

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
 B.Sc. Engineering 2nd Year 2nd Term Examination, 2016
 Department of Computer Science and Engineering
 CSE 2201

Algorithm Analysis and Design

TIME: 3 hours

FULL MARKS: 210

N.B. i) Answer ANY THREE questions from each section in separate scripts.

ii) Figures in the right margin indicate full marks.

SECTION A

(Answer ANY THREE questions from this section in Script A)

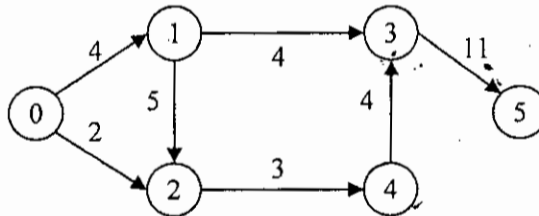
1. a) How an algorithm can be devised? Explain with example. (08)
- b) Give the best Big-Oh characterization for each of the following running time estimates (11)
 (where n is the size of the input problem)
 - i) $n + (n-1) + (n-2) + \dots + 3 + 2 + 1$
 - ii) $37n + n \log(n^2) + 5000 \log(n)$
 - iii) $1000n^2 + 16n + 2^n$
 - iv) $\log(n) + 10000$
 - v) $n \log(n) + 15n + 0.002n^2$
- c) Consider the following coin denominations: 1, 3, 5, 10, 22, 50. Can the greedy method be (09)
 used to find the smallest number of coins of these denominations with total value equal to
 some number B? Why?
- d) Write the control abstraction for greedy method. (07)

2. a) What are Implicit and Explicit constraints? Write Implicit and Explicit constraints for (08)
 n -queens and sum of subset problems.
- b) Consider the following table. Construct OBST for keys with the given probabilities. (14)

i	1	2	3	4	5
P_i	0.24	0.22	0.23	0.3	0.01

- c) Define parallel algorithms. Explain Speedup and Efficiency of parallel algorithms. (07)
- d) In the Floyd-Warshall all-pairs shortest algorithm, there are three nested loops. There are six (06)
 possible permutations of these three loops. Which ones provide a correct algorithm?

3. a) Consider the following travelling salesperson problem (TSP): (14)



- i) Convert it into a multistage graph
- ii) Find the minimum cost path in the multistage graph (from (i)). Do this using the forward reasoning approach.
- b) Apply backtracking technique to solve the following instance of subset sum problem: (05)
 $S = \{1, 4, 5, 6, 8\}$ and $d = 18$.
- c) What are the differences between branch-and-bound and backtracking paradigm. (06)
- d) Draw the state space tree for 4-queen problem. How is the solution reduced from 4^4 to (10)
 optimal solution? Explain.

4. a) What are the differences between performance analysis and performance measurement of an (06)
 algorithm?
- b) What is the running time in θ -notation (as a function of n) of the following code? Give an (09)
 explanation.

```

for x = 1 to n do
    begin
        y = x;
        while (y > 1) do
            y = y/2;
        end
    end
    
```

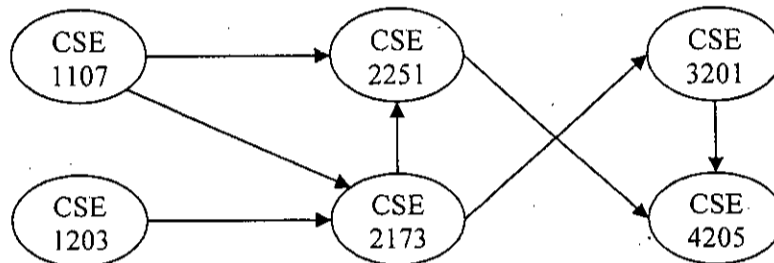
- c) Describe the steps in applying dynamic programming strategy when developing an algorithm. (07)

- d) The knapsack problem takes 2 inputs: the capacity of the knapsack and a list of items. Each item has a value and weight. The goal is to put items into the knapsack such that the value is maximized (optimal) but we cannot go over the weight capacity of the knapsack (valid). As an example consider a knapsack with capacity 15 and items (25, 5), (45, 11), (12, 3), (7, 2), (6, 2), (10, 7) and (5, 4) where the first number in each pair indicates the value and the second number the weight. Valid solutions are: $\langle \rangle$, $\langle 1, 3, 4 \rangle$, $\langle 2, 3, 4, 5 \rangle$ and an optimal solution is $\langle 2, 7 \rangle$.
- Describe a possible way of creating a state space tree for this problem.
 - Design a heuristic for a branch-and-bound algorithm.
 - Will the branch-and-bound algorithm return a valid solution?
 - Will the branch-and-bound algorithm return an optimal solution?

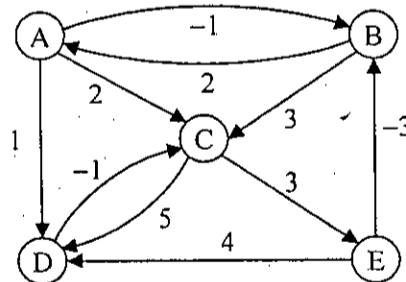
SECTION B

(Answer ANY THREE questions from this section in Script B)

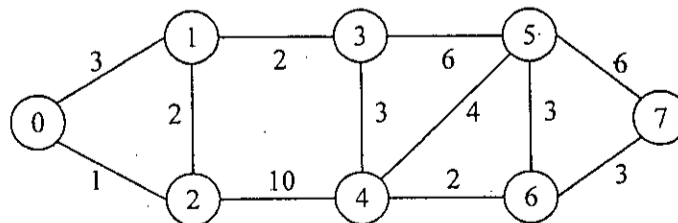
5. a) What is pre-condition? Write down the pre-condition of Bellman-Ford algorithm and explain. (06)
- b) What is topological sort? The directed graph given below shows the prerequisite relation among courses of different semesters (e.g. CSE 1203 is a prerequisite of CSE 2173). Give a linear ordering of nodes of the graph showing visiting time and finishing time for each node. Draw your own opinion about whether it is possible to give a linear ordering of nodes if a new directed edge is inserted in the graph from the node CSE 4205 to CSE 2173.



- c) In scheduling independent tasks problem, let the number of processor $m = 3$, number of tasks $n = 7$, where $(t_1, t_2, t_3, t_4, t_5, t_6, t_7) = (5, 2, 2, 4, 3, 5, 3)$. Schedule the tasks by Longest Processing Time (LPT) rule and then find the time difference between LPT scheduling and optimal scheduling. (08)
- d) What do you mean by P, NP and NP-hard and NP-complete problems? (06)
6. a) Write down the relaxation condition of single source shortest path algorithm. Find the shortest path between A to C for the following graph. Consider node A as source vertex. If the weight between B to A changed to -2 , then what will happen? (15)

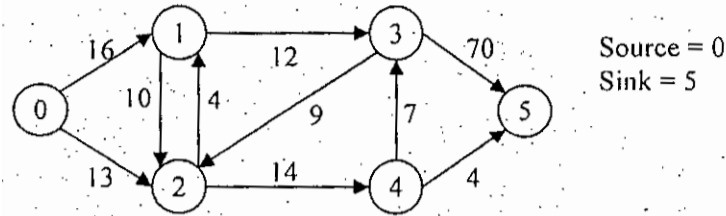


- b) What is spanning tree? Consider the following undirected graph where the value of each edge represents the length of that edge. Apply Prim's algorithm.
- What is the length of the shortest path between 0 and 7?
 - What is the total length of the edges in a minimum spanning tree?

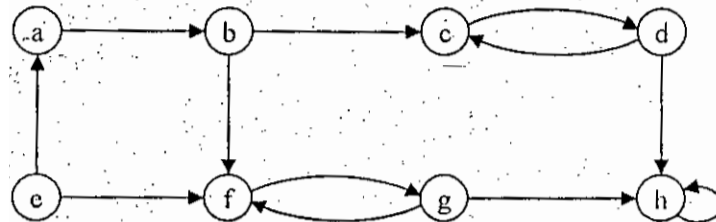


- c) "AND / OR GRAPH (AOG) is not always a tree" – justify the statement with example. (06)
- d) What is admissible edge in Relabel-to Front algorithm? What do you mean by max flow network? (04)

7. a) Write down the difference between Ford-Fulkerson and Edmonds-Karp algorithm for (06) maximum network flow problem with example.
 b) Apply Relabel-to-Front algorithm for the following network. Show each steps of changing (15) height and acce flow changing.

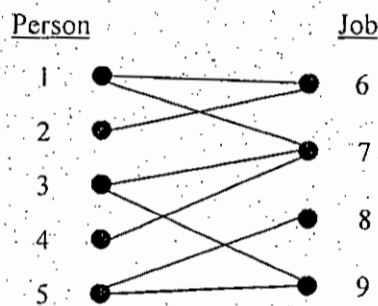


- c) Find the strongly connected components from the following graph. (10)



- d) Define vertex cover problem with example. (04)

8. a) What is Augmenting path and maximum bipartite matching? Discuss with suitable example. (06)
 b) Define bipartite graph. Find the maximum matching using khokho idea and Berge's theorem (15) of the following bipartite graph.



- c) State differences between Prim's and Kruskal's algorithm. Which one is better? (06)
 d) Given two string $X = \{ ABCB \}$ and $Y = \{ BDCAB \}$. Find the longest common subsequence (08) of X and Y using dynamic programming technique.

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
B.Sc. Engineering 2nd Year 2nd Term Examination, 2016
Department of Computer Science and Engineering
CSE 2203

Microprocessors and Microcontrollers

TIME: 3 hours

FULL MARKS: 210

- N.B. i) Answer **ANY THREE** questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

SECTION A

(Answer **ANY THREE** questions from this section in Script A)

1. a) What is the advantage of using a CPU register for temporary data storage over using a memory location? (06)
- b) Define segmentation. Write the advantages of segmentation in 8086 microprocessor. (07)
- c) Mention the trade-off of choosing between assembly language and high level language. (08)
- d) Let us consider that SS contains 5000H and SP contains FFE0H. Then (06)
 - i) Determine the physical address.
 - ii) Calculate the lower range and upper range of the mentioned segment.
 - iii) Determine the maximum size of the stack segment.
- e) Suppose that a 32 bit microprocessor is feeding with 3 GHz clock generator. On an average, 20 cycles are required to complete an instruction. (08)
 - i) Determine processor speed in terms of instruction/sec.
 - ii) How long it would take to execute 64 KB of code if average instruction size is 32 bit?

2. a) What is the significance of flag register? Show 8086 flag register format and determine the contents of the flags (CF, PF, AF, ZF, SF, OF) after the execution of the following code segment. (08)

```
MOV AL, 0FFH
ADD AL, 01H
```

- b) What is addressing mode? Mention (with justification) the type of addressing modes that are used in the following instructions. (08)
 - i) MOV AX, [BX]
 - ii) MOV AX, [BX+8]
 - iii) MOV [BX+SI], BP
 - iv) MOV AX, 0FFFFH
- c) "Both units : BIU(Bus Interface Unit) and EU(Execution Unit) of 8086 internal architecture operate asynchronously to achieve pipelining"- justify the statement. (07)
- d) Construct the binary code for each of the following 8086 instructions (12)
 - (i) IN AL, 05H
 - (ii) AND AL, 0FH
 - (iii) MOV [BX], CX

3. a) What are the functions of (i) Assembler (ii) Emulator? (06)
- b) Use a stack map to show the effect of each of the following instructions on the stack pointer and on the contents of the stack. (08)

```
MOV SP, 0050H
PUSH AX
CALL STRING
POP AX
STRING PROC NEAR
PUSHF
PUSH AX
PUSH CX
    |
    |
POP CX
POP AX
POPF
RET
STRING ENDP
```

- c) What are meant by (i) State, (ii) Machine cycle, and (iii) Instruction cycle? (06)
- d) Show the signal activities (with timing) of 8086 read operation with neat sketch and explain in brief. (09)
- e) What is Bit-slice microprocessor? (06)

4. a) Define (i) Interrupt, (ii) Interrupt vector, and (iii) Interrupt vector table. (06)
- b) Write the instructions in order to set and reset the trap flag. Explain in brief how these instructions perform the desired function. (08)
- c) Why is Nonmaskable interrupt named so? Show justification using an example. (07)
- d) How does priority resolver handle the situation when 8086 microprocessor is executing the IR₄ service procedure, meanwhile an interrupt signal arrives at the IR₂ input of the 8259A? (08)
- e) Depict shortly the following terms with suitable example(s): (06)
 - (i) SIMD (ii)MIMD and (iii) MISD

SECTION B

(Answer ANY THREE questions from this section in Script B)

5. a) What are the criteria for choosing a microcontroller? Briefly explain Von Neumann and Harvard architecture of microcontroller with appropriate figure(s). (10)
- b) What are the differences between microprocessor and microcontroller? (06)
- c) A door sensor is connected to the P1.1 pin and a buzzer is connected to P1.7. Write an 8051 C program to monitor the door sensor, and when it opens, sound the buzzer. You can sound the buzzer by sending a square wave of few hundred Hz. (07)
- d) Explain the alternate function of Port 3 of 8051 microcontroller. (06)
- e) What are the salient features of 8051 microcontroller? (06)

6. a) What should be the value of signals A_0 , \overline{BHE} , Memory Banks, location addresses, D_0 - D_7 , D_8 - D_{15} for the following transfer operation? [Bank is either even or odd] (12)
 - i) Microprocessor writes a Byte 22H into odd address location 2000 : 0003H
 - ii) Microprocessor writes a Byte 11H into even address location 2500 : 0002H
 - iii) Microprocessor writes a Word 1562H into odd address location 1000 : 0005H
 - iv) Microprocessor writes a Word 2516H into even address location 2000 : 0004H
- b) Write an 8051 C program to toggle only pin P1.5 continuously in every 250ms. Use timer 0, mode 2 (8-bit auto reload) to create the delay. (08)
- c) Briefly explain the following timer mode operation of 8051 microcontroller using figure(s): (10)
 - i) Timer Mode 0 ii) Timer Mode 1
 - iii) Timer Mode 2 iv) Timer Mode 3
- d) Express -38.75 in single precision floating point based on 8087 math coprocessor. (05)

7. a) Explain the function of the following registers: CWCW, RR, and MSR. Briefly describe DMA data transfer with proper figure(s). (10)
- b) Briefly explain the two methods with appropriate figure that are used to solve the limited memory problem rather than MMU. (08)
- c) How 16,384 segments \times 65,536 bytes/ segment or about 1Gbyte of logical or virtual address space can be achieved? Explain with necessary figure(s). (10)
- d) What are the steps to switch from real address mode to protected address of 80286 microprocessor? (07)

8. a) What are the main functions of IOP? Describe the communication between IOP and CPU with necessary figure(s). (10)
- b) How does 80386 use a selector to access a descriptor in a descriptor table? (10)
- c) What are the conditions of stack in math coprocessor (8087) after performing following operation sequentially? (06)
 - (i) After reset (ii) Performs 3 PUSH operations (iii) Performs 2 PUSH operations
- d) What is paging memory management mode of 80386? Explain in brief. (09)

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
 B.Sc. Engineering 2nd Year 2nd Term Examination, 2016
 Department of Computer Science and Engineering
 CSE 2207
 Numerical Methods

TIME: 3 hours

FULL MARKS: 210

- N.B. i) Answer **ANY THREE** questions from each section in separate scripts.
 ii) Figures in the right margin indicate full marks.

SECTION A

(Answer **ANY THREE** questions from this section in Script A)

1. a) What is the difference between chopping and symmetric round off? Show with an example. (07)
- b) Why is relative error calculation more significant over absolute error calculation? (06)
- c) What are the differences between bracketing and open end methods? For finding roots, a bracketing iterative method can guarantee to converge a root, in contrast, an open end cannot. Why? (10)
- d) Write underlying theory of bisection method. Using this method, find a root of the equation $x^2 - x - 3 = 0$. (12)

2. a) How does secant method overcome the limitation of Newton-Raphson method? Explain with example. (09)
- b) Using Newton-Raphson method, compute the root of the equation, $x^2 - 5x + 6 = 0$, for initial estimate $x_0 = 5$. (12)
- c) Find the root of the equation $x^2 - 4x - 10 = 0$ using False Position method. (14)

3. a) What is interpolation? Derive Newton-Gregory formula for forward interpolation. (14)
- b) What is divided difference table? Using the set of data points given in the following table, obtain the table of divided differences. Also use the table to estimate the value of $f(1.5)$. (13)

i	0	1	2	3	4
x_i	1	2	3	4	5
$f(x_i)$	0	7	26	63	124

- c) State whether the following functions are splines or not. If spline, then which order spline is $f(x)$? (08)

$$f(x) = \begin{cases} x & 0 \leq x \leq 1 \\ x^2 - x + 1 & 1 \leq x \leq 2 \\ 3x - 3 & 2 \leq x \leq 3 \end{cases}$$

4. a) What is regression analysis? Use least square regression to fit a power-function model of the form $y = ax^b$ to the following data. (13)

x	1	2	3	4	5
y	0.5	2	4.5	8	12.5

- b) Using Lagrange's formula, find the form of the function given by: (10)

x	4	5	7	10	11	13
$f(x)$	48	100	294	900	1210	2080

- c) What is the difference between Polynomial method and Power method for solving Eigen value problem? Using Faddeev-Leverrier method determine the co-efficients of the characteristic polynomial of the system,

$$\begin{aligned} (-1 - \lambda)x_1 &= 0 \\ x_1 + (-2 - \lambda)x_2 + 3x_3 &= 0 \\ 2x_2 + (-3 - \lambda)x_3 &= 0 \end{aligned}$$

SECTION B

(Answer ANY THREE questions from this section in Script B)

5. a) What do you mean by numerical integration? Explain. (08)
b) Derive a general quadrature formula for equidistant ordinates and from there draw the equation for Simpson's three-eighth's rule. (13)
c) Calculate the value of the integral $\int_4^{5.2} \tan x dx$ by Simpson's $\frac{1}{3}$ rule. Compare the result with the true value of the integral. (14)
6. a) What do you mean by ordinary differential equation? Explain it with an example. (08)
b) Derive the equation for the Modified Euler's method. (12)
c) Solve the equation $\frac{dy}{dx} = x + y$, with initial condition $y(0) = 1$ by Runge-Kutta rule, from $x = 0$ to $x = 2$ with $h = 1$. (15)
7. a) Write the difference between (i) Homogeneous system of equations and (ii) Non-homogeneous system of equations. (06)
b) Suppose a matrix A will be factorized into L and U as follows: $A = LU$. Then find the equation for L and U . (12)
c) Find the inverse of the following matrix: (07)
- $$\begin{bmatrix} 3 & 2 & 4 \\ 2 & 1 & 1 \\ 1 & 3 & 5 \end{bmatrix}$$
- d) Solve the following system by Jacobi-Iterative method. (10)
- $$\begin{aligned} 27x + 6y + z &= 85 \\ 6x + 15y + 2z &= 72 \\ x + y + 54z &= 110 \end{aligned}$$
8. a) What is the relation between "Laplace" and "Liebmann's" iterative method? Explain. (08)
b) Derive the equation of Poisson to solve a partial differential equation. (12)
c) Using Bender-Schmidt method, solve the equation $2f_{xx}(x,t) = f_t(x,t)$, $0 < t < 1.5$ and $0 < x < 4$ given the initial condition $f(x,0) = 50(4-x)$, $0 \leq x \leq 4$ and the boundary conditions
- $$\begin{aligned} f(0,t) &= 0, & 0 \leq t \leq 1.5 \\ f(4,t) &= 0, & 0 \leq t \leq 1.5 \end{aligned}$$

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
B.Sc. Engineering 2nd Year 2nd Term Examination, 2016
Department of Computer Science and Engineering
HUM 2207

Economics and Accounting

TIME: 3 hours

FULL MARKS: 210

- N.B. i) Answer **ANY THREE** questions from each section **including question No. 8** in separate scripts.
ii) Figures in the right margin indicate full marks.

SECTION A

(Answer **ANY THREE** questions from this section in Script A)

1. a) Define Scarcity, Choice, Specialization and Exchange. (10)
b) What are the basic problems of an economic organization? (15)
c) What is production possibilities frontier? Explain. (10)
2. a) What is supply? Explain the law of supply with diagram. (15)
b) What is equilibrium price? Explain market equilibrium with numerical example. (15)
c) Why does supply curve slope upward to the right? (05)
3. a) What is price-elasticity of demand? Explain the various types of price-elasticity of demand. (15)
b) The 'Nobaron Corporation' is a publisher of romance novels. The corporation hires an economist to determine the demand for its novel. After months of hard work the economist informed the corporation that the demand for the firm's novel (θ_x) is given by the equation $\theta_x = 12,000 - 5,000P_x + 5I + 500P_c$. Assume that the initial values of P_x , I and P_c are \$5, \$10,000 and \$6 respectively. Using the above information, the company's manager wants to –
i) Determine what effect a price increase would have on total revenues.
ii) Evaluate how sale of the novel would change during a period of rising incomes.
iii) Assess the probable impact if competing publishers would raise their prices.
c) What is meant by Income-elasticity of demand? (05)
4. a) What is GDP deflator? Why do the economists prefer real GDP as a measure of Economic well-being? Explain. (15)
b) What is inflation? Explain the main causes of inflation. (10)
c) How does the effect of inflation be reduced by rising bank rate? (10)

SECTION B

(Answer **ANY THREE** questions from this section in Script B)

5. a) Define Accounting. Discuss the functions of Accounting. (10)
b) What is accounting cycle? Describe the steps of accounting cycle. (12)
c) Define transaction. Discuss the features of transactions. (08)
d) Why is accounting called a language of business? (05)
6. a) Digital IT centre was started by Nabila in a small shopping center. In the first weeks of operation, he completed the following transactions: (15)
2016
July - 1 Deposited Tk 70,000 in an account in the name of company to start the business.
.. 2 Paid current month rent Tk 9,000.
.. 3 Purchase store equipment on account Tk 36,000.
.. 4 Purchase supplies for cash Tk 17,000.
.. 5 Received revenue Tk 8,000 for service provided.
.. 6 Billed customers for services Tk 7,000.
.. 7 Paid utilities expense Tk 2,500.
.. 8 Received from customers Tk 2,000.
.. 9 Made payment on store equipment purchase in transaction 03 Tk 18,000.
.. 10 Withdrew cash for personal expense Tk 4,000.

Required: prepare a tabular analysis of the July transactions. Uses column heads: Cash, Account receivable, Supplies store equipment, Accounts payable, and Capital.

- b) 2016 The owner invested Tk150,000 of cash in the business. (20)
- January - 1
- ” 2 The company purchased Tk 50,000 of office equipment paying cash of Tk 20,000 and the balance on account.
- ” 3 The company purchased supplies of Tk 7,500 for cash.
- ” 4 The company performed services: for cash Tk 26,000 and on account Tk 37,000.
- ” 5 The company made a cash payment of Tk 15,000 on the accounts payable.
- ” 6 The owner withdrew Tk 20,000 cash for personal use.
- ” 7 The company paid Tk 6,500 cash for January rent.
- ” 8 The company collected cash of Tk 4,500 from customers on account.
- ” 9 The company paid employee salaries of Tk 39,000.
- ” 10 The company incurred utilities expense of Tk 5,000 on account.

Required: Journalise the above transactions in the book of X & co.

7. a) Dhanmondi Golf and Driving Range owns by Asad on January 01, 2015. The following (25) selected events and transactions occurred during January.

- January - 1 Mr. Asad invested Tk 20,00,000 cash in the business.
- ” 4 Paid advertising expense of Tk 8,000 in cash.
- ” 5 Paid Tk 14,000 for one-year insurance policy in cash.
- ” 10 Purchase equipment from Rubina Golf Company for Tk 12,000. Payable within 30 days.
- ” 18 Received Tk 20,000 in cash for Golf fee earned.
- ” 19 Withdrew Tk 10,000 cash for personal use.
- ” 20 Paid salaries Tk 12,000.

Required: prepare necessary ledger accounts.

- b) What are the purposes that can be served by ledger accounts? (10)

8. The trial balance for Amzad Service Company on June 30, 2016, the accounting period ended. (35)

Amzad Service Company
Trial balance as on June 30, 2016

Account Titles	Debit (Taka)	Credit (Taka)
Cash	14,400	
Accounts Receivable	7,620	
Supplies	1,250	
Prepaid insurance	4,400	
Equipment	38,000	
Notes payable		14,000
Accounts payable		14,350
Capital		28,000
Drawing	1,600	
Service revenue		17,620
Salaries expense	2,200	
Travel expense	2,000	
Rent expense	2,200	
Miscellaneous expense	300	
	73,970	73,970

Additional information:

- Supplies on hand total Tk 650.
- Depreciation is Tk 500 for 6 months.
- Insurance expired at the rate of Tk 250 per month.
- Service provided but unbilled at June 30 total Tk 950.

Instructions:

- Prepare a statement of comprehensive income for the period ended June 30, 2016 (for 6 months).
- Prepare owner's equity statement.
- Prepare a statement of financial position.

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
B.Sc. Engineering 2nd Year 2nd Term Examination, 2016
Department of Computer Science and Engineering
MATH 2207

Complex Variable, Vector Analysis and Statistics

TIME: 3 hours

FULL MARKS: 210

- N.B. i) Answer **ANY THREE** questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.
iii) Necessary tables: z-table, t-table

SECTION A

(Answer **ANY THREE** questions from this section in Script A)

1. a) Find the roots of $(2\sqrt{3} - 2i)^{1/2}$ and locate them graphically. (10)
- b) Prove that $\lim_{z \rightarrow 0} \frac{\bar{z}}{z}$ does not exist. (10)
- c) Is the function $u(x, y) = x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$ harmonic? If so, find its corresponding conjugate v and express $f(z) = u + iv$ terms of z . (15)
2. a) Define singular points. Describe the different types of singularities with examples. (12)
- b) Evaluate $\int_i^{2-i} f(3xy + iy^2) dz$ along the straight line joining $z = i$ and $z = 2 - i$. (13)
- c) Define Cauchy's Integral Theorem. Evaluate $\oint_C \frac{dz}{z-a}$ where C is any simple closed curve and $z = a$ is (i) inside C , (ii) outside C . (10)
3. a) Find the constants a and b so that the surface $ax^2 - byz = (a+2)x$ will be orthogonal to the surface $4x^2y + z^3 = 4$ at the point $(1, -1, 2)$. (18)
- b) Test whether the vector field \bar{F} is rotational or not. If possible find the scalar potential at $(1, -2, 3)$ of \bar{F} where $\bar{F} = (2xy^3z - y + 2)\bar{i} + (3x^2y^2z - x + z)\bar{j} + (x^2y^3 + y - 2)\bar{k}$. (17)
4. a) Using Divergence theorem, evaluate $\iiint_s \bar{F} \cdot \bar{n} ds$ where s is the closed surface consisting of $x = 0, y = 0, z = 0, z = 8$ and $x^2 + y^2 = 4$ and $\bar{F} = 6xz\bar{i} + 2x\bar{j} - y\bar{k}$. (14)
- b) What are the physical meaning of $\nabla \cdot \bar{F}$? In what direction from the point $(1, 4, -1)$ is the directional derivatives $\phi = x^3y^2z$ maximum? Also find the directional derivative along z axis at the point $(1, 1, -1)$. (14)
- c) State Green's theorem. Using this theorem show that the area bounded by a simple closed curve C is given by $\frac{1}{2} \oint_C xdy - ydx$. (07)

SECTION B

(Answer **ANY THREE** questions from this section in Script B)

5. a) Define and explain raw moment and central moment. (08)
- b) Calculate β_1 (skewness) and β_2 (kurtosis) and coefficient of skewness based on moment from the following data. Also comment the nature of this distribution. (20)

Age below (years)	25	30	35	40	45	50	55
No. of employees	8	20	40	65	80	92	100

- c) What are the difference between skew curve and normal curve? (07)

6. a) Calculate the coefficient of variation and Karl Pearson's coefficient of skewness from the following data: (12)

Marks	No. of students
Less than 30	18
" " 40	40
" " 50	70
" " 60	30
" " 80	10
" " 100	5

- b) Define and explain Uniform distribution and Hyper geometric distribution. (10)
 c) From a lot of 15 items, 4 are selected at random and fired. If the lot contains 3 defective items that will not fire. What is the probability that (13)
 i) None will be defective.
 ii) At least one will be defective.

7. a) A random variable x has the following probability function (13)

x	-2	-1	0	1	2	3
$P(x)$	0.1	$2k$	0.2	k	0.3	k

Find the value of k and calculate the mean and variance.

- b) Show that the function $f(x) = \begin{cases} \frac{1}{18}(3+2x), & 2 \leq x \leq 4 \\ 0 & \text{otherwise} \end{cases}$ is a density function. Find the standard deviation and mean deviation from the mean of the distribution. (15)
 c) What do you mean by mathematical expectation? A fair die is tossed twice. Find the probability of getting 4, 5 or 6 on the first toss and 1, 2, 3 or 4 on the second toss. (07)
8. a) For a normally distributed variate X , with mean 1 and standard deviation 3, find the probability that (i) $3.43 \leq X \leq 6.19$ (ii) $-1.43 \leq X \leq 6.19$ (15)
 b) Show that mean and median of the normal distribution coincide. (10)
 c) Mention some properties of Poisson's distribution. Discuss in brief the relation between (10)
 i) Binomial and Poisson distribution.
 ii) Poisson and normal distribution.