Hajee Mohammad Danesh Science and Technology University, Dinajpur
Department of Computer Science and Engineering
B. Sc. (Engineering) in Computer Science and Engineering
Semester Final Examination 2020(Jul-Dec)
Level 2, Semester II, Course Code: **CSE 255**, Credit: **3.0**
Course Title: **Algorithms Analysis and Design**

Time: **03** hours | Total Marks: **90**

[N.B. The figure in the right margin indicates the marks allocated for respective question. Split answer of any question is not allowed.]

Section-A

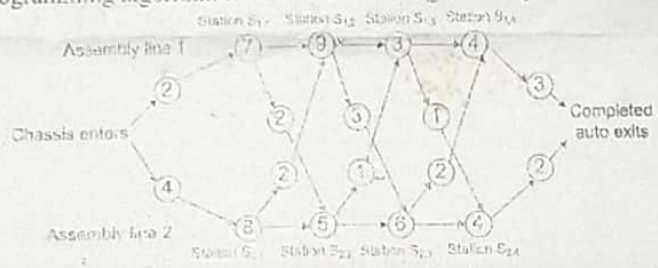
*(Answer any **03(three)** from the following questions)*

1. a) Define algorithm. Write its importance in Computer Science and Engineering. 3
   b) Prove that algorithms can be treated as a technology considering a suitable problem. 3
   c) To develop a new algorithm, space and time complexity of the existing algorithms are required to calculate with a view to measuring their performance. To do so, calculate the run-time complexity and represent in any asymptotic notation of the following algorithm **AddMatrix** (), written using pseudocode convention. 5

```
Algorithm AddMatrix(a,b,c,m,n)
{
for i:=1 to m do
for j:=1 to n do
        c[i,j]:=a[i,j]+b[i,j];
}
```

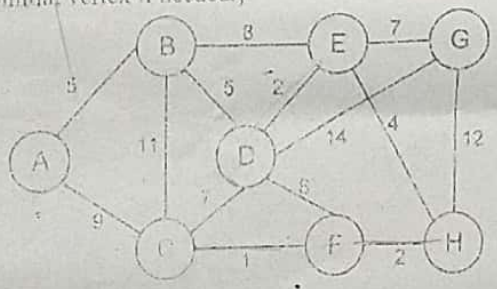
   d) Use a recursion tree to determine a good asymptotic upper bound on the recurrence $T(n) = 2T(n/2) + cn$. 4

2. a) Identify in which category of algorithms (brute-force, divide-and-conquer, dynamic programming, greedy, heuristics, or backtracking) does each of the following algorithms falls? 3
   i. Binary search ii. Bellman-Ford iii. Huffman algorithm
   iv. Heap sort v. Kruskal's vi. 0/1 Knapsack Problem
   b) Equate between dynamic programming technique and greedy algorithm technique to solve an optimization problem. You have to assume the activity selection problem for better convenience to write the answer. 4
   c) Design a dynamic programming algorithm to solve the following assembly-line scheduling problem: 8



   As in the problem there are two assembly lines each of which has 4 stations, your task is to determine which stations from line 1 and which stations from line 2 in order to minimize the total time through the factory for an auto to be exit.

3. a) Explain the general divide-and-conquer method. 3
   b) Define max-heap. Write the pseudocode or draw the flowchart of generating **Fibonacci** series. 1+3
   c) What is a **Minimum Spanning Tree (MST)**? Find the MST of the following graph using **Prim's** or **Kruskal's** algorithm. {Take vertex A as initial vertex if needed.} 1+7



4. a) Which kinds of problems are solved by dynamic programming? Mention some names of the problems. 1+2
   b) Apply **counting** sort algorithm to sort the array of integers: 2,5,2,1,3,7,0, and 6. 4
   c) Explain the steps to develop an algorithm with a view to finding a longest common subsequence (LCS) from the any two strings such as X=(A, B, C, B, D, A, B) and Y=(B, D, C, A, B) using dynamic programming technique. 8

Section-B

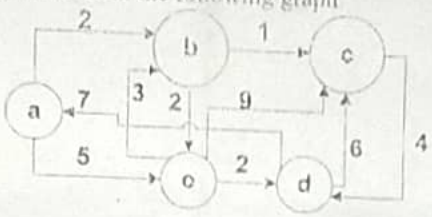
(Answer any 03(three) from the following questions)

1. a) What is comparison sort? Explain the decision tree model for any comparison sort operation.
   b) Technically compare between **merge sort** and **quick sort** algorithms.
   c) Explain **0-1 greedy knapsack** problem. Assume that we have a knapsack with max weight capacity W = 10. Our objective is to fill the knapsack with items such that the benefit (value or profit) is maximum. Following table contains the items along with their profit and weight.

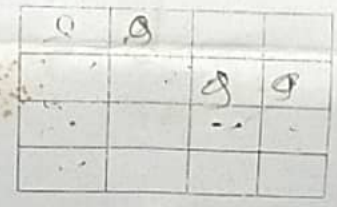
Item i	1	2	3	4
Profit p_i	1	2	5	6
Weight w_i	2	3	4	5

   Now solve the above problem by dynamic 0/1 knapsack approach.

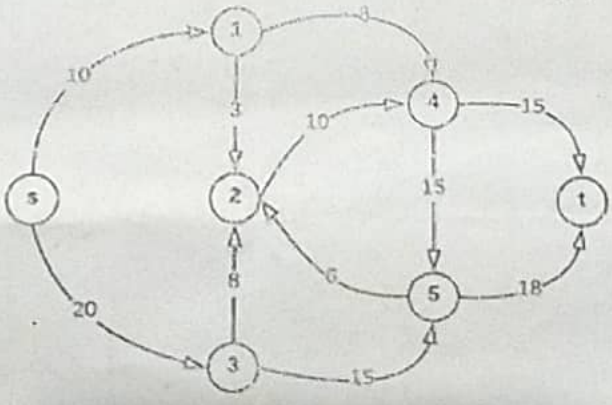
2. a) Technically differentiate between **breadth-first search (BFS)** and **depth-first search (DFS)** algorithms in case of traversing a graph.
   b) Explain the properties of **Bellman-Ford** and **Dijkstra's** algorithm to solve the shortest path problems.
   c) What is single-source shortest path problem? Perform **Bellman-Ford** algorithm to find the shortest path to the destination vertex, c from all other vertices in the following graph.



3. a) What is **topological** sort? How can it be done?
   b) Apply **heap** sort algorithm to sort the array of integers: 5,3,7,1,2,9,6, and 4.
   c) Consider the 4-queens problem which is one of the constraint satisfaction problems. Apply **backtracking** approach to solve the problem considering the given initial placement of the first queen on the 4×4 queen board.



4. a) Find the greatest common divisor of 414 and 662 using the Euclidean algorithm.
   b) Suppose we want to store messages made up of six characters **a, b, c, d, e, f** with frequencies **25, 10, 35, 15, 5, 10** (Percent's) respectively. Now assign prefix free code for each of the six characters by using **Huffman's greedy** algorithm.
   c) Consider the following flow network where s and t represent source and sink respectively. Now find the max-flow and min-cut by using the **Ford-Fulkerson** algorithm also show each residual graph.

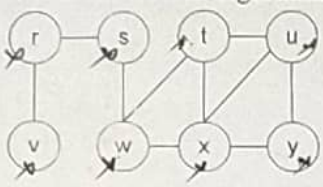


Hajee Mohammad Danesh Science and Technology University, Dinajpur
Department of Computer Science and Engineering
B. Sc. (Engineering) in Computer Science and Engineering
Level 2 Semester II, Mid-semester Examination 2020 (Jul-Dec)
Course Code: CSE 255, Course Title: Algorithms Analysis and Design, Credit: 3.0
Time: 50 Minutes
Total Marks: 30

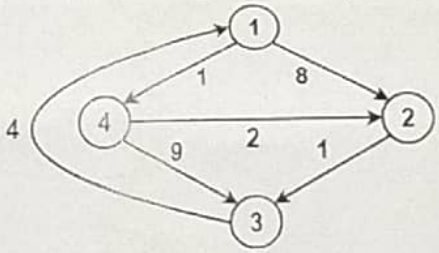
[N.B. The figure in the right margin indicates the marks allocated for respective question. Split answer to a question will not be accepted.]

*Answer any **two** from the following questions.*

1. a) Define *algorithm*. What are the desirable properties of an algorithm? 1+3
   b) To solve a typical problem using computer-programming, a sequence of 9 integers i.e., 8, 12, 5, 1, 3, 2, 9, 25 and 16 is needed to sort efficiently. Since you know the various sorting algorithms with their comparative performance, your task is to sort the sequence using **heap sort** algorithm, since it's one of the efficient sorting algorithms. 7
   c) Traverse the following graph using breadth-first search algorithm. Consider the source vertex is **w**. 4



2. a) Explain the general divide-and-conquer method. 2
   b) Apply merge sort algorithm to sort the array of integers: 5,3,7,1,2,9,6, and 4. 4
   c) Considering the following graph find the shortest-path for all pairs of vertices using **Floyd-Warshall** algorithm derived from the dynamic programming concept. Clearly differentiate the run-time complexity of this algorithm with that of the straight-forward (brute-force) solution for this problem. 7+2



3. a) Technically compare between greedy and dynamic programming algorithms. 3
   b) Apply either recursive or iterative **greedy algorithm** to solve the following activity selection problem having eleven (11) activities with their start (s_i) and finish time (f_i). In this problem you have to select a maximum-size subset of mutually compatible activities. Activities a_i and a_j are compatible if the intervals $[s_i, f_i)$ and $[s_j, f_j)$ do not overlap (i.e., a_i and a_j are compatible if $s_i >= f_j$ or $s_j >= f_i$) 12

Activities (a_i)	Start time (s_i)	Finish time (f_i)
1	1	4
2	3	5
3	0	6
4	5	7
5	3	8
6	5	9
7	6	10
8	8	11
9	8	12
10	2	13
11	12	14

Hajee Mohammad Danesh Science and Technology University, Dinajpur
Department of Computer Science and Engineering
B.Sc. (Engineering) in CSE
Semester Final Examination 2020 (Jul-Dec)
Level 2 Semester II, Course Code: CSE 257, Credit: 3.0
Course Title: Theory of Computation and Concrete Mathematics (Theoretical)
Time: 3 Hours Total Marks: 90

[N.B. The figure in the right margin indicates the marks allocated for respective question. Split answer of any question is not allowed.]

Section-A

(Answer any 03(three) from the following questions)

1. a) Define automata theory. List some of the applications of automata theory. 2+3

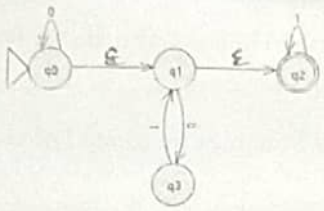
   b) i) Construct a DFA which accepts set of all strings over {0,1} having a substring 011. 3+6

   ii) Construct a DFA for decimal numbers divisible by 4.

   c) Write the differences between DFA and NFA. 4

2. a) Define ε-closure. 2

   b) Convert the following ε-NFA to NFA. 7

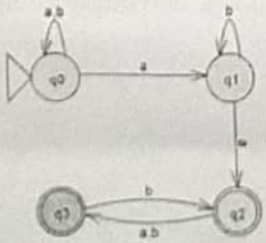


   c) Define: (i) Sequence (ii) Graph (iii) Empty set 6
   (iv) Path (v) Theorem (vi) Tree

3. a) Compare the transition functions of NFA and DFA. 2

   b) Construct an equivalent NFA for the given regular expression ((aUb)c)* 6

   c) Convert the following NFA to DFA: 7



4. a) What is an ambiguous grammar? 2

   b) Convert the following grammar into Chomsky normal form. 8

S→ AaB | b

A→ S|ε | AB

B→bbb |ASA

c) Find regular expressions for each of the following languages over the alphabet {0,1}. 5

i) The set of strings that end in 3 consecutive 1's.

ii) All strings containing the substring 000.

iii) The set of strings that have at least one 1.

iv) The set of strings that have at most one 1.

v) All strings containing an even number of 0's.

Section-B

*(Answer any **03(three)** from the following questions)*

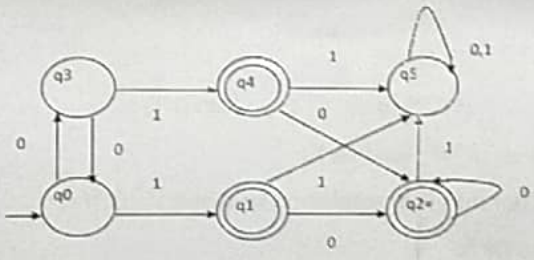
1. a) Prove that, if (3n+2) is odd, then n is odd. (Use proof by contradiction) 5

b) Explain pushdown automata with an example. 7

c) Define regular operations. 3

2. a) State the formal definition of a context-free grammar (CFG). Write the applications of context free grammar. 3+3

b) What is the purpose of minimizing states in DFA? Minimize the given DFA: 2+7



3. a) Derive the string 00101 from the Leftmost and Rightmost derivation using given CFG. 4

$S \rightarrow A \mid B$

$A \rightarrow 0A \mid \varepsilon$

$B \rightarrow 0B \mid 1B \mid \varepsilon$

b) State the formal definition of Turing machine. Explain the various types of Turing machine. 4+7

4. a) What is the minimum number of (legal) moves needed to move the stack to one of the other pegs in tower of hanoi? Find the recursive formula and closed form formula. 9

(b) Prove that the class of regular languages is closed under the union operation. 6

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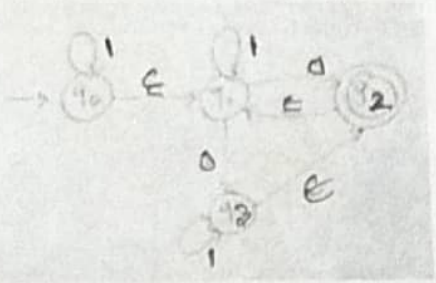
B.Sc. (Engineering) in CSE
Mid Semester Examination 2020
Level 2 Semester II, Course Code: CSE 257, Credit: 3.0
Course Title: Theory of Computation and Concrete Mathematics
Time: 50 Minutes Total Marks: 30

Answer any Two of the followings

1. a) Define: (i) Language (ii) Mapping (iii) Predicate 5
(iv) Element (v) Proof

b) Convert the following epsilon NFA to DFA. 10



2. a) Using proof by induction, prove that for any $n \geq 0$ and $x \neq 1$, 8

$$1 + x + x^2 + \ldots + x^n = \frac{x^{n+1} - 1}{x - 1}$$

b) Convert the regular expression b + ba* to NFA. 7

3. a) Draw a DFA for the language accepting strings ending with '0110' over input alphabets $\sum$ = {0, 1}. 4

b) Define derivation, types of derivation, derivation tree & ambiguous grammar. 6

c) Verify whether the following context free grammar is ambiguous or not: 5

E → E+E | E*E | I
I → 0 | 1 | a | b

Quiz Test

Time: 25 Minutes

Total Marks: 15

1. a) State the formal definition of NFA and regular expression. 9

   b) Differentiate complexity theory and computability theory. 3

   c) Define equivalence relation. 3

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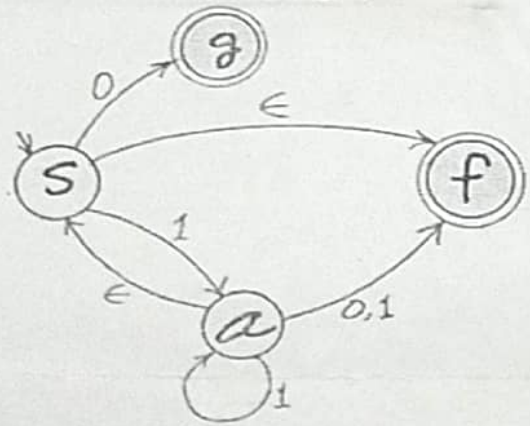
B.Sc. (Engineering) in CSE
Mid Semester Examination 2020 (Jul-Dec)
Level 2 Semester II, Course Code: CSE 258, Credit: 0.75
Course Title: Theory of Computation and Concrete Mathematics (Sessional)
Time: 20 Minutes Total Marks: 11.25

1. Give the regular expression for the set of all strings ending in 00. 1
2. Define the term Epsilon transition. 1.25
3. What are the applications of regular expression? 1.50
4. Convert the following epsilon NFA to its equivalent DFA. 5



5. Obtain the leftmost and rightmost derivations for the string 00112. The production rules are given by 2.50

$S \rightarrow AB$
$A \rightarrow 01 \mid 0A1$
$B \rightarrow \varepsilon \mid 2B$

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Department of Computer Science and Engineering
Semester Final Examination 2020 (Jul-Dec)
B.Sc. (Engineering) in CSE
Level 2 Semester II, Course Code: CSE 259, Credit: 3.0
Course Title: Computer Architecture and Organization

Time: 3 Hours **Total Marks: 90**

Section A

Answer any THREE

1. a) Compare between computer architecture and computer organization. What is 'Von Neumann Bottleneck'? 4+1

   b) Write the steps to execute an instruction. 5

   c) What is straight line sequencing? Perform the following operation using one-address, two-address and three address instructions: X=Y+Z. 2+3

2. a) Define addressing mode. Explain which addressing mode is used in the following instructions. 2+3
   i. int a,b;
   ii. MOVE LOC,R1
   iii. ADD(A),R2

   b) *Differentiate between RISC and CISC.* 5

   c) Show the stages of pipelining with a diagram and describe them. 5

3. a) How are S and C calculated in a Carry Save Adder? Add the numbers 111, 101, and 100 using a Carry Save Adder. 2+3

   b) Write advantages of Booth's algorithm. Multiply -3 with -2 using Booth's algorithm. 2+3

   c) Draw the circuit for restoring division. 5

4. a) Show fixed point number representation with example. What is IEEE 754? 4+1

   b) When do data hazards occur? Explain how to resolve data hazards. 2+3

   c) What is the advantage of superscalar operations compared to pipelining? Show the basic principle of a systolic array by a diagram. 2+3

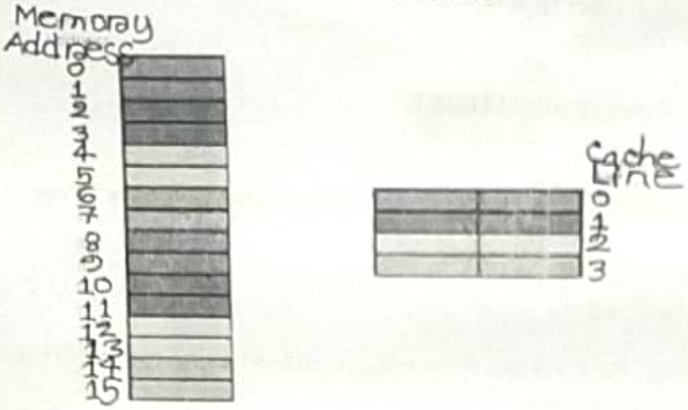
Section B

Answer any THREE

1. a) Draw the flowchart of a cache read operation. 5

b) What are tag bits? How are tag bits determined in direct mapping? 2+3

c) Consider the following figure; the cache has two byte blocks and each block has 2^1 bytes. Now calculate: 5
i. memory address 8 corresponds to which memory block?
ii. the calculated memory block would be mapped into which cache line?



2. a) How does the out-of-order execution approach work? 5

b) What type of processors use this register renaming approach? Perform register renaming: 2+3

R1 ← M[1024]
R1 ← R1 + 2
M[1032] ← R1
R1 ← M[2048]
R1 ← R1 + 4
M[2056] ← R1

c) What is the purpose of the multithreading approach? Mention the names of different multithreading. 2+3

3. a) How does interrupt overcome the limitation of programmed I/O? How does the processor determine which one to process, if multiple interrupts occur? 2+3

b) What is meant by bus arbitration? How does distributed arbitration choose a bus master? 2+3

c) Why is the daisy chain considered as a more efficient method? 5

4. Write short note on any two of the followings: 7.5x2
i. Bus structure
ii. Direct Memory Access
iii. Branching

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B.Sc. (Engineering) in CSE
Mid Term Examination 2020 (Jul-Dec)
Level 2 Semester II, Course Code: CSE 259, Credit: 3.0
Course Title: Computer Architecture and Organization

Time: 50 Minutes **Marks: 30**

1. What is structural hazard? Explain how to resolve data hazard? 10
2. How does associative mapping overcome the disadvantage of direct mapping? 10
   How is set associative mapping expressed?
3. Define out-of-order execution. Show register renaming by an example. 10

Hajee Mohammad Danesh Science and Technology University, Dinajpur
Department of Electronics and Communication Engineering
B. Sc. (Engineering) in Computer Science and Engineering
Level 2 Semester II, Final Examination 2020
Course Code: ECE 259, Credit: 3.0
Course Title: Digital Electronics and Pulse Techniques

Time: 3.0 hours | Total Marks: 90

Separated answers of a question is not allowed

Section – A

Answer any three of the followings

1. a) Sketch the general sweep voltage waveform and sawtooth voltage waveform of voltage time-base generator. 3
   b) What is multivibrator? Define different type of multivibrators with each output waveform. 1+3=4
   c) Draw and discuss the circuit diagram of astable multivibrator and sketch the output waveform of astable multivibrator and determine the frequency of the output waveform. 4+1+3=8

2. a) What problem is raised in comparator circuit when noisy sinusoidal waveform is applied? 3
   b) Draw the circuit diagram of current time-base generator and sketch the input-output waveform. 4+1=5
   c) Draw the circuit diagram of inverting schmitt trigger circuit and sketch the output waveform for noisy sinusoidal waveform. 5+2=7

3. a) Define peak-to-peak value, DC-level, duty cycle of a signal. 1+1+1=3
   b) Draw a circuit diagram of a parallel negative clipper circuit with negative reference voltage and sketch the output waveform for a sinusoidal input with peak value $V = +15$ volts, assuming that reference voltage, $V_r = -5$ volts. 3+3=6
   c) Draw a circuit diagram of a positive clamper circuit with negative reference voltage and sketch the output waveform for a sinusoidal input with positive peak value $V_1 = +5$ volts and negative peak value $V_2 = -15$ volts, assuming that reference voltage, $V_r = -10$ volts. 3+3=6

4. a) What is wave shaping and non-sinusoidal waveform? 1+1=2
   b) Prove that for the same input, the output of ~~low~~ high pass RC and high pass RL filter will be the same if $RC = {}^{L}/_{R'}$. Assume that the initial conditions are those of rest (no voltage on C and no current in L) and R' is the resistor of high pass RL filter. 6
   c) Determine the response of high pass RC filter for the exponential waveform input and sketch the input-output waveform. 7

Section – B

Answer any three of the followings

1. a) Write the limitations of weighted-resistor DAC over R2R ladder DAC. 2

   b) Design a combinational circuit using PLA for the following Boolean functions. 6

   $$Y_1 = \sum m(4,5,7) \text{ and } Y_2 = \sum m(3,5,7)$$

   c) Draw the circuit diagram of 3-bit weighted-resistor D/A converter and determine the output if the following bit sequence is used as input. 3+4=7

   1 0 1 1 1 0 1 1 1 0 0 0 0 0 1

2. a) Write the principle reasons for the widespread use of digital techniques and systems. 4

   b) Define switch. Mention the different type of switches and explain the advantages of semiconductor switch. 1+2+2=5

   c) Draw a 3-input DTL NAND gate and calculate (i) fan-out, (ii) noise-margins and (iii) average power dissipation of the gate. The diode and transistor parameters are: voltage across a conducting diode = 0.7 volts, cut-in voltage of diode $V_\gamma = 0.6$ volts, cut-in voltage of transistor $V_\gamma = 0.6$ volts, $V_{BE,sat} = 0.8$ volts, $V_{CE,sat} = 0.2$ volts and $h_{FE} = 30$. 3+3=6

3. a) Explain how can a transistor be used as a switch? 4

   b) Discuss the logic operation of 2-input RTL NOR gate and determine the noise margin of the circuit for $h_{FE} = 10$. 3+2=5

   c) Design a 3-input CMOS NOR gate and summarized the output values for all possible inputs with mentioning the state of each transistors. 6

4. a) Draw and discuss the circuit diagram of CMOS transmission gate. 2+2=4

   b) Discuss the current hogging problem of DCTL. 5

   c) Draw the circuit diagram of 3-input TTL NAND gate and discuss its logical operation with mentioning the state of each transistor. 3+3=6

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B. Sc. (Engineering) in Computer Science and Engineering
Level 2 Semester II, Mid-term Examination 2020
Course Code: CSE 259, Credit: 3.0
Course Title: Digital Electronics and Pulse Techniques

Time: 50 minutes

Total Marks: 30

1. a) Define noise immunity and noise margin. 1+1=2
   b) Which logic family is faster than other logic families and why? 1+2=3
   c) Explain how a diode can be used as a switch. 5
   d) Design and verify a 3-input OR gate using DRL technology. 5

2. a) Define figure of merit, current source logic, fan-in and fan-out. 4×1=4
   b) Explain why wire-logic is not used for CMOS logic circuit. 5
   c) How can increased the fan-out of DTL NAND gate and draw the circuit diagram of modified integrated DTL NAND gate. 1+5=6

Hajee Mohammad Danesh Science and Technology University, Dinajpur
Department of Electronics and Communication Engineering
B. Sc. (Engineering) in Computer Science and Engineering
Level 2 Semester II, Quiz I, II and III 2020
Course Code: CSE 259, Credit: 3.0
Course Title: Digital Electronics and Pulse Techniques

Time: 25 minutes

Total Marks: 15

1. What are clipper circuit and clamper circuit? Write the applications of clipper and clamper circuit. 5
2. Draw a circuit diagram of a series positive clipper circuit with negative reference voltage and sketch the output waveform for a sinusoidal input with peak value $V = 15$ volts, assuming that reference voltage, $V_r = -5$ volts. 5
3. Draw a circuit diagram of a positive clamper circuit with negative reference voltage and sketch the output waveform for a sinusoidal input with positive peak value $V_1 = +5$ volts and negative peak value $V_2 = -15$ volts, assuming that reference voltage, $V_r = -10$ volts. 5

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Department of Computer Science and Engineering

B. Sc. (Engineering) in Computer Science and Engineering

Level 2, Semester II, Semester Final Examination 2020

Course Code: ECE 260, Credit: 0.75

Course Title: Digital Electronics and Pulse Techniques (Sessional)

Time: 45 Minutes

Marks: 15

Name of the experiment: Design a 5-bit R-2R ladder D/A converter and determine the output of the converter using Circuit Maker assuming that output is bipolar.

Quiz (29/07/19)

Total-15

1. Show a schematic diagram of an ICE engine and labelling the each components in it.
2. List the characteristics of good refrigerant. Also mention some commonly used refrigerants.
3. Briefly discuss the following terms with neat sketch: statically indeterminate reactions, partial constraints and improper constraints.

Hajee Mohammad Danesh Science and Technology University, Dinajpur

B.Sc. in CSE Level 2, Semester II (July-December) Examination 2020

Course Title: Financial and Managerial Accounting

Full Marks: 60 Course Code: ACT 205 Time: 2 Hours

The figures in the right margin indicate the marks for respective questions. Different parts of a question, if any, should be answered sequentially.

USE SEPARATE SCRIPT FOR ANSWERING EACH SECTION

SECTION # A

Answer any two

1. (a) Define Accounting and discuss the nature of Accounting Information. 7
   (b) Discuss the qualitative characteristics of accounting information. 8

2. Dolly Parton opened a law office. Dolly Parton, Attorney at Law, on July 1, 2020.On July 31, the balance sheet showed Cash Tk. 4,000, Accounts Receivable Tk.1,500, Supplies Tk.500, Office Equipment Tk.5,000, Accounts Payable Tk.4,200, and Dolly Parton, Capital Tk.6,800. During August the following transactions occurred. 15

   1. Collected Tk. 1,400 of accounts receivable.
   2. Paid Tk. 2,700 cash on accounts payable.
   3. Earned revenue Tk. 7,500 of which Tk. 3,000 is collected in cash and the balance is due in September.
   4. Purchased additional office equipment for Tk. 1,000, paying Tk. 400 in cash and the balance on account.
   5. Paid salaries Tk. 2,500, rent for August Tk. 900, and advertising expenses Tk. 350.
   6. Withdrew Tk. 550 in cash for personal use.
   7. Received Tk. 2,000 from Standard Chartered Bank-money borrowed on a note payable.
   8. Incurred utility expenses for month on account Tk. 250.

   Required:

   a. Prepare a tabular analysis of the August transactions beginning with July 31 balances. The column headings should be as follows: Cash + Accounts Receivable + Supplies + Office Equipment = Notes Payable + Accounts Payable + Dolly Parton, Capital.
   b. Prepare an income statement for August, and a Balance Sheet at August 31, 2020.

3. Mr. Shahnawaz Ahmed opened the Campus Laundromat on July 1, 2020. During the first month of operations the following transactions occurred: 15

July 1	Invested Tk. 2,00,000 cash in the business.
July 2	Paid Tk. 5,000 cash for store rent for the month of July.
July 3	Purchased Washers and dryers for Tk. 25,000, paying Tk.10,000 in cash and signed a note payable for the remaining balance.
July 4	Paid Tk. 12,000 for one-year accident insurance policy.
July 10	Received bill from the Daily News for advertising the opening of the shop Tk. 2,000.
July 20	Withdrew Tk. 7,000 cash for personal use.
July 30	Determined that cash receipts for computer services for the month were Tk. 22,000.

   Required:

   a. Journalize the July transactions.
   b. Open Ledger accounts and post the July transactions.

SECTION # B

Answer any two

1. (a) What is meant by managerial accounting? 5
   (b) Contrast between financial and managerial accounting. 5
   (c) "A variable cost is a cost that varies per unit of product, whereas a fixed cost is constant per unit of product." Do you agree? Explain. 5

2. The administrator of Azalea Hills Hospital would like a cost formula linking the administrative costs involved in admitting patients to the number of patients admitted during a month. The Admitting Department's costs and the number of patients admitted during the immediately preceding eight months are given in the following table: 15

Month	Number of Patients Admitted	Admitting Department Costs
May	1,800	Tk. 14,700
June	1,900	Tk. 15,200
July	1,700	Tk. 13,700
August	1,600	Tk. 14,000
September	1,500	Tk. 14,300
October	1,300	Tk. 13,100
November	1,100	Tk. 12,800
December	1,500	Tk. 14,600

Required:

Use the high-low method to estimate the fixed and variable components of admitting costs.

3. Hermann Company manufactures and sells a single product. The company's contribution format income statement for the most recent year is given below: 15

Details	Total	Per Unit
Sales (15,000 Units)	Tk. 4,50,000	Tk. 30
Less Variable expenses	1,80,000	12
Contribution margin	2,70,000	18
Less fixed expenses	2,16,000	
Net operating income	54,000	

Management is anxious to improve the company's profit performance and has asked for an analysis of a number of items.

Required:

(a) Compute the company's CM ratio and variable expense ratio.
(b) Compute the company's break-even point in both units and sales Taka. Use the equation method.
(c) Assume that sales increase by Tk. 1,00,000 next year. If cost behavior patterns remain unchanged, by how much will the company's net operating income increase? Use the CM ratio to determine your answer.
(d) Refer to the original data. Assume that next year management wants the company to earn a minimum profit of Tk. 72,000. How many units will have to be sold to meet this target profit?

DEPARTMENT OF ACCOUNTING, HSTU.
B. Sc. in CSE, Level 2, Semester II (July-Dec.) 2020
Course Title: Financial and Managerial Accounting
Course Code: ACT 205
Mid-Semester Examination

Full Marks: 20 Time: 50 Minutes

Answer any two of the following questions:

1. (a) Define Accounting and discuss the nature of Accounting Information. 5
   (b) Who are the users of Accounting Information? And why do they use? 5

2. Dolly Parton opened a law office. Dolly Parton, Attorney at Law, on July 1, 2020.On July 31, the balance sheet showed Cash Tk. 4,000, Accounts Receivable Tk.1,500, Supplies Tk.500, Office Equipment Tk.5,000, Accounts Payable Tk.4,200, and Dolly Parton, Capital Tk.6,800. During August the following transactions occurred. 10

August 1	Collected Tk. 1,400 of accounts receivable.
August 3	Paid Tk. 2,700 cash on accounts payable.
August 6	Earned revenue Tk. 7,500 of which Tk. 3,000 is collected in cash and the balance is due in September.
August 8	Purchased additional office equipment for Tk. 1,000, paying Tk. 400 in cash and the balance on account.
August 11	Paid salaries Tk. 2,500, rent for August Tk. 900, and advertising expenses Tk. 350.
August 15	Withdrew Tk. 550 in cash for personal use.
August 18	Received Tk. 2,000 from Standard Chartered Bank-money borrowed on a note payable.
August 21	Incurred utility expenses for month on account Tk. 250.

Required:

Prepare a tabular analysis of the August transactions beginning with July 31 balances. The column headings should be as follows: Cash + Accounts Receivable + Supplies + Office Equipment = Notes Payable + Accounts Payable + Dolly Parton, Capital.

3. Voltar Company manufactures and sells a specialized cordless telephone for high electromagnetic recitation environments. The company's contribution format income statement for the most recent year is given below: 10

Details	Total	Per Unit	Percent of Sales
Sales (20,000 Units)	12,00,000	60	100%
Less Variable expenses	9,00,000	45	?%
Contribution margin	3,00,000	15	?%
Less fixed expenses	2,40,000		
Net operating income	60,000		

Management is anxious to improve the company's profit performance and has asked for an analysis of a number of items.

Required:

i) Compute the company's CM ratio and variable expense ratio.
ii) Compute the company's break-even point in both units and sales taka. Use the equation method.
iii) Assume that sales increase by Tk. 4,00,000 next year. If cost behavior patterns remain unchanged, by how much will the company's net operating income increase? Use the CM ratio to determine your answer.
iv) Refer to the original data. Assume that next year management wants the company to earn a minimum profit of Tk. 90,000. How many units will have to be sold to meet this target profit?

CSE-254 (Java sessional)

1.	Write a java program to build a simple calculator that can perform addition , division if the numbers are prime, and perform subtraction, multiplication if the numbers are not prime. Must follow the OOP fashion to solve the problem.	15
2.	Write a java program to illustrate an example of method **overloading** and method **overriding in** Java .	15
3	Implement exception handling example in java that can handle Arithmetic and Input Mismatch Exception	15