

**Kishoreganj University**  
**2<sup>nd</sup> Year 2<sup>nd</sup> Semester B.Sc. (Engg.) Final Examination-2023**  
**Department of Computer Science and Engineering**  
**CSE 2201: Data Structure and Algorithms-II (3 Credits)**

**Time: 3 Hours**

**Full Marks: 70**

**Instructions**

- Figures shown in the right margin indicate full marks.
- Answer 05 out of 07 questions.

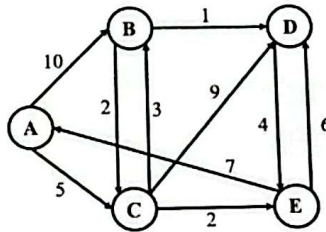
- 1 a. Consider the following matrix  $G$  that represents an undirected weighted graph. In the matrix,  $G[u][v] = w$  represents that there is an edge between  $u$  and  $v$  and the weight of the edge is  $w$  where  $w$  is a positive integer.  $G[u][v] = 0$  indicates that there is no edge between  $u$  and  $v$ .

**G**

|   | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| A | 0 | 8 | 1 | 3 | 0 | 0 |
| B | 8 | 0 | 0 | 3 | 0 | 0 |
| C | 1 | 0 | 0 | 4 | 3 | 1 |
| D | 3 | 3 | 4 | 0 | 2 | 2 |
| E | 0 | 0 | 3 | 2 | 0 | 1 |
| F | 0 | 0 | 1 | 2 | 1 | 0 |

Show all the necessary steps for calculating the minimum spanning tree of  $G$  using Kruskal's algorithm. The figure of the disjoint set must be illustrated that uses union by height and path compression heuristics.

- b. Find the shortest path of each node from vertex-A using Dijkstra's algorithm. Provide necessary illustrations and show all the steps.



- 2 a. Why Relaxing Edges  $(V - 1)$  times gives us Single Source Shortest Path?

2

- b. Justify the following statement with an example.

2+2+1

- (i) Does Bellman-Ford Algorithm work for Undirected graph?
- (ii) How can detect the Negative Weight Cycle of a graph?
- (iii) Bellman-Ford is a greedy algorithm.

- c. Define Transitive Closure with an example

2

- d. Consider the following information to draw a directed weighted graph  $G = V, E$ .

|   | A        | B        | C        | D        |
|---|----------|----------|----------|----------|
| A | 0        | $\infty$ | -3       | $\infty$ |
| B | 5        | 0        | 4        | $\infty$ |
| C | $\infty$ | $\infty$ | 0        | 3        |
| D | $\infty$ | -2       | $\infty$ | 0        |

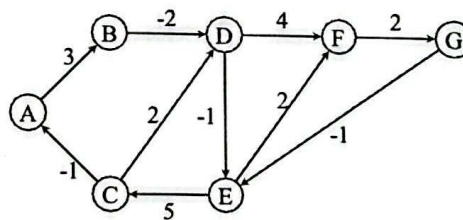
(\*Here,  $\infty$  represents no direct edge between two vertices.\*)

Perform the step-by-step **Floyd-Warshall Algorithm** to compute the final shortest path matrix.

- 3 a. Solve the following instance of 0/1 Knapsack problem using the branch-and-bound approach with a state-space-tree. Assume that the knapsack capacity is 15. 7

| Item | Weight | Value |
|------|--------|-------|
| 1    | 7      | 84    |
| 2    | 6      | 72    |
| 3    | 3      | 90    |
| 4    | 4      | 160   |

- b. Find the shortest path between all pairs of vertices using Johnson's Algorithm for the given graph. 7



- 4 a. Insert the following sequence of integers given in an AVL tree. 7

18 14 12 10 8 6 4 2

Note that, figure of the tree after each insertion and rotation must be illustrated. Height and balance factor for each node must be mentioned in the figures as well.

- b. Construct a Red Black Tree by Inserting following number. 7

10, 85, 15, 70, 20, 60, 30, 50, 65, 80, 90, 40, 5, 55

- 5 a. Why is a Fibonacci heap called a Fibonacci heap? 2

- b. Describe the different types of rotations with proper examples that occur in a Splay Tree. 6

- c. Create a Binomial Heap by inserting the following values: 20, 9, 4, 23, 17, 6, 11, 3, 14, 16, 1, 8, 12, 19, 5. Describe the structure of the heap after the insertions of 17, 1, and 5. 6

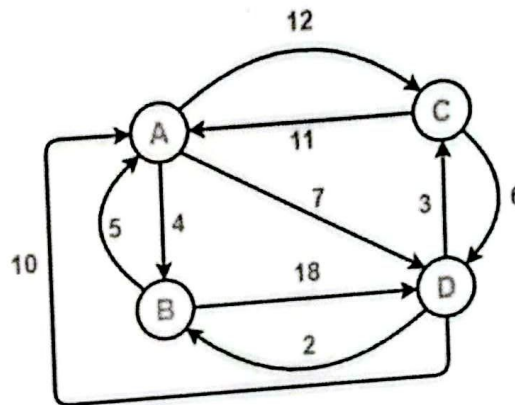
6 a. Write the names of five NP-complete problems. 3

b. Defines the following six classes of problems. 4

- P
- Co-P
- NP
- Co-NP
- NP-complete
- NP-hard

Show the relationship by using a diagram among these classes of problems that most researchers regard as the most likely.

c. Solve Travelling Salesman Problem using Branch and Bound Algorithm in the following graph. 7



7 a. Explain how the Finite Automata-based String Matching algorithm processes a text in  $O(n)$  time and why it does not require backtracking. 3

b. Compare the Naïve String Matching Algorithm and Rabin-Karp Algorithm in terms of: 4

- Worst case time complexity
- How they handle multiple pattern searches

c. Given the text  $T = \text{"ABABDABACDABABCABAB"}$  and the pattern  $P = \text{"ABABCABAB"}$ , simulate the Knuth-Morris-Pratt (KMP) algorithm step by step. The LPS (Longest Prefix Suffix) table must be illustrated. 7

**Kishoreganj University**  
**2<sup>nd</sup> Year 2<sup>nd</sup> Semester B. Sc. (Engg.) Final Examination-2023**  
**Department of Computer Science and Engineering**  
**CSE 2203: Numerical Methods (3 Credits)**

**Full Marks: 70**

**Time: 3 Hours**

*Figures shown in the right margin indicate full marks.  
 Answer 05 out of 07 questions.*

1. a. Describe the concept applied in the bracketing methods used for solving nonlinear equations. Use the False Position Method to obtain a root of the following equation by performing five iterations. 6  

$$3x^2 + 6x - 45 = 0$$
 b. Obtain the quadratic factor of the following polynomial using Bairstow's method with starting values  $u = +1.8$  and  $v = -4$ . 4  

$$p(x) = x^3 + x + 10$$
 c. Compute a root of the following equation using Newton Raphson Method. Perform five iterations. 4  

$$x^4 + 3x^3 - 2x^2 - 12x - 8 = 0, x_0 = 1$$
2. a. A system of resistors in an electrical circuit follows Kirchhoff's Current Law (KCL), leading to the following system of linear equations for the currents  $I_1, I_2, I_3$ : 6  

$$\begin{aligned} 2I_1 + I_2 - I_3 &= 3 \\ I_1 + 3I_2 + 2I_3 &= 9 \\ 3I_1 + 2I_2 + 4I_3 &= 13 \end{aligned}$$
 Identify the value of current flows  $I_1, I_2, I_3$  using the Gauss-Jordan method.
 b. Explain Crout's Decomposition Method. Decompose the following matrix using the Crout's method. 4  

$$A = \begin{bmatrix} 1 & 1 & 1 \\ 4 & 3 & -1 \\ 3 & 5 & 3 \end{bmatrix}$$
 c. Decompose the matrix 4  

$$A = \begin{bmatrix} 4 & 3 & -1 \\ 1 & 1 & 1 \\ 3 & 5 & 3 \end{bmatrix}$$
 into the form LU where L is unit lower triangular and U is upper triangular matrices.
3. a. Using Taylor's Expansion, derive a formula for computing the second derivative of a function. Find approximation to second derivative of the following function: 6  

$$f(x) = e^x \sin(x)$$
 at  $x = 0.75$  with  $h = 0.01$ . Compare the result with the true value.
 b. Compute the approximate derivatives of  $f(x) = \sin x + \cos x$  at  $x = 0.45$  radians using the first order forward difference formula, at increasing values of  $h$  from 0.01 to 0.04, with a step-size of 0.005. Analyze the total error. Identify the step where the error is minimum. 4
- c. Explain Richardson's Extrapolation. "Richardson's Extrapolation improves the estimates of derivatives"- justify the statement. 4
4. a. Summarize the necessity of pivoting for solution of linear systems. 3
 b. State the differences between Simpson's 1/3 rule and Simpson's 3/8 rule for numerical integration. Compute the values of 7  

$$I = \int_0^1 \frac{dx}{1+x^2}$$

using both Trapezoidal and Simpson's  $\frac{1}{3}$  rule with  $h=0.25$ . Also compare between the obtained results.

- c. Explain Newton Cote's Method for integration with proper examples. How could we improve the accuracy of a numerical integration process? 4
5. a. Explain the term 'interpolation' with proper example. 3
- b. The population of Mississippi during three census periods was as follows: 5

| Year                 | 1951 | 1961 | 1971 |
|----------------------|------|------|------|
| Population (Million) | 2.8  | 3.2  | 4.5  |

Estimate the population during 1966 using Lagrange's interpolation formula.

- c. Identify the cubic polynomial using both forward difference and backward difference formula which takes the following values  $y(1) = 24$ ,  $y(3) = 120$ ,  $y(5) = 336$  and  $y(7) = 720$ . Also, compare the results obtaining from both formulas. 6
6. a. In an organization, systematic efforts were introduced to reduce the employee absenteeism and results for the first 10 months are shown below: 6

| Months        | 1  | 2 | 3 | 4   | 5 | 6 | 7   | 8 | 9 | 10  |
|---------------|----|---|---|-----|---|---|-----|---|---|-----|
| Absentees (%) | 10 | 9 | 9 | 8.5 | 9 | 8 | 8.5 | 7 | 8 | 7.5 |

Fit a linear least squares line to the data and plot the data and the regression line in a graph.

- b. Fit the power equation  $y = ax^b$  to the following data: 4

|   |     |     |     |     |
|---|-----|-----|-----|-----|
| x | 2   | 4   | 6   | 8   |
| y | 1.4 | 2.0 | 2.4 | 2.6 |

- c. Fit a second order polynomial to the data in the table below: 4

|   |     |      |      |      |
|---|-----|------|------|------|
| x | 1.0 | 2.0  | 3.0  | 4.0  |
| y | 6.0 | 11.0 | 18.0 | 27.0 |

7. a. Use the simple Euler's method to solve the following equations for  $y(1)$  using  $h = 0.5$ . 6
- (i)  $\frac{dy}{dx} = x^2 + y^2$ , where  $y(0) = 2$
- (ii)  $\frac{dy}{dx} = x + y + xy$ , where  $y(0) = 1$
- b. Find  $y(0.5)$  for  $\frac{dy}{dx} = -4x - y$ , where  $y(0) = -1$ , with step length 0.1 using Taylor's expansion method. 4
- c. The general equation relating to current  $i$ , voltage  $V$ , resistance  $R$ , and inductance  $L$  of a serial electric circuit is given by 4

$$L \frac{di}{dt} + iR = V$$

Find the value of current after 2 seconds, if resistance  $R = 20\Omega$ , inductance  $L = 50H$ , and voltage  $V = 240V$ . Consider that current  $I = 0$  when  $t = 0$ .

**Kishoreganj University**  
**2<sup>nd</sup> Year 2<sup>nd</sup> Semester B.Sc. (Engg.) Final Examination-2023**  
**Department of Computer Science and Engineering**  
**CSE 2205: Theory of Computing (3 Credits)**

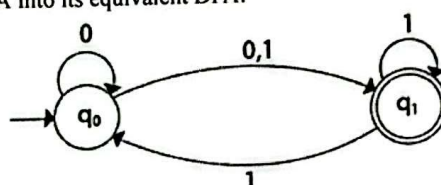
**Time: 3 Hours**

**Full Marks: 70**

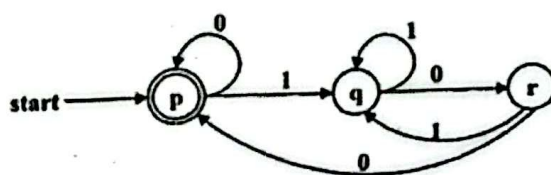
**Instructions**

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- Answer 05 out of 07 questions.

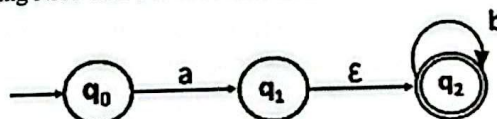
- 1 a. Define a dead state in automata. Why do we add these states in an automaton? 4
- b. Draw a non-deterministic finite automaton that accepts 00 and 11 at the end of a string containing 0, 1 in it; e.g., it accepts 01010100 and 01010111, but not 000111010. 4
- c. Convert the given NFA into its equivalent DFA. 6



- 2 a. Construct a regular expression corresponding to the state diagram given in the following figure: 4

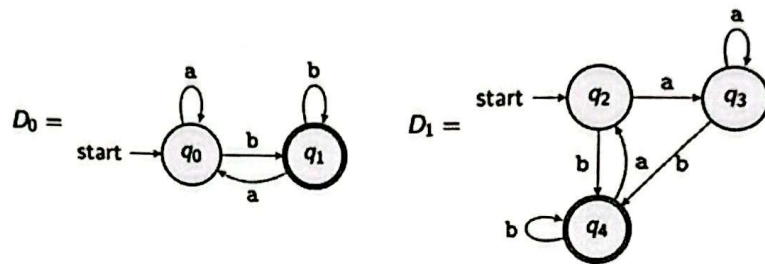


- b. Define  $\epsilon$ -closure. Compute  $\epsilon$ -closure of each state and find its equivalent DFA. 6
- |                 | $\epsilon$  | a           | b           | c           |
|-----------------|-------------|-------------|-------------|-------------|
| $\rightarrow p$ | {q}         | {p}         | $\emptyset$ | $\emptyset$ |
| q               | {r}         | $\emptyset$ | {q}         | $\emptyset$ |
| *r              | $\emptyset$ | $\emptyset$ | $\emptyset$ | {r}         |
- c. Convert the following NFA with  $\epsilon$  to NFA without  $\epsilon$ . 4

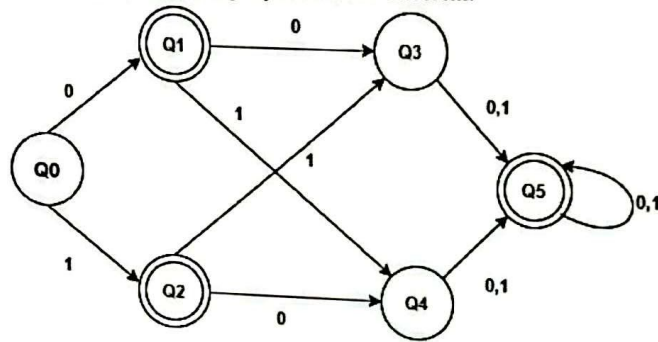


- 3 a. Explain the concept of equivalence in automata. What is the difference between equivalence of automata and equivalence of languages? 4

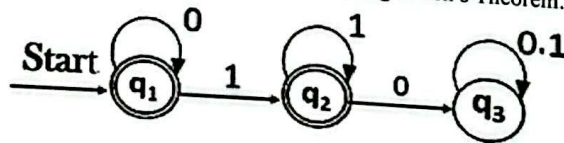
- b. Are the following two DFA equivalent?



- c. Minimize the following DFA using Myhill-Nerode Theorem.



- 4 a. Design a finite automaton from the regular expression  $10 + (0 + 1)0^*1$ .
- b. "A language L is accepted by some DFA if and only if L is accepted by some NFA"-Prove this statement.
- c. Construct the regular expression for the given DFA using Arden's Theorem.



- 5 Mealy and Moore machines were developed to model sequential logic systems, providing formal methods to describe output behavior based on states and inputs. These machines offered solutions for different design needs: Moore machines for more predictable, state-dependent outputs and Mealy machines for more dynamic, input-responsive outputs.

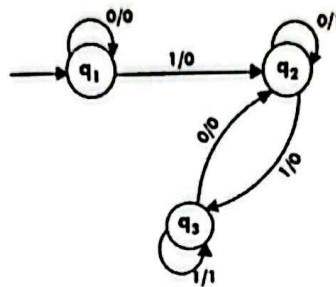
In the Moore machine, the output is associated with every state, and in the Mealy machine, the output is given along the edge with an input symbol.

Now, answer the following questions.

- a. Design a Moore machine to generate 1's complement of a given binary number.

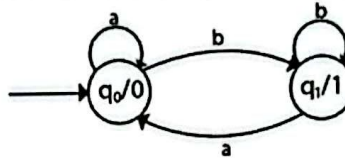
- b. Convert the following Mealy machine into an equivalent Moore machine.

5



- c. Convert the following Moore machine into its equivalent Mealy machine.

5



- 6 a. Define Pushdown Automata with formal notations. Draw a PDA for the language  $L_{ww^R} = \{WW^R \mid W \text{ is in } (0+1)^*\}$ .

5

- b. How does a Pushdown Automaton (PDA) differ from a Finite Automaton (FA)?

4

- c. Convert the following grammar to a PDA that accepts the same language by empty stack.

5

$$S \rightarrow 0S1 \mid A$$

$$A \rightarrow 1A0 \mid S\epsilon$$

Simulate the action for the input 0011 on the new PDA.

- 7 a. Design a Turing Machine (TM) to implement the function "multiplication". Simulate the action for the input 001000.

4

- b. What is the distinction between undecidability and intractability in the context of automata theory? Why is the exploration of these concepts important for understanding the boundaries of computational problems?

5

- c. Discuss how the concept of undecidability contributes to the field of cryptography. Provide necessary examples.

5

**Kishoreganj University**  
**2<sup>nd</sup> Year 2<sup>nd</sup> Semester B. Sc. (Engg.) Final Examination-2023**  
**Department of Computer Science and Engineering**  
**CSE 2207: Database (3 Credits)**

**Time: 3 Hours**

**Full Marks: 70**

Figures shown in the right margin indicate full marks.  
Answer 05 out of 07 questions.

- 1 a. What is a Database Management System (DBMS)? Explain its importance. 4  
b. How do you convert an ER diagram into a relational model? Provide a brief explanation. 5  
c. What is database engine? Describe the components of database engine with necessary diagrams. 5

- 2 a. Explain the difference between primary key, foreign key, and candidate key with examples. 4  
b. Suppose a hospital management system needs to maintain records of **patients, doctors, rooms, and appointments**. Each patient has a unique patient ID, name, age, gender, contact details, and medical history, while each doctor has a doctor ID, name, specialization, department, and contact details. A patient can book multiple appointments, each assigned to one doctor, but a doctor can have multiple appointments, with details such as date, time, and status (confirmed, canceled, or completed). Patients may be admitted to hospital rooms, where each room has a room number, type (ICU, General, Private), and availability status. 10

Draw an ER diagram representing these entities, attributes, and relationships, ensuring proper cardinalities and primary keys.

- 3 a. Define functional dependency and explain its importance in database design. 3  
b. What is the difference between BCNF and 3NF? Provide an example to illustrate the difference. 3  
c. Step by step convert the following table into 1NF, 2NF, and 3NF with appropriate details. 8

| StdID | StdName | Course                | InstID   | InstName             | InstPhone  |
|-------|---------|-----------------------|----------|----------------------|------------|
| 101   | Alice   | Data Structures, DBMS | I01, I02 | Dr. Smith, Dr. Lee   | 1234, 5678 |
| 102   | Bob     | DLD, OS               | I01, I03 | Dr. Smith, Dr. Brown | 1234, 9876 |

- 4 a. What is a JOIN operation? What are stored procedures, and how do they extend DBMS functionality? 4  
b. What is View? Why view is needed in database system? 2  
c. Consider the following relations and answer the following queries using SQL: 8

*Patients (PatientID, Name, Age, Gender, Address)*  
*Doctors (DoctorID, Name, Specialty, Department)*  
*Appointments (AppointmentID, PatientID, DoctorID, Date, Time, Status)*  
*Treatments (TreatmentID, PatientID, DoctorID, Diagnosis, Medication)*  
*Departments (DepartmentID, DepartmentName)*

- i) Retrieve the names of all patients who have an appointment scheduled.
  - ii) Find the names of patients who have been diagnosed with "Diabetes".
  - iii) Get the Number of Appointments Scheduled by Each Patient
  - iv) Find patients who have appointments with both a "Cardiologist" and a "Neurologist".
  - v) Retrieve the names of patients who have never scheduled an appointment.
  - vi) Find the names of patients who have appointments with the same doctor on different dates.
- 
- 5 a. Explain the different types of storage in DBMS, including RAID levels. 5
  - b. What is semi-structured data? Give a comparison between XML data and JSON data. 4
  - c. Discuss the ACID properties required for maintaining data integrity. 5
  - 6 a. What are the purposes to place an index in a database? Give a brief classification of index structures? 4
  - b. What is the difference between hashing and indexing? Why do you need multilevel indexing? 4
  - c. Suppose a B<sup>+</sup> Tree of order 3 stores values 10, 20, 30, 40, 50, 60, 70, 80, 90, 100. 6
    - (i) Draw the B<sup>+</sup> Tree after all insertions.
    - (ii) Delete 40 and update the tree.
  - 7 a. What are the main types of database architectures? Draw the centralized architecture of database system and describe different types of database users. 10
  - b. What is the difference between DDL (Data Definition Language) and DML (Data Manipulation Language)? Give examples. 4

**Kishoreganj University**  
**2<sup>nd</sup> Year 2<sup>nd</sup> Semester B. Sc. (Engg.) Final Examination-2023**  
**Department of Computer Science and Engineering**  
**GED 2209: Accounting (3 Credits)**

**Full Marks: 70**

**Time: 3 Hours**

Figures shown in the right margin indicate full marks.  
Answer 05 out of 07 questions.

- 1 a. Why is accounting called language of business? 2  
b. Differentiate between Bookkeeping and Accounting? 2  
c. Hasib opened an advertising business named "geeky international". A summary of May's transaction is stated below: 7+3

|         |                                                                                                                                            |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------|
| May-1:  | Hasib invested taka 25000 cash to start advertising business.                                                                              |
| May-4:  | Purchased used equipment for advertising purpose for 12000 taka. Hasib paid 2000 cash and signed a note payable for the remaining balance. |
| May-7:  | Incurred taka 800 of gasoline expense on account.                                                                                          |
| May-10: | Purchased little tools which will provide benefit for 5 months for taka 4000 on account.                                                   |
| May-15: | Received taka 1000 from standard chartered bank money borrowed on note payable.                                                            |
| May-17: | Earned revenue of taka 10000 of which 3000 taka is collected in cash and balance is due.                                                   |
| May-20: | Paid note payable amount due in transaction of May 4.                                                                                      |
| May-25: | Received 5000 taka in cash from customer who billed in transaction of May 17.                                                              |
| May-30: | Hasib gave 1000 taka to his son from cashbox of business                                                                                   |

**Requirement:**

- i. Prepare a transaction analysis.  
ii. Prepare an income statement and owner's equity statement for the month of May. 2
- 2 a. What is the double entry book keeping rule? 2  
b. Why is trial balance not a conclusive proof of accuracy? 2  
c. XYZ firm was started on April 1 by Abhijit Bhowmik. A summary of April transactions is given below: 3+4+3
1. Started business by investing Tk. 5000.
  2. Service provided for cash Tk. 2400.
  3. Bought equipment for cash Tk. 1000 and bills for the balance Tk. 4000.
  4. Provided services on Account Tk. 1600.
  5. Received cash from customer who billed earlier Tk. 900.

**Instructions**

- i. Prepare journal entries.
- ii. Post the transactions to Ledger Accounts.
- iii. Prepare a trial balance at April 30, 20X4.

- 3 a. Lucido Products markets two computer games: Claimjumper and Makeover. A contribution format income statement for a recent month for the two games appears below: 8

|                   | Claimjumper   | Makeover      | Total        |
|-------------------|---------------|---------------|--------------|
| Sales             | \$30,000      | \$70,000      | \$100,000    |
| Variable Expenses | 20,000        | 50,000        | 70,000       |
| CM                | <u>10,000</u> | <u>20,000</u> | 30,000       |
| Fixed Expenses    |               |               | 24,000       |
| Net Income        |               |               | <u>6,000</u> |

**Instructions:**

- Compute the overall contribution margin (CM) ratio for the company.
  - Compute the overall break-even point for the company in dollar sales.
  - Verify the overall break-even point for the company by constructing a contribution format income statement showing the appropriate levels of sales for the two products.
- b. Selected financial data from the June 30 year-end statements of Safford Company are given below: 6

|                                    |             |
|------------------------------------|-------------|
| Total assets                       | \$3,600,000 |
| Long-term debt (12% interest rate) | \$500,000   |
| Total stockholders' equity         | \$2,400,000 |
| Interest paid on long-term deb     | \$60,000    |
| Net income                         | \$280,000   |

Total assets at the beginning of the year were \$3,000,000; total stockholders' equity was \$2,200,000. The company's tax rate is 30%.

**Instructions:**

- Compute the return on total assets.
  - Compute the return on equity.
  - Is financial leverage positive or negative? Explain.
- 4 a. Henrie's Drapery Service is investigating the purchase of a new machine for cleaning and blocking drapes. The machine would cost \$137,280, including freight and installation. Henrie's has estimated that the new machine would increase the company's cash inflows, net of expenses, by \$40,000 per year. The machine would have a five-year useful life and no salvage value. 8

**Instructions:**

- Compute the machine's internal rate of return to the nearest whole percent.
  - Compute the machine's net present value. Use a discount rate of 14%. Why do you have a zero net present value?
  - Suppose that the new machine would increase the company's annual cash inflows, net of expenses, by only \$37,150 per year. Under these conditions, compute the internal rate of return to the nearest whole percent.
- b. VK Company has the following inventory, purchases, and sales data for the month of March: 6

|          |           |                    |      |
|----------|-----------|--------------------|------|
| March 1  | Inventory | 400 units @ \$4.00 | 1600 |
| March 10 | Purchases | 500 units @ \$4.50 | 2250 |
| March 20 | Purchases | 300 units @ \$4.75 | 1425 |
| March 30 | Purchases | 500 units @ \$5.00 | 2500 |
| March 15 | Sales     | 500 units          |      |
| March 25 | Sales     | 300 units          |      |

**Instructions:**

Under a periodic inventory system, determine the cost of inventory on hand at March 31 and the cost of goods sold for March under -

- FIFO
- LIFO
- Average-cost.

5 a. Are variable costs always relevant costs? Explain. 3

b. Hanif Transport Ltd. operates a fleet of delivery trucks in Singapore. The company has determined that if a truck is driven 105,000 kilometers during a year, the average operating cost is 11.4 cents per kilometer. If a truck is driven only 70,000 kilometers during a year, the average operating cost increases to 13.4 cents per kilometer. 6

**Instructions:**

- Using the high-low method, estimate the variable and fixed cost elements of the annual cost of the truck operation.
- Express the variable and fixed costs in the form  $Y = a + bx$ .
- If a truck were driven 80,000 kilometers during a year, what total cost would you expect to be incurred?

c. HK Inc. is a merchandiser that provided the following information: 5

|                                          | Amount   |
|------------------------------------------|----------|
| Number of units sold                     | 20000    |
| Selling price per unit                   | \$30     |
| Variable selling expense per unit        | \$4      |
| Variable administrative expense per unit | \$2      |
| Total fixed selling expense              | \$40000  |
| Total fixed administrative expense       | \$30000  |
| Beginning merchandise inventory          | \$24000  |
| Ending merchandise inventory             | \$44000  |
| Merchandise purchases                    | \$180000 |

**Instructions:**

- Prepare a traditional income statement.
- Prepare a contribution format income statement.

6 a. Define prime cost & factory overhead with examples. 4

b. The SUSAN Company makes art prints. The following details are available for the year ended 30th June, 2023: 10

|                                   | Amount  |
|-----------------------------------|---------|
| <b>Opening stocks:</b>            |         |
| Direct materials                  | 26000   |
| Work-in-progress                  | 74000   |
| Finished goods                    | 120000  |
| <b>Direct materials purchased</b> | 436000  |
| Direct labor                      | 120000  |
| Indirect labor and supervision    | 44000   |
| Administrative expenses           | 160000  |
| Factory rent, rates and insurance | 94000   |
| Depreciation of factory equipment | 70000   |
| Selling expenses                  | 140000  |
| Factory power, heat and light     | 20000   |
| Sundry factory overheads          | 12000   |
| Financial charges                 | 120000  |
| Sales                             | 1460000 |
| <b>Closing stocks:</b>            |         |
| Direct materials                  | 42000   |
| Work-in-progress                  | 54000   |
| Finished goods                    | 80000   |

**Instructions:**

- i) A schedule of cost of goods manufactured for the year ended 30th June, 2023.
  - ii) A Profit statement for the year ended 30th June, 2023.
- 7 a. What is the basic difference between absorption costing and variable costing? 2
- b. Lynch Company manufactures and sells a single product. The following costs were incurred during the company's first year of operations: 12
- |                                            |           |
|--------------------------------------------|-----------|
| <b>Variable costs per unit:</b>            |           |
| <b>Manufacturing:</b>                      |           |
| Direct materials                           | \$6       |
| Direct labor                               | \$9       |
| Variable manufacturing overhead            | \$3       |
| <b>Variable selling and administrative</b> | \$4       |
| <b>Fixed costs per year:</b>               |           |
| Fixed manufacturing overhead               | \$300,000 |
| Fixed selling and administrative           | \$190,000 |

During the year, the company produced 25,000 units and sold 20,000 units. The selling price of the company's product is \$50 per unit.

**Instructions:**

- i) Assume that the company uses absorption costing:
  - a. Compute the unit product cost.
  - b. Prepare an income statement for the year.
- ii) Assume that the company uses variable costing:
  - a. Compute the unit product cost.
  - b. Prepare an income statement for the year.