

**Bangabandhu Sheikh Mujibur Rahman Science and Technology University**

Department of Computer Science & Engineering  
2<sup>nd</sup> Year 2<sup>nd</sup> Semester B.Sc. Engineering Examination-2021

**Course Title: Industrial Management and Accountancy**  
Full Marks: 60

**Course No: ACC255**  
**Time: 3 hours**

**N.B.**

- i) Answer any **THREE (3)** questions from each Section.
- ii) All questions are of equal values.

**Section – A (30 Marks)**

- Q.1 (a) Why accounting is considered as an Information systems? 4
- (b) What are the branches of Accounting? 3
- (c) Explain the Extended Equation of Accounting. 3
- Q.2 Mr. Berney is a tax lawyer and started his own law firm, Fare Consulting, on June 1, 2010. The following transaction occurred during the month of June.  
June 1: Mr. Berney invested \$75,000 cash in the business.  
2: The company borrowed \$10,000 cash from the bank on a note.  
7: Purchased computer equipment for \$50,500 on cash.  
11: Received a cash payment of \$4,000 for service performed.  
14: Performed \$3,000 of services on account.  
15: Employee service received in operating the business to date were paid in cash \$3,200.  
19: The firm paid \$4,500 on the note to the bank.  
19: The firm paid \$50 as interest expense.  
31: Client of June 14 paid \$1,000 of the amount they owe the company.

**Instructions:**

- (a) Prepare a tabular analysis of the transactions, using the following column. 6  
Heading: Cash, Accounts Receivable, Office Equipment, Notes Payable, Berney's capital, Berney's Drawings, Revenues and Expenses
- (b) Prepare the Income Statement. 2
- (c) Prepare the Balance Sheet. 2
- Q.3 (a) Define Adjusting Entries. 2
- (b) What are the types of Adjusting Entries? 4
- (c) Okabe Company accumulates the following adjustment data at October 31. 4  
1. Services provided but not recorded total \$750  
2. Store supplies of \$300 have been used.  
3. Okabe Company signed a \$20,000; 3-month note payable on October 1, The note requires Okabe to pay interest at an annual rate of 12%.  
4. Utility expenses of \$225 are unpaid.  
5. Unearned revenue of \$260 has been earned.  
6. Salaries of \$900 are unpaid.  
7. Prepaid insurance totaling \$350 has expired.

**Instruction:**

Prepare the adjusting entries at the date of October 31.

- Q.4 Mr. Solaiman opened a new business named Solaiman Trading. During the first month of the operation of his business, the following events and transactions occurred.

April 1 Invested \$50,000 cash  
 1 Place an order for purchasing equipment's of \$3,400.  
 2 Paid utilities for the month \$2,000.  
 3 Purchased supplies on account from Care company \$3,000.  
 10 Provided dental services and billed \$6,100.  
 11 Received \$2,000 cash advance for service to be provided by the next month.  
 20 Received \$3,100 cash for services completed and delivered.  
 30 Paid \$3,400 for purchasing equipment as per the order.  
 30 Paid \$2,600 to Care company for accounts payable due.

- (a) Journalize the transactions. 5  
 (b) Post to the ledger accounts. Prepare the following account – 5  
 Cash, Capital, Salary Expense, Service Revenue, Accounts Payable

### Section – B (30 Marks)

- Q.5 (a) What is account? 2  
 (b) Write about GAAP. 2  
 (c) Prepare a Trial Balance from the following information. 6

Brooklyn Inc.  
 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	750
Owner's Capital	12,900
Owner's Drawing	1,100
Service Revenue	6,300
Salaries and Wages Expense	1,300
Miscellaneous Expense	400
Interest	100
Tax	100
Depreciation – Equipment	200
Reserve Fund	5,000
Rent Expense	1,800
Furniture	2,500
Depreciation Furniture	500

- Q.6 (a) Define Business, commerce and industry. 3  
 (b) Why sole proprietorship is more popular than other business organizations? 3  
 (c) Discuss the procedures for the termination of partnership. 4
- Q.7 (a) What is business? What factors to be considered for starting a new business? 5  
 (b) Write about the Fayol's Fourteen Principles of Management? 5
- Q.8 (a) Classify partners in the perspective of Partnership business. 5  
 (b) What are the advantages and disadvantages of Partnership business? 5

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**2<sup>nd</sup> Year 2<sup>nd</sup> Semester B.Sc. Engineering Final Examination-2021**

Course No.: CSE253  
Full Marks: 60

Course Title: Introduction to Digital Systems  
Time: 3 Hours

*[Answer any Six questions taking Three from each section]*

**Section A (30 Marks)**

- |     |   |   |
|-----|---|---|
| Q.1 | (a) Design basic gates with diode and transistor.                                   | 5 |
|     | (b) Explain CMOS gate with an example.  | 3 |
|     | (c) What do you mean by Fan-Out and Fan-In give examples..                          | 2 |
| Q.2 | (a) What is propagation delay? Explain propagation delay with figure .              | 3 |
|     | (b) Explain operations of NAND gate latch with truth table and figure.              | 4 |
|     | (c) What is a clock in a digital system? Explain PGT and NGT with figures.          | 3 |
| Q.3 | (a) Design OR and AND gates using diodes only.                                      | 3 |
|     | (b) Design and explain the working principle of NOR gate using a transistor.        | 4 |
|     | (c) Write the applications of TTL circuits.   | 3 |
| Q.4 | (a) Design a D flip-flop from clocked S-R flip-flop? Write the uses of D flip-flop. | 4 |
|     | (b) Explain asynchronous and synchronous Input with examples.                       | 3 |
|     | (c) Design a shift register using D flip-flop.                                      | 3 |

**Section B (30 Marks)**

- |     |  |   |
|-----|--|---|
| Q.5 | (a) Design and explain the working principle of a DAC.                             | 5 |
|     | (b) Explain sampling and quantization with examples.                               | 5 |
| Q.6 | (a) Design a clipper circuit that will clip 2V from a 5 to a -5 sin wave.          | 3 |
|     | (b) Design and explain the working principle of a clamper circuit with an example. | 5 |
|     | (c) What is the clock and trigger of a digital circuit?                            | 2 |
| Q.7 | (a) Describe astable, monostable and bistable multivibrator with circuit diagram.  | 4 |
|     | (b) Write a note on Binary Ripple Counter how you design it with flip-flop.        | 6 |
| Q.8 | (a) illustrate applications of shift registers?                                    | 5 |
|     | (b) Explain synchronous and asynchronous Counters with examples.                   | 5 |

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**2<sup>nd</sup> Year 2<sup>nd</sup> Semester B.Sc. Engineering Final Examination-2021**

Course No.: CSE251

Full Marks: 60

Course Title: Algorithm Design and Analysis  
Time: 3 Hours

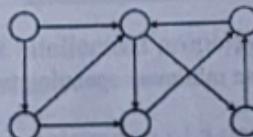
*[Answer any Six questions taking Three from each section]*

**SECTION-A (30 Marks)**

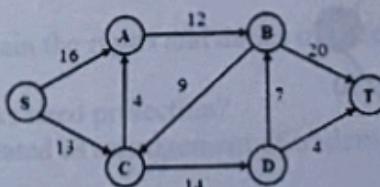
1. a) Write down the Huffman codes algorithm and apply for the following example 3  
A (80) B (25) C (120) D (115) E (50) F (55) G (45) H (75).  
b) Compute the minimum number of scalar multiplications for the matrix chain multiplication of  $A_1, A_2, A_3$  and  $A_4$  with dimensions  $15 \times 5, 5 \times 50, 50 \times 20$  and  $20 \times 10$  respectively. Also, show the ordering of the matrices for the desired minimum number of scalar multiplications. 7
2. a) Find the longest common subsequence of  $X = \{1, 0, 0, 1, 0, 1, 0, 1\}$  and  $Y = \{0, 1, 0, 1, 1, 0, 1, 0\}$  using dynamic programming method. 5  
b) Explain the asymptotic upper, lower and tight bounds of an algorithm. 3  
c) Find out the time complexity for the following code snippet: 2

```
Q ∈ all vertices of G;  
while(Q ≠ ∅)  
    u = ExtractMin(Q);  
    for each v ∈ Adj[u]  
        Relax(v);
```

3. a) Compute worst case running time of quick sort. What are the drawbacks of quick sort and how can we resolve those? 3  
b) What are back edge, forward edge, cross edge and tree edge? Explain with examples. 3  
c) Find the back edge, forward edge, cross edge and tree edge from the following graph. 4



4. a) An engineer in an oil factory wants to flow oil from the source S to sink T in the following figure. What should be the maximum flow in the network? 6



- b) What is dynamic programming? What are the differences between dynamic programming and divide & conquer? 4

**SECTION-B (30 Marks)**

5. a) What are the differences between backtracking and branch & bound? 3  
b) Write a linear-time algorithm and an exponential-time algorithm for finding the  $n$ th Fibonacci number. Analyze the time-complexity of each algorithm. 4  
b) Write down the greedy algorithm for fractional knapsack problem. 3

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**2<sup>nd</sup> Year 2<sup>nd</sup> Semester B.Sc. Engineering Final Examination-2021**

Course No.: MAT255  
 Full Marks: 60

Course Title: Complex Variables and Laplace Transformation  
 Time: 3 Hours

*[Answer any Six questions taking Three from each section]*

**SECTION-A (30 Marks)**

- Q.1 (a) What is the graphical representation of a complex number?  
 Explain modulus and argument of a complex number. 4
- (b) For any complex number  $z_1$  and  $z_2$ , show that  $|z_1 - z_2| \geq |z_1| - |z_2|$ . 2
- (c) State and prove De Moivre's theorem in the complex variable. 4
- Q.2 (a) Prove that, the function  $u = 3x^2y + 2x^2 - y^3 - 2y^2$  is harmonic. Find its harmonic conjugate  $v$  and express  $u + iv$  as an analytic function of  $z$ . 5
- (b) State and prove the Cauchy integral formula for the derivative of an analytic function. 5
- Q.3 (a) State and prove Liouville's theorem. 5
- (b) Show that,  $\oint_C \frac{e^{iz}}{z^2 + 1} dz = 2\pi i \sin t$ , where  $C$  is the circle  $|z| = 3$  and  $t > 0$ . 5
- Q.4 (a) Define residue. State and prove the residue theorem. 5
- (b) Find the residues of  $\frac{z^2 - 2z}{(z+1)^2(z^2 + 4)}$  at all its poles in the finite plane. 5

**SECTION-B (30 Marks)**

- Q.5 (a) Define Laplace transform. Find the Laplace transform of  $e^{3t}(2\cos 5t - 3\sin 5t)$ . 5
- (b) Prove that if  $L\{F(t)\} = f(s)$ , then  $L\{F''(t)\} = s^2 f(s) - sF(0) - F'(0)$ . 5
- Q.6 (a) Determine the Laplace transform  $L\{F(t)\}$  where,  $F(t) = \begin{cases} \cos(t - \frac{2\pi}{3}); & \text{when } t > \frac{2\pi}{3} \\ 0 & ; \text{ when } t \leq \frac{2\pi}{3} \end{cases}$  5
- (b) Define inverse Laplace transform. Evaluate  $L^{-1}\left\{\frac{1}{s^3(s^2 + 4)}\right\}$ . 5

Q.7 (a) Find the inverse Laplace transform of  $\frac{2s+1}{(s+2)^2(s-1)^2}$  5

(b) Evaluate  $L^{-1}\left\{\frac{3}{s^2(s+2)}\right\}$  using the convolution theorem. 5

Q.8 (a) Using Heaviside's expansion theorem evaluate  $L^{-1}\left\{\frac{3s+1}{(s+1)(s-3)}\right\}$ . 5

(b) Solve:  $Y''(t) + 9Y'(t) = \cos 2t$ ,  $Y(0) = 1$ ,  $Y(\frac{\pi}{2}) = -1$ . 5

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Course No.: CSE251

Course Title: Algorithm Design and Analysis

Full Marks: 60

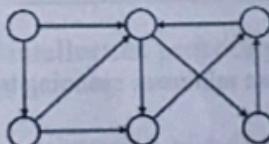
Time: 3 Hours

*[Answer any Six questions taking Three from each section]*

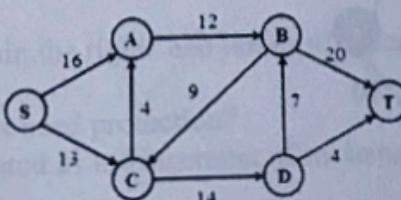
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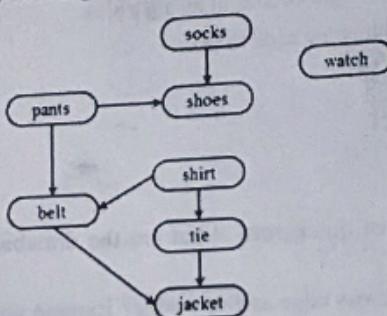
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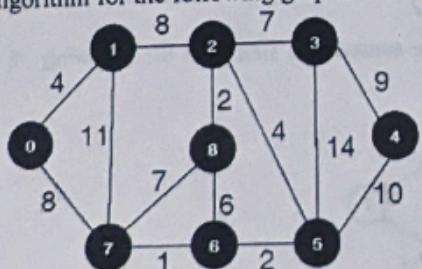
6. a) What is a state-space tree? Solve the following instance of the 0/1 knapsack problem using the branch & bound approach with a state-space tree. Assume that the knapsack capacity is 10. 6

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

- b) Apply the topological sort algorithm on the following graph and show the topological ordering. 4



7. a) What is the problem with Dijkstra algorithm and how bellman ford algorithm overcomes the problem? 3
- b) Solve the recurrence  $T(n) = 3T(\sqrt{n}) + \log n$ . 3
- c) What is minimum spanning tree? Compute minimum spanning tree applying Prim's algorithm for the following graph. 4



8. a) Define path, tree and forest. 3
- b) Solve the 8-puzzle problem using branch & bound approach. 5

2	3	
1	4	5
7	8	6

- c) Prove that subpaths of shortest paths are shortest paths 2

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Course No.: LAW255  
Full Marks: 60

Course Title: Cyber and Intellectual Property Law  
Time: 3 Hours

*[Answer any Six questions taking Three from each section]*

**Section-A (30 Marks)**

- |  |                     |
|--|---------------------|
| 1. a) Define the term 'E-Contract'.<br>b) Write the essential elements of E- Contact.  | 3<br>7              |
| 2. a) Elucidate the object and functions of Bangladesh Press Council.<br>b) What are the major obstacles of ensuring media freedom of Bangladesh? Argue.   | 5<br>5              |
| 3. a) What rights are not available under the Right to Information Act,2009.<br>b) Explain the procedure to obtain information and disposal of information under Right to Information Act, 2009. | 5<br>5              |
| 4. Make short explanatory notes on <b>Any Four</b> of the following:<br>a) Cyber Crime   b) BTRC   c) Cyber Tribunal   d) Cyber Security   e) E-commerce.  | $4 \times 2.5 = 10$ |

**Section-B (30 Marks)**

- |   |        |
|---|--------|
| 5. Explain the importance of intellectual property rights. Clarify the main challenges of intellectual property rights. | 10     |
| 6. a) What are the criteria for registration of a design?<br>b) Describe the procedure for registration of a design.    | 5<br>5 |
| 7. Define Patents. Explain the rights and duties of Patentees.  | 10     |
| 8. a) Why do trademarks need protection?<br>b) Which acts are treated as infringement of trademark?                     | 5<br>5 |

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Course No.: CSE255

Full Marks: 60

Course Title: Theory of Computing

Time: 3 Hours

*[Answer any Six questions taking Three from each section]*

**Section A (30 Marks)**

- Q.1 (a) What do you mean by abstract computing devices? Write some applications of finite automata. 4  
(b) Define languages and grammars with proper examples. 4  
(c) What do you mean by string and power of a string? 2
- Q.2 (a) Differentiate between DFA and NFA. 3  
(b) Write a DFA and a regular expression for a binary string that contains 011 as a substring. 5  
(c) What are the conditions for a language to become regular? 2
- Q.3 (a) Draw a NFA for a binary string that contains 101 as a substring. 3  
(b) Draw DFA and NFA for recognizing the word “Great”. 6  
(c) What did  $\epsilon$ -transitions mean? 1
- Q.4 (a) Design a context free grammar G to generate the language of regular expression  $0^+(\epsilon U 1)0^+$ . Using G, show the derivation of the string 00001000. 3  
(b) Consider the following context free grammar: 4

$$\begin{aligned}S &\rightarrow aTXb \\T &\rightarrow XTS \mid \epsilon \\X &\rightarrow a \mid b.\end{aligned}$$

Convert the CFG to an equivalent push down automaton.

- (c) What is ambiguity? Give an example of an ambiguous context free grammar and explain it. 3

### Section B (30 Marks)

- Q.5 (a) Explain the use of union, concatenation, and Kleene closure operations over a language L. 3
- (b) Write a regular expression for a binary string that does not contain two consecutive 0's or two consecutive 1's anywhere. 2
- (c) Construct a RE, DFA, and CFG for binary strings that start and end with the same symbols. 5
- Q.6 (a) Define context-free grammar. Write some applications of CFG. 4
- (b) Design the following CFG – 6
- i) Can accept only the palindromic binary string.
  - ii) Starts and ends with the different symbols.
- Q.7 (a) Define pushdown automata. Design a pushdown automata for the language  $L = \{1^n 0^n | n \geq 0\}$  4
- (b) Consider the following context-free Grammar G: 3
- $$R \rightarrow XRX \mid S \quad S \rightarrow aTb \mid bTa \quad T \rightarrow XTX \mid X \mid \epsilon \quad X \rightarrow a \mid b$$
- Now answer all the following questions:
- i. What are the variables of G?
  - ii. What are the terminals of G?
  - iii. Which is the start variable of G?
  - iv. Give three strings in  $L(G)$ .
  - v. Give three strings not in  $L(G)$ .
  - vi. Give a description of  $L(G)$ .
- (c) Define ambiguous grammar. What are the conditions for ambiguous grammar? 3
- Q.8 (a) Draw DFA and NFA for recognizing the word "Computer". 6
- (b) Suppose the PDA  $P = (\{p, q, r, s\}, \{0, 1\}, \{0, 1, \$\}, \delta, p, \{s\})$  has the following transition function: 4
- |   |  |
|---|--|
| i. $\delta(p, \epsilon, \epsilon) = \{(q, \$)\}$        | v. $\delta(r, 0, 0) = \{(r, \epsilon)\}$           |
| ii. $\delta(q, 0, \epsilon) = \{(q, 0)\}$               | vi. $\delta(r, 1, 1) = \{(r, \epsilon)\}$          |
| iii. $\delta(q, 1, \epsilon) = \{(q, 1)\}$              | vii. $\delta(r, \epsilon, \$) = \{(s, \epsilon)\}$ |
| iv. $\delta(q, \epsilon, \epsilon) = \{(r, \epsilon)\}$ |  |
- Draw the state diagram for this PDA.