port City International University

Mid Term Examination, Spring 2020

Course Code: CSE 441 **Course Title:** Optical Fiber Communication

Department: CSE **Batch:** CSE-12-D-B

Time: 2.00 hours **Full Marks:** 30

[N.B.: Answer any **Five** (5) Questions. *Including Question no.7*]

---

1. a) What is optical fiber? Write the basic construction of optical fiber. 3
   b) Write short notes on following: 3
      i) Acceptance angle, and
      ii) Numerical aperture.

2. a) What is refractive index? 1
   b) Briefly explain the properties of light with proper diagram. 5

3. a) Define the following: 2
      i) Single mode fiber, and
      ii) Multi-mode fiber.
   b) Write the characteristics of single mode fiber and multi mode fiber. 4

4. Differentiate between: 6
      i) Step index fiber and graded index fiber,
      ii) Single mode step index fiber and multi mode step index fiber, and
      iii) Multimode step index fiber and multimode graded index fiber.

5. a) What is cutoff wavelength? Determine the cutoff wave length for a step index fiber to exhibit single-mode operation when the core refractive index and radius are 1.46 and 4.5μm, respectively, with the relative index difference being 0.25%.(where V_c=2.405). 3
   b) Describe different types of light rays on the basis of propagation inside the optical fiber with proper diagram. 3

6. a) Mathematically describe normalized frequency and total number of guided modes. 4
   b) An optical fiber in air has a numerical aperture of 0.4. Compare the acceptance angle for meridional rays with that for skew rays which change direction by 100° at each reflection. 2

7. a) A multimode index fiber has a relative refractive index difference of 7% and a cladding refractive index of 0.5. Calculate solid acceptance angle in air and critical angle at the core-cladding interface.When the number of modes 4

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Mid Term Examination, Spring-2020

Course Code: CSE 323 **Course Title:** Computer Networks

Department: Computer Science and Engineering **Batch:** CSE-13-A (Day)

Time: 2.00 hours **Full Marks:** 30

[N.B.: Answer any **Five** (5) Questions **including question no 7.**]

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1. a) What is the difference between a host and an end system? List several different types of end systems. Is a Web server an end system? 3

   b) List six access technologies. Classify each one as home access, enterprise access, or wide-area wireless access. 3

2. a) Dial-up modems, HFC, DSL and FTTH are all used for residential access. For each of these access technologies, provide a range of transmission rates and comment on whether the transmission rate is shared or dedicated. 3

   b) Describe the most popular wireless Internet access technologies today. Compare and contrast them. 3

3. a) Suppose you wanted to do a transaction from a remote client to a server as fast as possible. Would you use UDP or TCP? Why? 3

   b) List the four broad classes of services that a transport protocol can provide. For each of the service classes, indicate if either UDP or TCP (or both) provides such a service. 3

4. a) What is meant by a handshaking protocol? Consider an e-commerce site that wants to keep a purchase record for each of its customers. Describe how this can be done with cookies. 3

   b) Describe how Web caching can reduce the delay in receiving a requested object. Will Web caching reduce the delay for all objects requested by a user or for only some of the objects? Why? 3

5. a) Why is it said that FTP sends control information "out-of-band"? 3

   b) Suppose Alice, with a Web-based e-mail account (such asGmail), sends a message to Bob, who accesses his mail from his mail server using POP3. Discuss how the message gets from Alice's host to Bob's host. Be sure to list the series of application-layer protocols that are used to move the message between the two hosts. 3

6. Illustrate the hierarchy of DNS servers & interaction of various DNS servers. 6

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Port City International University
Mid Term Examination, Spring-2020

e Code: CHEM-111 | Course Title: Chemistry
tment: Computer Science & Engineering | Section: CSE-18-D-A
2.00 hours | Full marks: 30

[N.B.: Answer any Five (5) Questions. Give labeled diagram wherever necessary]

1) a. Using a figure illustrate the classification of matter and give one example for each type. 4

b. Use Dalton's theory to explain why potassium nitrate from India or Italy has the same mass percents of K, N, and O. 2

2) a. Define these terms: (*i*) atomic number, (*ii*) mass number, and (*iii*) isotope. 2

b. One of the early models of the atom proposed that atoms were wispy balls of positive charge with the electrons evenly distributed throughout. What would you expect to observe if you conducted Rutherford's experiment and the atom had this structure? 4

3) Discuss the postulates of Rutherford's atomic model. Mention the drawbacks of this model. 6

4) a. Write the drawback of Bohr model. 3

b. Show that, the angular momentum, mvr, of an electron is an integral multiple of $h/2\pi$. 3

5) Deduce the following relation from Bohr's theory- 6

$$E_n = -\frac{2\pi^2 Z^2 me^4}{n^2 h^2}$$

6) a. The first line of the Lyman series of the hydrogen atom emission results from a transition from the $n = 2$ level to the $n = 1$ level. What is the wavelength of the emitted photon? 3

b. Which of the orbitals namely $1p$, $2s$, $2p$, $3f$ are not possible? Give reason for your answer. 3

7) a. Describe $(n + l)$ rule. Using a diagram show how electrons are distributed in different subshells following this rule. 4

b. Write electron configurations in short form for the $3d$-block elements. 2

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Mid Term Examination, Spring-2020

Course Code: CSE 421 **Course Title**: Computer Graphics

Department: Computer Science & Engineering **Batch**: CSE-13-A (Day)

Time: 2.00 hours **Full Marks**: 30

[N.B.: Answer any **Five** (5) Questions **including Question number** 7. Figures in the right margin indicate full marks]

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1. a) Define object space and image space. Differentiate between computer graphics and image processing. 4

   b) Find the relationship between RGB and CMY color models. 2

2. a) What do you mean by true color representation of an image? How can you reduce the space requirements of true color images? Explain with an example. 3

   b) If you want to cut a 512×512 sub-image out from the center of an 800×600 image, what are the coordinates of the pixel in the large image that is at the lower left corner of the small image? 3

3. a) Why Bresenham's line converting algorithm provides better results than direct use of line equation or DDA algorithm? 1

   b) Explain the process of scan converting a line with $0 < m < 1$ using Bresenham's line converting algorithm. 5

4. a) Briefly explain common aliasing effects. 2

   b) Illustrate the procedure to scan convert a circle using Midpoint circle algorithm. 4

5. a) Differentiate between coordinate and geometric transformations. 2

   b) Explain the following geometric transformations: i) translation, ii) rotation about the origin, iii) scaling, and iv) mirror reflection about y-axis. 4

6. a) Derive the transformation that rotates an object point θ degree about the origin. Write the matrix representation for this rotation. 3

   b) Magnify the triangle with vertices A(0,0), B(1,1) and C(5,2) to twice its size while keeping C(5,2) fixed. 3

7. Indicate which raster locations would be chosen by Bresenham's algorithm when scan converting a line from pixel coordinate (1, 1) to pixel coordinate (8, 5), given that, $d_{i+1} = d_i + 2\Delta y$ if $d_i < 0$ and $d_{i+1} = d_i + 2(\Delta y - \Delta x)$ otherwise. 6

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Port City International University
Mid Term Examination, Spring-2020

Course Code: CSE 331 **Course Title:** Pattern Recognition

Department: Computer Science & Engineering **Batch:** CSE-12-D-B

Time: 2.00 hours **Full Marks:** 30

[N.B.: Answer any **Five** (5) Questions including **number** 7. Figures in the right margin indicate full marks]

---

1. a) What is pattern recognition? 1
   b) Describe design principles of pattern recognition system with an example. 5

2. What is learning? Explain in brief the different machine learning techniques that can be used by a classifier. 6

3. a) What is k-NN rule? 2
   b) Explain nearest neighbour algorithm with example. 4

4. a) What do you mean by feature selection and feature extraction? Explain 4
   b) If for any two elements A<B given that P(A)=1/3,P(B)=1/5 and P(AUB)=11/30,then find P(A/B). 2
   Space

5. a) What is the difference between Markov model and hidden Markov model? 2
   b) Briefly explain first-order hidden Markov model with a suitable diagram. 4

6. a) How do we define similarity? Explain intra-class variability and inter-class similarity with example. 3
   b) Differentiate between machine learning and pattern recognition. 3

7. a) Assume there are c classes $w_1, \cdots, w_c$, and one feature vector x, give the Bayes rule for classification in terms of a priori probabilities of the classes and class-conditional probability densities of x. 2 → alignment
   b) Suppose we have a two-classes problem (A, ~ A), with a single binary-valued feature (x, ~ x). Assume the prior probability P(A) = 0.33. Given the distribution of the samples as shown in the following table, use Bayes Rule to compute the values of posterior probabilities of classes. 4

	A	~A
x	248	167
~x	82	503

Table 1

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Port City International University

Mid Term Examination, Spring-2020

Course Code: CSE-217 | **Course Title**: Data Structures

Department: Computer Science & Engineering | **Batch**: CSE-18-A (Day)

Time: 2.00 hours | **Full Marks**: 30

[N.B.: Answer Question **7 and any 4(Four)** from the remaining.]

---

1. a) Consider the linear array AAA(5:50), BBB(-5:10) and CCC(18). 4
   i) Find the number of elements in each array.
   ii) Suppose Base(AAA) = 300 and w=4 words per memory cell for AAA. Find the address of AAA[15], AAA[35] and AAA[55].
   b) Show that the complexity of Binary search algorithm is $O(\log_2 n)$. 2

2. Using the bubble sort algorithm find the number of comparisons (C) and the number of interchanges (D) which alphabetize the n=6 letters in PEOPLE. 6

3. a) Let DATA be the following sorted 13 element array: 4
   DATA: 11, 22, 30, 33, 40, 44, 55, 60, 66, 77, 80, 88, 90.
   Apply Binary search to DATA to find the ITEM = 40.
   b) Write down the limitations of Binary Search algorithm. 2

4. a) Write down the differences between array and linked list. 3
   b) Can we apply binary search algorithm to a sorted linked list? Explain your answer. 3

5. a) Write an algorithm to insert an item to a specific location in a two-way linked list. 3
   b) Distinguish between a linear and nonlinear data structure. 3

6. a) Consider the following stack, where STACK is allocated with N=6 memory cells: 4
   STACK: AAA, DDD, EEE, FFF,GGG,___
   Describe the stack as the following operations take place:
   PUSH(KKK), POP(), PUSH(LLL), PUSH(SSS), POP(), and PUSH(TTT).
   b) Explain how you can minimize overflow in a stack. 2

7. Suppose you are given a task to reverse a word. Which data structures will you use to perform this task? Explain your answer with an appropriate example. 6

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Port City International University

Mid-Term Examination, Spring-2020

Course Code: CSE 231 **Course Title:** Operating System Concepts

Department: CSE **Batch:** CSE-16(Day)

Time: 2 hours **Full marks-30**

[N.B.: Answer any Five (5) Questions Including Q(7). Give labeled diagram wherever necessary]

1. (a) What is Operating System? Define the goals of Operating System. 1+2
   (b) Explain the Computer System Structure using a suitable diagram. 3

2. (a) What is bootstrap program? 1
   (b) Describe Storage-Device Hierarchy using suitable diagram. 5

3. (a) What is multiprogramming? 1
   (b) Explain difference between multiprogramming and multitasking with the help of a real time example. 3
   (c) Define clustered system. 2

4. (a) Briefly explain Operating System Services. 5
   (b) Differentiate system protection and system security. 1

5. (a) What is CPU Scheduling? Explain with real time example. 2
   (b) Write down the Scheduling criteria those are needed to be considered during scheduling. 4

6. 6

Process	Arrival Time	Burst Time
P_1	0.0	6
P_2	2.0	8
P_3	4.0	7
P_4	5.0	3

Using SJFS scheduling algorithm find out i) W.T. ii) A.W.T. iii) A.T.A.T

7. The SJF algorithm is supposed to improve performance, but notice that we chose to run process according to the shortest burst time. Let, you want to the photocopy shop to copy the documents at first, you want to copy 10 units of documents. During your copying one of your friends comes to copy 5 unit where you have 7 units remaining. After 3 units time later another friend come with 4 unit's documents and another friend come with 8 unit's paper at 7 unit's time from the beginning of the copy.
   i) Compute average waiting time using preemptive SJFS algorithm. 3
   ii) Compute what the average turnaround time will be if the machine is left idle for the first 1 unit using non preemptive SJFS algorithm. 3

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Port City International University

Mid Term Examination, Spring-2020

Course Code: CSE 317 | **Course Title:** Theory of Computing
Department: CSE | **Batch**: CSE 13A (Day)
Time: 2.00 hours | **Full Marks**: 30

[N.B.: Answer any **Five (5)** Questions **including Question 7**. Figures in the right margin indicate full marks.]

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1. a) What is an automaton? 1
   b) Can human be considered like an automaton? Justify your answer. 3
   c) Write down some differences between DFA and NFA. 2

2. For each of the following languages, construct a DFA that accepts the language. 6
   i. {w : w starts and ends with different symbol}, and
   ii. {w : w contains the substring "abb"}.

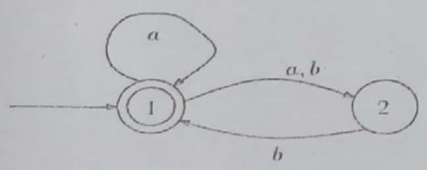
3. For each of the following languages, construct an NFA that accepts the language. 6
   i. {w : w starts with "a" and ends with "ab"}, and
   ii. {w : Fourth symbol from the right end is 'b'}.

4. Prove that the class of regular languages is closed under the concatenation operation. 6

5. a) Construct a DFA that accepts the following language 4
   {w : w contains an odd number of b or exactly two a}.
   b) Provide the formal description of the DFA of 5(a). 2

6. Construct a NFA for the following regular expression 6
   $(ab \cup ba)^*$

7. Consider the following NFA



   i. Provide the formal description of the NFA. 2
   ii. Convert the following NFA to an equivalent DFA. 4

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