Course Code: CSE251   Course Title: Algorithm Design and Analysis
Total Marks: 60   Time: 3 (Three) Hours
N.B.
i.   Answer SIXquestions taking any THREE from each section.
ii. All questions are of equal values.
iii. Use separate answer script for each section.

Section: A

1. a) Explain the asymptotic upper, lower and tight bounds of an algorithm.   3
    b) Find out the time complexity for the following code snippet: 2
```
sum = 0;
for (k=1; k<=n; k*=2)
    for (j=1; j<=n; j++)
        sum++;
```
    c) How can you check whether figure Q(1a) has a cycle and whether figure Q(1b) is a bipartite   5
       graph or not?Show the necessary steps.
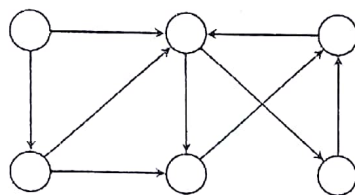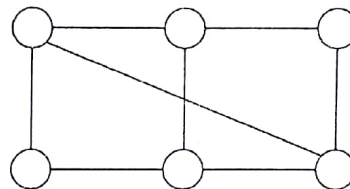

Figure Q(1a)   Figure Q(1b)

2. a) Compute the minimum number of scalar multiplicationsfor the matrix chain multiplication   5
       of A_1, A_2, A_3 and A_4 with dimensions 15 X 5, 5 X 50, 50X 20 and 20 X 10 respectively. Also,
       show the ordering of the matrices for the desired minimum number of scalar multiplications.
    b) Find out the optimal solutions using matrix chain multiplication. Where dimension of matrixes are: 5
       A1 = 10 X 100
       A2 = 100 X 5
       A3 = 5 X 50
       A4 = 50 X 1

3. a) An Internet Service Provider (ISP) wants to cover an area with broadband internet. The   4
       probable connectivity of the houses and ISP is given in figure Q(3a). The number above the
       connecting edge indicates the cost of connection. Find out the minimum cost of connection
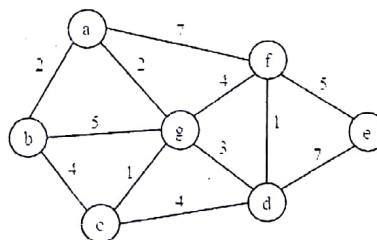   that covers all the houses.

Figure Q(3a)

    b) Define and explain augmented path and residual network.   1
    c) An engineer in an oil factory wants to flow oil from the source S to sink Tin the figure   5
       Q(3b).What should be the maximum flow in the network?
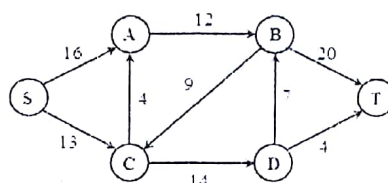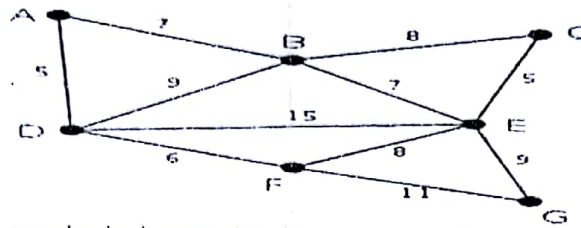

Figure Q(3b)

4. a) Define transitive closure of a graph. 1
    b) Find out the shortest path using prim's algorithm for the following figure 4

    c) Apply the topological sort algorithm on the following graph figure Q(4b) and show the 5
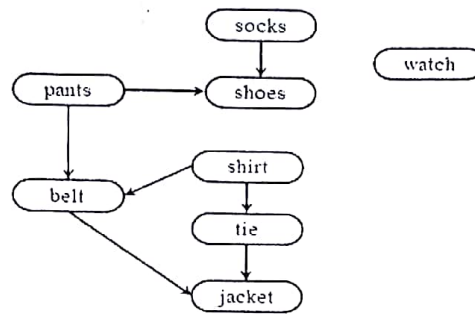   topological ordering.

Figure Q(4b)

Section: B

5. a) What is a state-space tree? Solve the following instance of the 0/1 knapsack problem using 5
        the branch & bound approach with a state-space tree. Assume that the knapsack capacity
        is 10.

Item	Weight	Value
1	7	42
2	4	40
3	3	12
4	5	25

    b) Solve the 8-puzzle problem using branch & bound approach. 5

2	3	
1	4	5
7	8	6

6. a) Definition: NP problem, NP-hard problem. 2
    b) Given 4 positive integers $w_1 = 3$, $w_2 = 4$, $w_3 = 5$, $w_4 = 6$ and a positive integer S=13. Find all 4
        subsets of w_1 to w_4 that sum to S.
    c) What is dynamic programming? What are the differences between dynamic programming 4
        and divide & conquer?

7. a) Define path, tree and forest. 1
    b) Write a linear-time algorithm and an exponential-time algorithm for finding the nth 4
        Fibonacci number. Analyze the time-complexity of each algorithm.
    c) Solve the 4-queens problem using backtracking. 5

8. a) What are the line segment properties? How can we determine them? 5
    b) Prove that if edge (u, v) is the lightest among all edges, (u, v) is in a Minimum Spanning 2
        Tree.
    c) Write down the greedy algorithm for fractional knapsack problem. 3

Bangabandhu Sheikh Mujibur Rahman Science and Technology University
Department of Computer Science & Engineering
2nd Year 2nd Semester B.Sc. Engineering Examination-2018

Course No: LAW 255   **Course Title: Cyber and Intellectual Property Law**
Full Marks: 60
Time: 3 hours

N.B.
i) Answer **SIX** questions, taking any **THREE** from each section.
ii) All questions are of equal values.
iii) Use separate answer script for each section.

SECTION-A (30 Marks)

Q.1   Define cybercrime. Critically analyze the objectives of the information and   10
communication technology act, 2006.

Q.2   What do you mean by hacking? Write down the punishments prescribed for hacking   10
provided in the information and communication technology act, 2006.

Q.3   What is patent? What conditions must be met to obtain patent protection? Discuss the   10
rights of a patent.

Q.4   Write short notes on (any two):   10
      i.   Passing off
     ii.   Infringement of patent
    iii.   Infringement of copyright

SECTION-B (30 Marks)

Q.5   Write the advantages and disadvantages of cyber law. Discuss the use of digital   10
signature in E-Commerce.

Q.6   Write the main features of trade mark. Describe the main points about trade names.   10

Q.7   Describe the main features of intellectual property. Which rights the intellectual   10
property owner have?

Q.8   Discuss the constitution, jurisdiction and procedure of cyber tribunal.   10

Bangabandhu Sheikh Mujibur Rahman Science and Technology University
Department of Computer Science & Engineering
2nd Year 2nd Semester B.Sc. Engineering Final Examination-2018

Course Title: Industrial Management and Accountancy   Course Code: AIS255
Time: 3 Hours   Total marks: 60

N.B.
i) Answer 06 (Six) questions taking any 03 (Three) from each section.
ii) All questions are of equal values.
iii) Use separate answer script for each question.

Section- A

1. Cindy Godfrey started his own delivery service, Godfrey Deliveries, on June 1. 2010.The following transactions occurred during the month of June.

    June 1: Cindy invested $10,000 cash in the business.
    2: Purchased a used van for deliveries for $12,000. Mark paid $2,000 cash and signed a note payable for the remaining balance.
    3: Paid $500 for office rent for the month.
    5: Performed $4,400 of services on account.
    9: Withdrew $200 cash for personal use.
    12: Purchased supplies for $150 on account.
    15: Received a cash payment of $1,250 for services provided on June 5.
    17: Purchased gasoline for $100 on account.
    20: Received a cash payment of $1,500 for services provided.
    23: Made cash payment of $500 on the note payable.
    26: Paid $250 for utilities.
    29: Paid for the gasoline purchased on account on June 17.
    30: Paid $1,000 for employee salaries.

    a) Show the effects of the previous transactions on the accounting equation using the following columns. The column headings should be as follows: 07
    Cash _Accounts Receivable _Supplies _Van _ Notes Payable _ Accounts Payable _ Cindy Godfrey, Capital_Cindy Godfrey.Drawings _ Revenues _ Expenses.

    b) Prepare an income statement for the month of June.   03

2. a) Describe the purposes of Accounting.   02
    b) Classify Adjusting entries.   02
    c) Piper Company accumulates the following adjustment data at December 31.   06
    1. Services provided but not recorded total $750.
    2. Store supplies of $300 have been used.
    3. Utility expenses of $225 are unpaid.
    4. Unearned revenue of $260 has been earned.
    5. Salaries of $900 are unpaid.
    6. Prepaid insurance totaling $350 has expired.
    Instruction: Prepare the adjusting entries at the date of December 31.

3. Maria Juarez is a licensed dentist. During the first month of the operation of her business. the following events and transactions occurred.
    April 1 Invested $40,000 cash.
    1 Hired a secretary-receptionist at a salary of $600 per week payable monthly.
    2 Paid office rent for the month $1,000.
    3 Purchased dental supplies on account from Smile Company $4,000.

10 Provided dental services and billed $5,100.

11 Received $1,000 cash advance from Trudy Borke for an implant.

20 Received $2,100 cash for services completed and delivered to John Stanley.

30 Paid secretary-receptionist for the month $2,400.

30 Paid $1,600 to Smile Company for accounts payable due.

a) Journalize the transactions. 05

b) Post to the ledger accounts. Prepare the following account - Cash, Capital. Salary 05
Expense, Service Revenue, Accounts Payable.

4. a) What are the features of joint stock company? 05

b) Prepare a Trial Balance from the following information. 05

Wareen Roofing

For the Month Ended March 31, 2017

Cash	4,500
Accounts Receivables	3,200
Supplies	2,000
Equipment	9,750
Accounts Payable	2,500
Unearned Service Revenue	550
Owner's Capital	12,900
Owner's Drawings	1,100
Service Revenue	6,300
Salaries and Wages Expense	1,300
Miscellaneous Expense	400

Section- B

5. a) Define Sole Proprietorship Business. 02

b) What are the characteristics of Sole Proprietorship? 04

c) What are the necessary strategies that enable a sole proprietorship business to survive? 04

6. a) What is business? 02

b) Briefly discuss the features of business transaction. 04

c) Describe the factors to be considered for starting a new business. 04

7. a) What are the essential elements of Partnership Business? 03

b) Describe the disadvantages of Partnership Business. 04

c) Differentiate between Sole Proprietorship and Partnership Business. 03

8. Write short notes (any five): 10

a) The steps of recording process

b) Expanded Accounting Equation

c) The Account

d) GAAP

e) Classification of Trade

f) Business Environment

g) Industry

Bangabandhu Sheikh Mujibur Rahman Science and Technology University
Department of Computer Science & Engineering
2nd Year 2nd Semester B.Sc. Engineering Examination-2018

Course No: LAW 255   Course Title: Cyber and Intellectual Property Law
Full Marks: 60
Time: 3 hours

SECTION-A (30 Marks)

Q.1 Define cybercrime. Critically analyze the objectives of the information and communication technology act, 2006.   10

Q.2 What do you mean by hacking? Write down the punishments prescribed for hacking provided in the information and communication technology act, 2006.   10

Q.3 What is patent? What conditions must be met to obtain patent protection? Discuss the rights of a patent.   10

Q.4 Write short notes on (any two):   10
    i.   Passing off
    ii.   Infringement of patent
    iii. Infringement of copyright

SECTION-B (30 Marks)

Q.5 Write the advantages and disadvantages of cyber law. Discuss the use of digital signature in E-Commerce.   10

Q.6 Write the main features of trade mark. Describe the main points about trade names.   10

Q.7 Describe the main features of intellectual property. Which rights the intellectual property owner have?   10

Q.8 Discuss the constitution, jurisdiction and procedure of cyber tribunal.   10

Bangabandhu Sheikh Mujibur Rahman Science and Technology University
Department of Computer Science & Engineering
2nd Year 2nd Semester B.Sc. Engineering Examination-2018

Course No: CSE 255   Course Title: Theory of Computing
Full Marks: 60   Time: 3 hours
N.B.
i) Answer SIX questions, taking any THREE from each section.
ii) All questions are of equal values.
iii) Use separate answer script for each section.

SECTION-A (30 Marks)

Q.1 (a) The following is the state diagrams of a DFA M_1 2
Answer the following questions about the machine.
(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) Design a DFA M with alphabet L = (0, 1, 2, 3, R}, which recognizes the language A.   4
The language A is the set of all strings where the sum of the numbers is a multiple of
3, except that the sum is reset to 0 whenever the symbol R appears. Only a
diagrammatic description of M should suffice.

(c) Prove that every NFA has an equivalent DFA.   4

Q.2 (a) Write short notes on "YACC parser generator".   4
(b) Convert the grammar   6
    S -> 0s1 | A
    A -> 1A0 | S | ε
    To a PDA that accepts the languages by empty stack.

Q.3 (a) What is the finite automata? Discuss the benefits of using the concept of automata   5
theory in the software industries.
(b) Mention the areas of CSE where the concept of theory of computing is applied.   2
(c) Define alphabet, language and problem with examples.   3

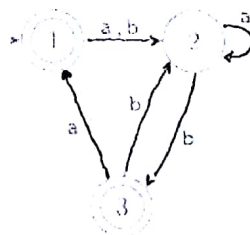Q.4 (a) Why is the Kleene star of a null set an empty string? Explain clearly.   3
(b) Construct an NFA that recognizes the language (01 U 001 U 010)*.   4
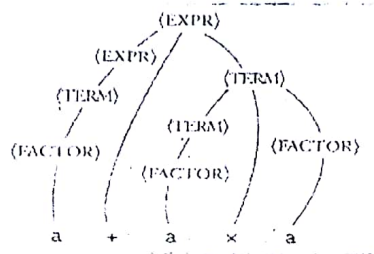(c) Convert the following DFA into Regular expression.   3

Q.5 (a) **Formally Define CFG.**   3
When working with context-free grammars, it is often convenient to have them in simplified form. What is the one of the simplest and most useful forms? Define it.

(b) Give a context-free grammar that generates the following parse tree. You only need to   3
write the production rules using conventional notation.

(c) Give context-free grammars that generate the following languages (any **two**). You   2+2
only need to write the production rules using conventional notation.
In all parts, the alphabet Σ is $\{0, 1\}$.
(i) $\{w \mid w$ starts and ends with the same symbol$\}$
(ii) $\{w \mid$ the length of w is odd and its middle symbol is a $0\}$
(iii) $\{w \mid w = w^R$, that is, w is a palindrome$\}$

Q.6 (a) A TM is given as, $M = (\{q1, q2, q3\}, \{0,1\}, \{0, 1, B\}, \Omega, q1, B, \{q2\})$ 6
Where Ω consists of the rules:
$\Omega(q1,1) = (q3, 0, R)$
$\Omega(q3,0) = (q1, 1, R)$
$\Omega(q3,1) = (q2, 0, R)$
$\Omega(q3,B) = (q3, 1, L)$
Write the codes for TM

(b) What the advantages of TM to solve the problem of Undecidability?   4

Q.7 (a) How can we recognize the left end of the tape of a Turing machine? Explain.   2
(b) Answer the following questions, and explain your reasoning: 8
(i) Can a Turing machine ever write the blank symbol on its tape?
(ii) Can the tape alphabet Γ be the same as the input alphabet Σ?
(iii) Can a Turing machine's head ever be in the same location in two successive steps?
(iv) Can a Turing machine contain just a single state?

Q.8 (a) Illustrate the relationship among classes of languages.   2
(b) Prove that $A_{TM} = \{<M, w> \mid M$ is a Turing machine accepting $w\}$ is not decidable.   8

2

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