

Course Code: CSE 353
 Time: 3 (Three) Hours

- Q.1** (a) What do you mean by computer networks? Write the uses of computer networks. How network protocols work in a computer network? 5
 (b) What are the responsibilities of the physical, network and session layer in the OSI model? 5
- Q.2** (a) List the functions which are provided by the physical layer. Differentiate between guided media and unguided media. 3
- (b) State the applications of **Radio transmission**, **Microwave transmission** and **Infrared transmission**. 4.5
 (c) Differentiate circuit switching with packet switching. 2.5
- Q.3** (a) Mention three possible services offered by the data link layer to the network layer. Which methods can be used to mark the start and end of each frame? 4
 (b) Write the definition of **Piggybacking** and **Pipelining** in data link protocol. Differentiate between frame and packet. 4
 (c) Compare single error with burst error. 2
- Q.4** (a) Write down the key assumptions for dynamic channel allocation. Define bridges. 3
 (b) What is the key difference between pure ALOHA and slotted ALOHA? Write about CSMA protocol. 4
 (c) Draw the architecture of classic Ethernet and Bluetooth. 3
- Q.5** (a) What do you mean by IP address? What is the purpose of IP address? Show the IPv4 Datagram. 4.5
 (b) (i) Find the error in the following IP Address and explain. 3
 111.56.045.78
 (ii) Find the class of the following IP addresses and explain.
 I. 00000001 00010111 00001011 11101111
 II. 11000001 00001011 00001011 11101111
 (c) An address in a block is given as 73.22.17.25. Find the number of addresses in the block, the first address, and the last address. 2.5
- Q.6** (a) Show the comparison of virtual-circuit and datagram networks. What do you mean by **network mask**, **subnet mask** and **super-net mask** of IP address? 4.5
 (b) Show the differences between static and dynamic routing. Show all the steps of Figure-1 for finding the shortest path from **source B** to **destination D** by using shortest path algorithm (Dijkstra's algorithm). 5.5

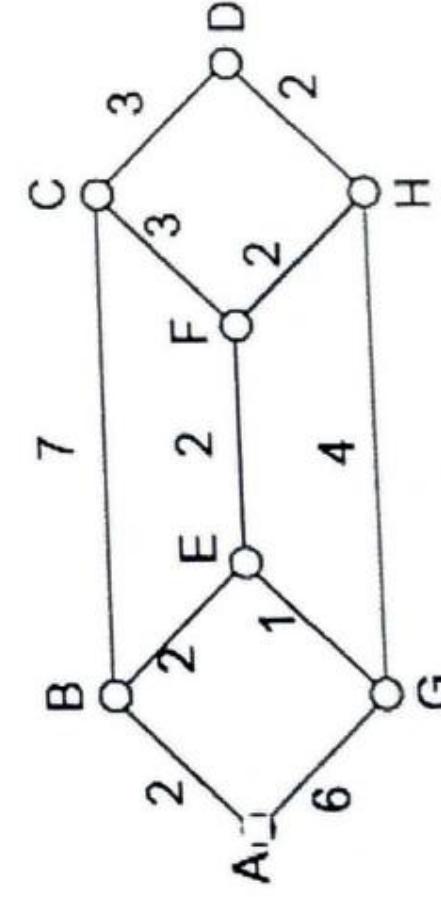


Figure-1

- Q.7** (a) Show the primitives for a simple transport services. What are the phases of connection? 4

Course Title: Computer Networks
Full Marks: 60

N.B. i) Answer any Six questions from Eight questions
ii) All questions are of equal values.

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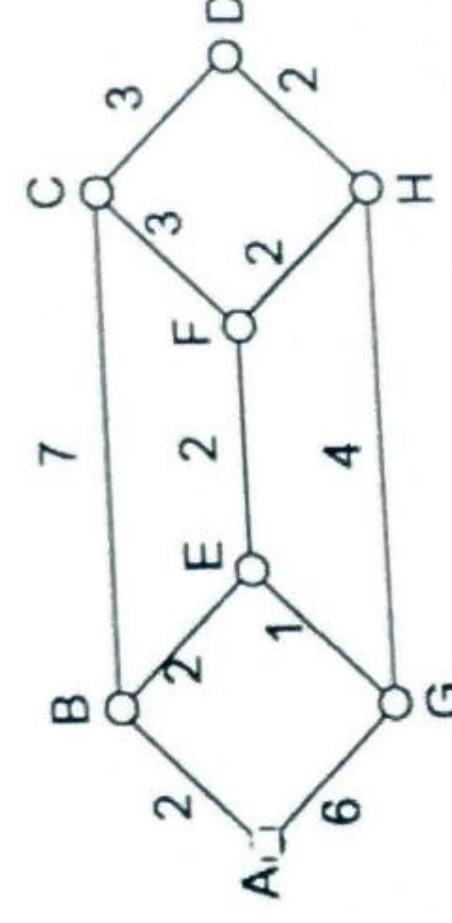


Figure-1

- (b) Define NAT. Why is it used in network? What is ICMP?
- (c) How a TCP connection can be established? Explain with figure.

- Q 8 (a) What is the basic difference between BOOTP and DHCP? Show the format of a DHCP packet
- (b) How does the TCP work? Discuss with figure.
- (c) Define URI. Explain the four things of URL. Define SMTP.

N.B.

- i) Answer any **SIX (6)** from the following **EIGHT (8)** questions.
- ii) All questions are of equal values.

- Q.1** (a) Define software engineering. What is the difference between software engineering and system engineering? 3
- (b) What are the benefits of incremental development model over waterfall model? List two problems of incremental model. 2+2
- (c) If the team consists of 10 members and needs to deliver the project within 7 months, do you think the project will be feasible? Show reason behind your answer. 3
- Q.2** (a) The decisions made by senior management or team leader can have a significant impact on the effectiveness of a software engineering team. What criteria do you think should be considered when choosing team leader? 4
- (b) Distinguish between the following facts: 3
- (i) Direct and indirect measure.
 - (ii) Error and defect
- (c) Explain W^5HH principle. 3
- Q.3** (a) Present an argument against lines of code (LOC) as a measure for software productivity. 2
- (b) Will your case hold up when dozens or hundreds of projects are considered? 5
- (c) Compute the function point value for a project with the following information domain characteristics:
- | |
|-------------------------------|
| No. of user inputs: 32 |
| No. of user outputs: 60 |
| No. of user inquiries: 24 |
| No. of files: 8 |
| No. of external interfaces: 2 |
- Assume that all complexity adjustment values are average. 3
- (c) Describe the categories of reusable software resources. 3
- Q.4** (a) Define independent paths, no. of regions and cyclomatic complexity for the flow graph given below: 6
-
- Q.5** (a) What is software maintenance? Describe the types of software maintenance. 3
- (b) Write down the steps of software maintenance process. 4
- (c) Briefly explain software quality metrics 3
- Q.6** (a) Specify different types of risks that may affect a software project. Discuss some strategies to help manage risks. 5
- (b) Describe five software application areas in which software safety and hazard analysis would be a major concern. 5
- Q.7** (a) Suppose, for the telecommunication and system software, the line of code is 90,000 and the effort in person-months is 6. Then find out the duration in months for developing this software. 4
- (b) Write the characteristics of KPA. 3
- (c) Discuss three situations where customer and end user are the same and different. 3

Bangabandhu Sheikh Mujibur Rahman Science & Technology University
 Department of Computer Science & Engineering
 3rd Year 2nd Semester B.Sc. Engineering Examination-2019

Course Title: **Numerical methods for Engineers**
 Full Marks: **60**

Course No: **CSE355**
 Time: **3 hours**

N.B.

- i) Answer any **SIX (6)** from the following **EIGHT (8)** questions.
- ii) All questions are of equal values.

- Q.1** (a) Why are numerical methods necessary for solving engineering problems? Explain this fact using appropriate examples. What are the problems associated with the graphical method in finding the root of an equation? 4
- (b) Determine the real roots of $f(x) = 6x^3 - 5x^2 + 7x - 2$ by using bisection method. Employ initial guesses of $x_l = 0$ and $x_u = 1$ and iterate until the estimated error ε_a falls below a level of $\varepsilon_s = 10\%$. 4
- (c) What are the differences between an open method and a bracketing method? 2
- Q.2** (a) Prove that the Newton-Raphson method has quadratic convergence property. 4
- (b) Derive the Newton-Raphson formula for finding the roots of equations. Find a root of the equation $xsinx + cosx = 0$ using the Newton-Raphson method. Carry out the computation for three iterations, and use four significant figures in your computation. 4
- (c) What are the problems associated with the naive Gauss elimination algorithm? 2
- Q.3** (a) Solve the following system of equations using LU decomposition with partial pivoting. Show detailed calculation steps. 5
- $$\begin{aligned} 2x_1 - 6x_2 - x_3 &= -38 \\ -3x_1 - x_2 + 7x_3 &= -34 \\ -8x_1 + x_2 - 2x_3 &= -20 \end{aligned}$$
- (b) Solve the same system of equations given in 3(a) but use the Gauss-Seidel methods. Iterate the process until the approximate error falls below a stopping criterion of $\varepsilon_s = 10\%$. 5
- Q.4** (a) What is meant by least square regression? How does it differ from interpolation? Derive the equations of the two constants (say, k_0 and k_1) used by the least square regression criterion. 5
- (b) Use least squares regression to fit a straight line to the following data: 5
- | | | | | | | | |
|--------|---|---|---|---|---|---|----|
| x | 1 | 3 | 4 | 6 | 8 | 9 | 11 |
| $f(x)$ | 1 | 2 | 4 | 4 | 5 | 7 | 8 |
- Find the equation of the straight line. :
- Q.5** (a) Describe an algorithm to solve 'inverse interpolation' problem. 2
- (b) Use Newton's interpolating polynomial to determine y at $x = 3.5$ to the best possible accuracy. 5
- | | | | | | | | |
|-----|---|--------|--------|--------|--------|--------|----|
| x | 0 | 1 | 2.5 | 3 | 4.5 | 5 | 6 |
| y | 2 | 5.4375 | 7.3516 | 7.5625 | 8.4453 | 9.1875 | 12 |
- (c) Distinguish between (i) accuracy and precision (ii) truncation error and round-off error of a numerical method. 3
- Q.6** (a) Evaluate the following integral using multi-application trapezoidal rule for two different step sizes, $h = 0.4$ and $h = 0.2$.

$$\int_0^{0.8} (-4x^2 + 3x - 5x + 7)dx$$

 What is the percent relative error based on the true value for both cases? 5

3

- (b) Compute a better estimate using the obtained estimates in question 6(a) using Richardson's extrapolation formula. Also, compute the true percent relative error for this third estimate.

2

- (c) State the formulas for Lagrange interpolating polynomials.

6

- Q.7 (a) Evaluate $\int_0^2 (3x^2 + 2x - 5) dx$ by using Simpson's $3/8$ rule.

4

- (b) Derive the high accuracy differentiation formula for the forward and backward finite difference approximation of the first derivative.

6

- Q.8 (a) Estimate the first derivative of the function $f(x) = 0.1x^4 + 0.25x^3 - 0.55x^2 + 0.4x + 3$ at $x = 0.5$ by (i) the high accuracy forward difference formula using the step-size of 0.5

- (ii) Richardson extrapolation method with the high accuracy forward difference formula using the step-sizes of 0.5 and 1.0.

4

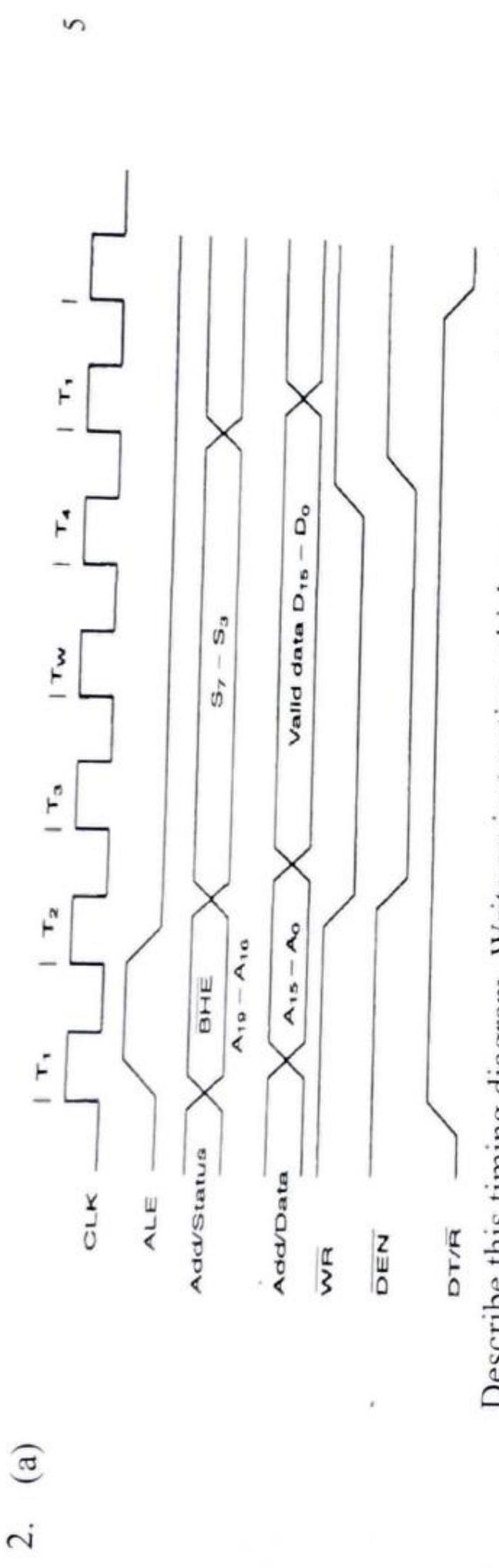
- (b) How does Runge-Kutta (RK) methods achieve the accuracy of a Taylor series approach without requiring the calculation of higher derivatives? Show how you can obtain different second-order methods for different values of parameter a_2

4

Full Marks: 60

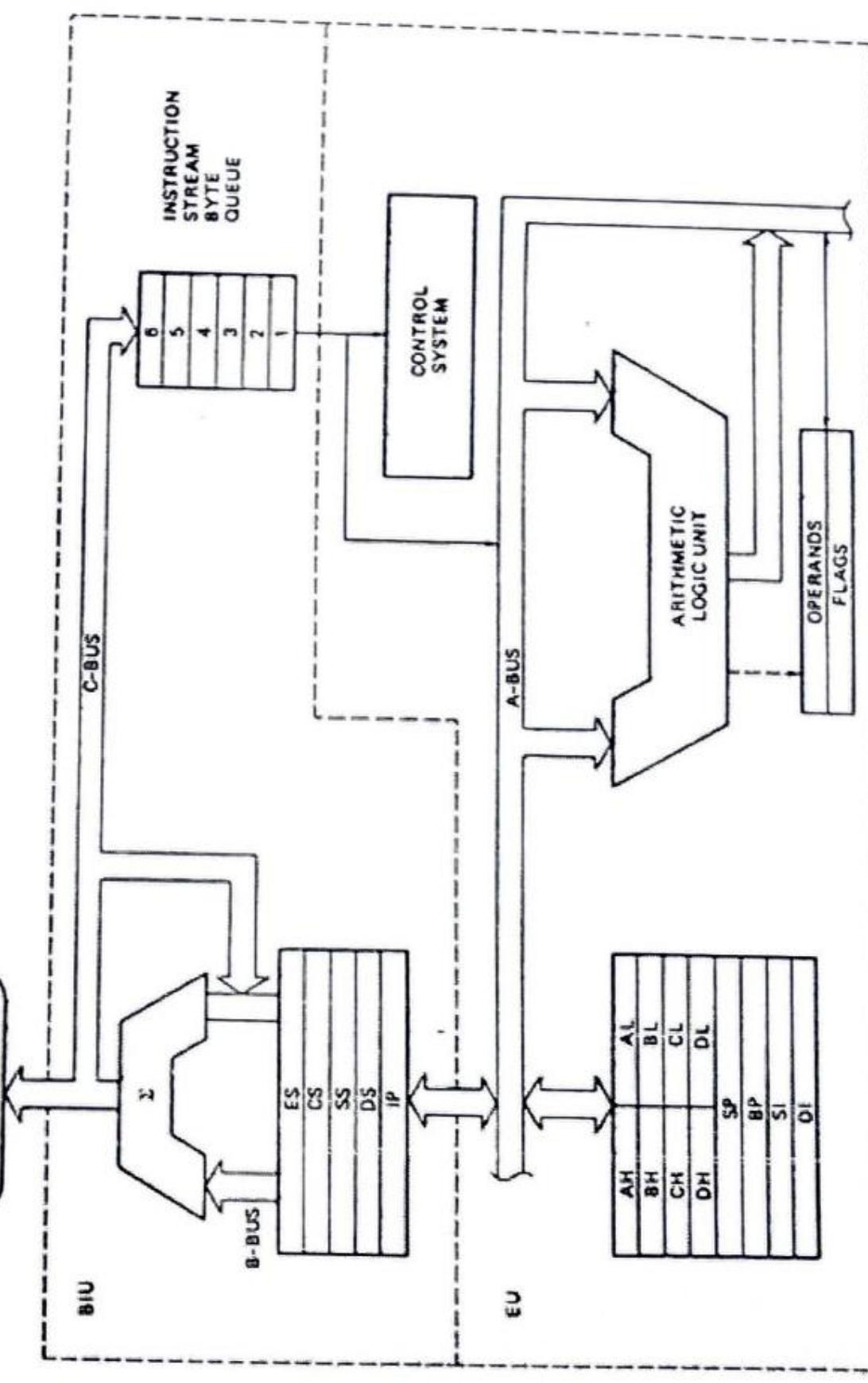
- i. Answer any Six (6) out of Eight (8) questions.
 ii. All of the questions are of equal values.

1. (a) What are the differences between Microprocessor and Microcontroller? 2
 (b) Why INTEL named the 8086 Microprocessor as '8086'? Briefly explain the internal architecture of 8086 CPU (Draw the block diagram also).
 (c) Why we need to use latch for 8086 microprocessors?
 (d) Define system bus. Address bus is unidirectional and data bus bidirectional, what do you think about it? 2



Describe this timing diagram. Write an instruction which can generates this timing diagram.

(b)



Describe the architecture of 8086 microprocessor from the figure.

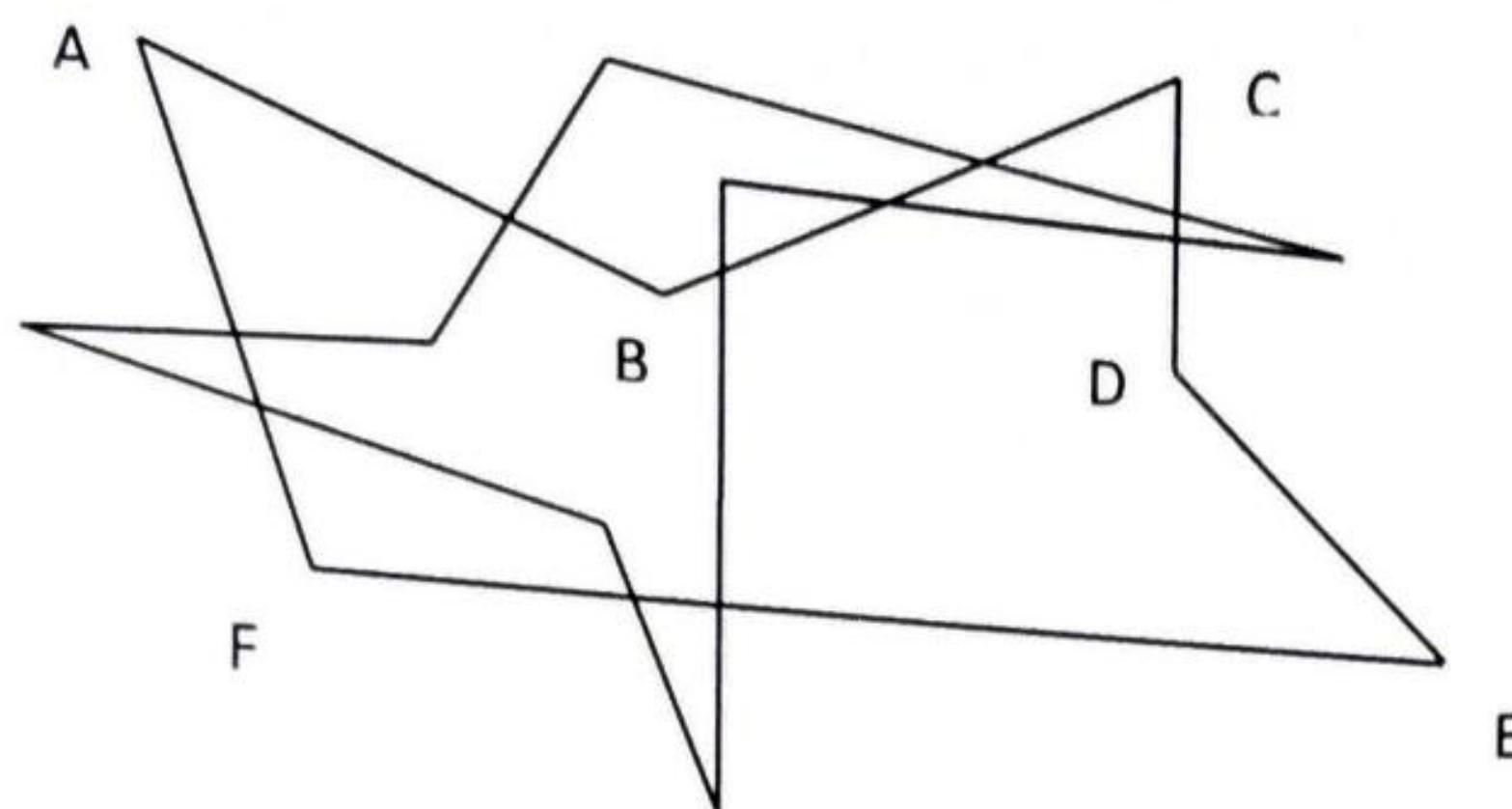
3. (a) Describe Addressing mode of microprocessor with proper example.
 (b) If the last two instructions are not written in any assembly language program, what will happen? 4

```
MOV AH, 4CH
INT 21H
MAIN ENDP
END MAIN
```

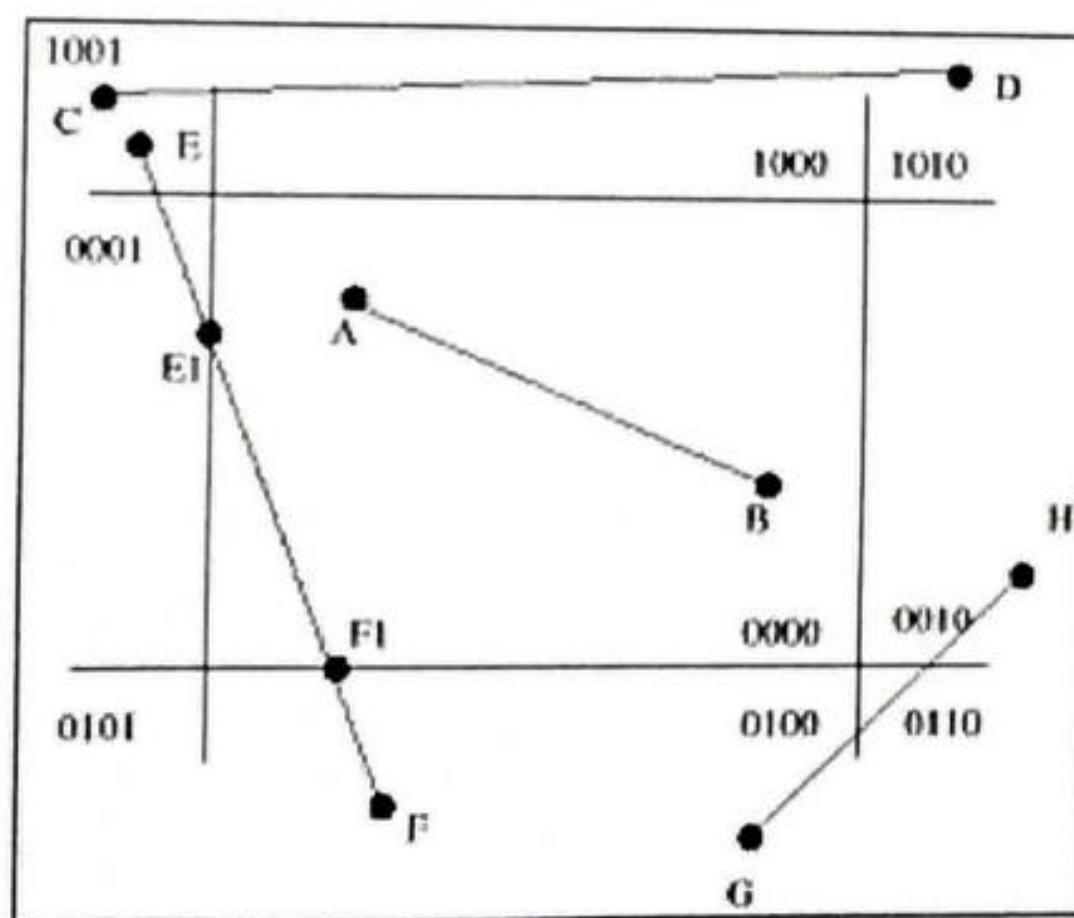
2

- Q.8 (a) How do you differentiate between validation testing and verification testing?
(b) Discuss different types interfaces between software components that should be tested during component testing.
(c) What is meant by software reliability and availability?

6. a. Clip polygon ABCDEF by using Weiler-Atherton polygon clipping algorithm



- b. Explain different types of shading model.
c. Write few applications of height mapping.
7. a. If you don't adjust line in viewport what types of problem you may face. Use Cohen-Sutherland Line Clipping Algorithm to clip the following line:



- b. Write the differences between random and raster-scan display.
c. How shadow mask method displays color in CRT monitor.
8. a. Why hidden surface algorithm needed? Briefly describe the Z-buffer algorithm for hidden surface detection.
b. Why Texture Mapping is needed?
c. Derive the general perspective transformation onto a plane with reference point $R_0(x_0, y_0, z_0)$, normal vector $N = n_1I + n_2J + n_3K$, and using $C(a, b, c)$ as the center of projection.

Good Luck

Bangabandhu Sheikh Mujibur Rahman Science and Technology University

Department of Computer Science & Engineering

3rd Year 2nd Semester B.Sc. Engg Final Exam- 2019

Course Title: Computer Graphics

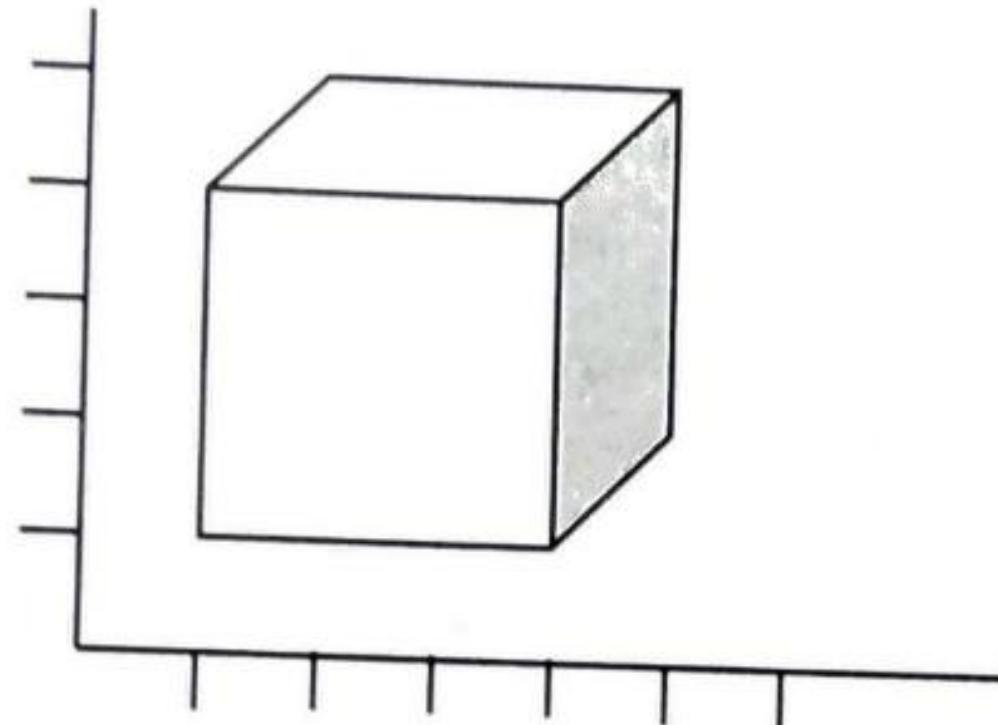
Full Marks: 60

Course Code: CSE351

Time: 3 Hours

Answer any six questions from eight questions

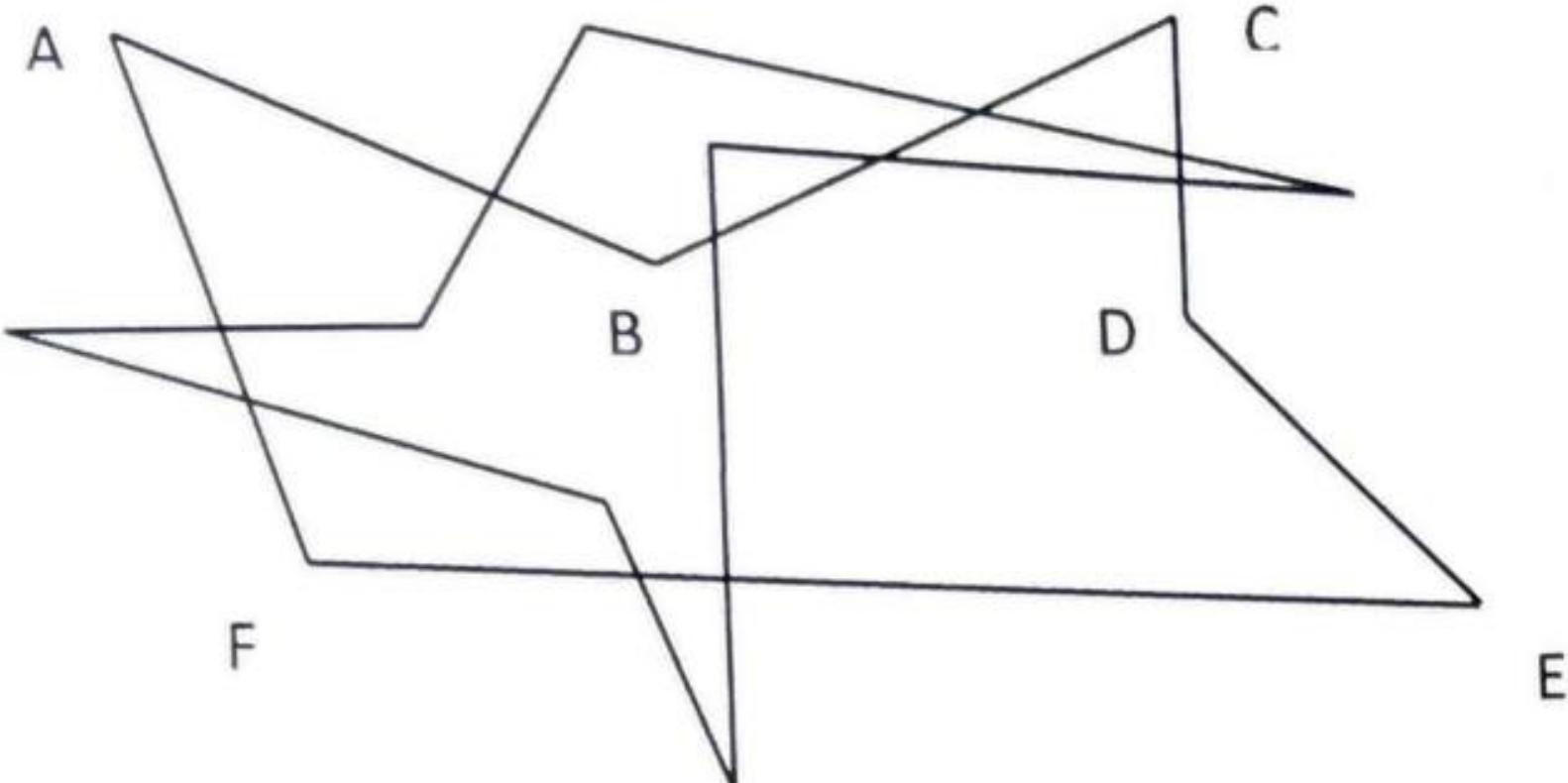
- | | |
|----|---|
| 1. | a. Use Bresenham line drawing algorithms to draw a line which should be drawn between the points (18, 25) and (27, 29). 5 |
| | b. List some emissive and non-emissive display system. 2 |
| 2. | c. What do you mean by hue, saturation and value for HSV color model? 3 |
| | a. Draw the translated and Scaled figure from the following object where $t_x = 2$, $t_y = 3$ and $S_x=2$, $S_y=2$ 5 |



- | | |
|----|--|
| b. | Define Aspect ratio and Resolution of an image. Show that the mirror reflection is simply a special case of scaling. 5 |
| 3. | a. Reflect the diamond shaped polygon whose vertices are A (-1, 0), B (0, -2), C (1, 0), and D (0, 2) about the line $y = x + 5$. 5 |
| | b. Explain key framing and morphing technique of computer animation. 3 |
| | c. How can you clip a point? 2 |
| 4. | a. Clip polygon against window ABCD using Sutherland-Hodgman's polygon clipping algorithm. The coordinates of the polygon are: a (80,200); b (220,120); c (150,120); d (100,30); e (10,120). Coordinates of the window are: A (200,50); B (50,150); C (200,150); D (50,50). 5 |
| | b. Ray-casting approach is an effective visibility-detection method for scenes with curved surfaces, particularly spheres. Explain the Space Partitioning ray casting approach. 3 |
| | c. Define the following terms: i. Fractals ii. Octrees. 2 |
| 5. | a. Why we have to map window coordinate to viewport coordinate? How window coordinate transform to viewport coordinate? Suppose a window coordinate is $(x_w, y_w) = (30, 80)$, find the viewport coordinate when $x_{wmin}=20$, $x_{wmax}=80$, $y_{wmin}=40$, $y_{wmax}=80$ and $x_{vmin}=30, x_{vmax}=0$, $y_{vmin}=40$, $y_{vmax}=60$. 5 |
| | b. Find the normalization transformation N which uses the rectangle A (1, 1), B (5, 3), C (4, 5), D (0, 3) as a window and the normalized device screen as a viewport. 5 |

Good Luck

a. Clip polygon ABCDEF by using Weiler-Atherton polygon clipping algorithm



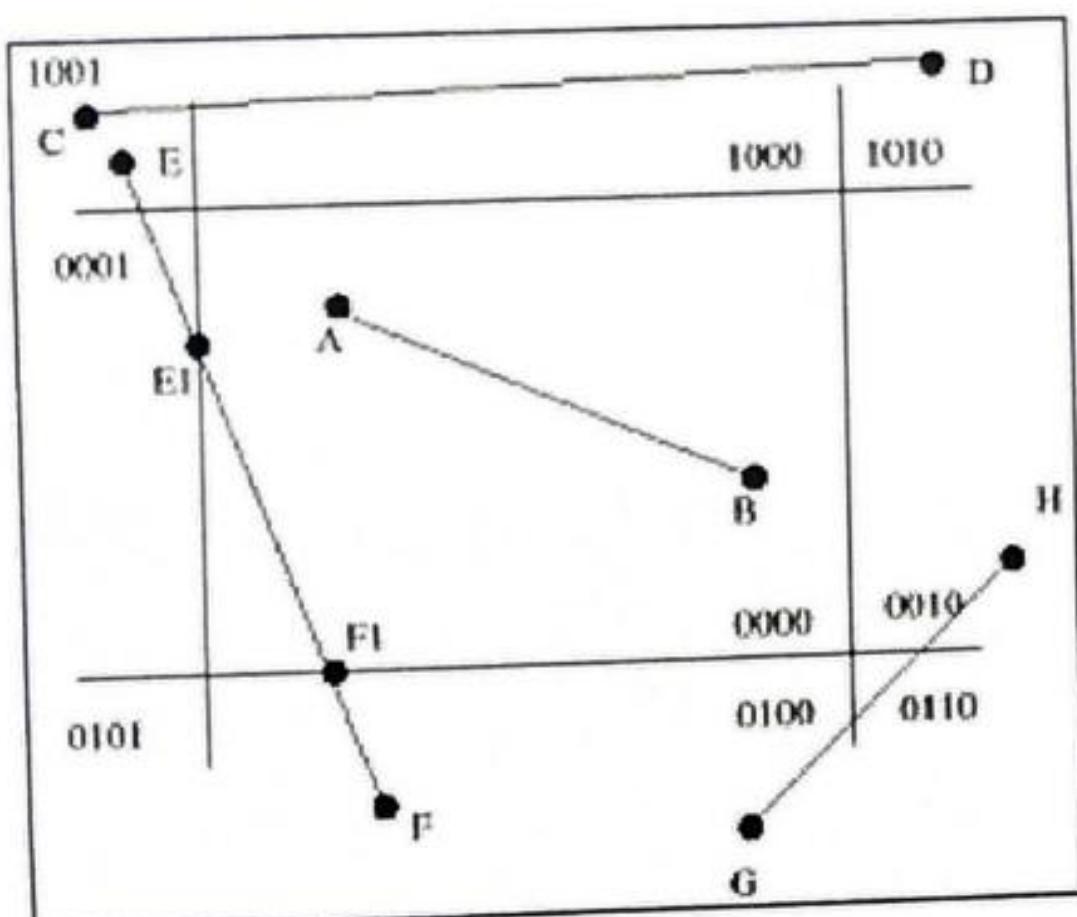
3

b. Explain different types of shading model.

2

c. Write few applications of height mapping.

a. If you don't adjust line in viewport what types of problem you may face. Use Cohen-Sutherland Line Clipping Algorithm to clip the following line:



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c. How shadow mask method displays color in CRT monitor.

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a. Why hidden surface algorithm needed? Briefly describe the Z-buffer algorithm for hidden surface detection.

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b. Why Texture Mapping is needed?

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c. Derive the general perspective transformation onto a plane with reference point $R_0(x_0, y_0, z_0)$, normal vector $N = n_1I + n_2J + n_3K$, and using $C(a, b, c)$ as the center of projection.

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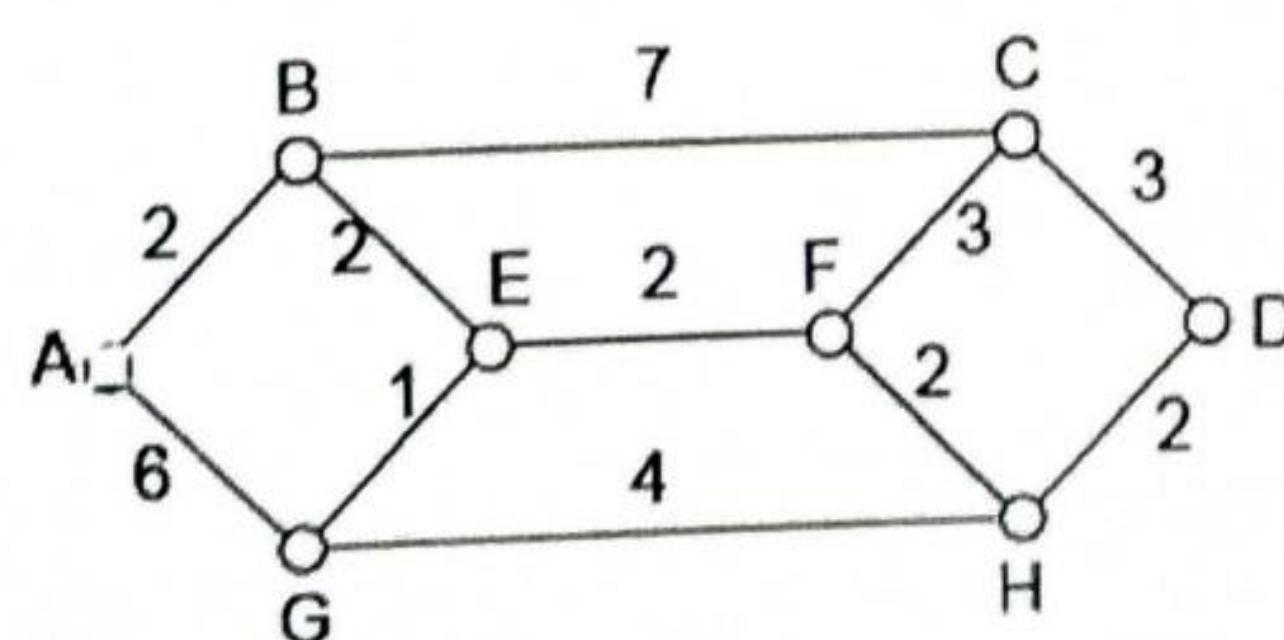


Figure-1

- (b) Define NAT. Why is it used in network? What is ICMP? 2
- (c) How a TCP connection can be established? Explain with figure. 4
- Q.8 (a) What is the basic difference between BOOTP and DHCP? Show the format of a DHCP packet. 3
- (b) How does the FTP work? Discuss with figure. 3.5
- (c) Define URL. Explain the four things of URL. Define SMTP. 3.5

Bangabandhu Sheikh Mujibur Rahman Science and Technology University

Department of Computer Science & Engineering
3rd Year 2nd Semester B.Sc. Engineering Examination-2019

Course No: CSE359
Full Marks: 60

Course Title: Software Engineering
Time: 3 hours

N.B.

- i) Answer any **SIX (6)** from the following **EIGHT (8)** questions.
- ii) All questions are of equal values.

- Q.1 (a) Define software engineering. What is the difference between software engineering and system engineering? 3
- (b) What are the benefits of incremental development model over waterfall model? List two problems of incremental model. 2+2
- (c) If the team consists of 10 members and needs to deliver the project within 7 months, do you think the project will be feasible? Show reason behind your answer. 3
- Q.2 (a) The decisions made by senior management or team leader can have a significant impact on the effectiveness of a software engineering team. What criteria do you think should be considered when choosing team leader? 4
- (b) Distinguish between the following facts: 3
- (i) Direct and indirect measure.
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- Q.3 (a) Present an argument against lines of code (LOC) as a measure for software productivity. 2
Will your case hold up when dozens or hundreds of projects are considered?
- (b) Compute the function point value for a project with the following information domain characteristics: 5
- No. of user inputs: 32
No. of user outputs: 60
No. of user inquiries: 24
No. of files: 8
No. of external interfaces: 2
Assume that all complexity adjustment values are average.
- (c) Describe the categories of reusable software resources. 3
- Q.4 (a) Define independent paths, no. of regions and cyclomatic complexity for the flow graph given below: 6
-
- (b) Draw the graph matrix for the flow graph as illustrated in Q.4(a). 4
- Q.5 (a) What is software maintenance? Describe the types of software maintenance. 3
(b) Write down the steps of software maintenance process. 4
(c) Briefly explain software quality metrics 3
- Q.6 (a) Specify different types of risks that may affect a software project. Discuss some strategies to help manage risks. 5
(b) Describe five software application areas in which software safety and hazard analysis would be a major concern. 5
- Q.7 (a) Suppose, for the telecommunication and system software, the line of code is 90,000 and the effort in person-months is 6. Then find out the duration in months for developing this software. 4
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(c) What is meant by software reliability and availability? 4

Bangabandhu Sheikh Mujibur Rahman Science & Technology University
 Department of Computer Science & Engineering
 3rd Year 2nd Semester B.Sc. Engineering Examination-2019

Course Title: Numerical methods for Engineers
 Full Marks: 60

Course No: CSE355
 Time: 3 hours

N.B.

- i) Answer any **SIX (6)** from the following **EIGHT (8)** questions.
- ii) All questions are of equal values.

- Q.1** (a) Why are numerical methods necessary for solving engineering problems? Explain this fact using appropriate examples. What are the problems associated with the graphical method in finding the root of an equation? 4
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- (c) What are the differences between an open method and a bracketing method? 2

- Q.2** (a) Prove that the Newton-Raphson method has quadratic convergence property. 4
- (b) Derive the Newton-Raphson formula for finding the roots of equations. Find a root of the equation $xsinx + cosx = 0$ using the Newton-Raphson method. Carry out the computation for three iterations, and use four significant figures in your computation. 4
- (c) What are the problems associated with the naive Gauss elimination algorithm? 2

- Q.3** (a) Solve the following system of equations using LU decomposition with partial pivoting. Show detailed calculation steps. 5

$$\begin{aligned} 2x_1 - 6x_2 - x_3 &= -38 \\ -3x_1 - x_2 + 7x_3 &= -34 \\ -8x_1 + x_2 - 2x_3 &= -20 \end{aligned}$$

- (b) Solve the same system of equations given in 3(a) but use the Gauss-Seidel methods. Iterate the process until the approximate error falls below a stopping criterion of $\varepsilon_s = 10\%$. 5

- Q.4** (a) What is meant by least square regression? How does it differ from interpolation? Derive the equations of the two constants (say, k_0 and k_1) used by the least square regression criterion. 5
- (b) Use least squares regression to fit a straight line to the following data: 5

x	1	3	4	6	8	9	11
$f(x)$	1	2	4	4	5	7	8

Find the equation of the straight line. ;

- Q.5** (a) Describe an algorithm to solve 'inverse interpolation' problem. 2
- (b) Use Newton's interpolating polynomial to determine y at $x = 3.5$ to the best possible accuracy. 5

x	0	1	2.5	3	4.5	5	6
y	2	5.4375	7.3516	7.5625	8.4453	9.1875	12

- (c) Distinguish between (i) accuracy and precision (ii) truncation error and round-off error of a numerical method. 3
- Q.6** (a) Evaluate the following integral using multi-application trapezoidal rule for two different step sizes, $h = 0.4$ and $h = 0.2$. 5

$$\int_0^{0.8} (-4x^2 + 3x - 5x + 7)dx$$

- (b) Compute a better estimate using the obtained estimates in question 6(a) using Richardson's extrapolation formula. Also, compute the true percent relative error for this third estimate. 3
- (c) State the formulas for Lagrange interpolating polynomials. 2
- Q.7 (a) Evaluate $\int_0^2 (3x^2 + 2x - 5)dx$ by using Simpson's $3/8$ rule. 6
- (b) Derive the high accuracy differentiation formula for the forward and backward finite difference approximation of the first derivative. 4
- Q.8 (a) Estimate the first derivative of the function $f(x) = 0.1x^4 + 0.25x^3 - 0.55x^2 + 0.4x + 3$ at $x = 0.5$ by (i) the high accuracy forward difference formula using the step-size of 0.5
(ii) Richardson extrapolation method with the high accuracy forward difference formula using the step-sizes of 0.5 and 1.0. 6
- (b) How does Runge-Kutta (RK) methods achieve the accuracy of a Taylor series approach without requiring the calculation of higher derivatives? Show how you can obtain different second-order methods for different values of parameter a_2 4

Bangabandhu Sheikh Mujibur Rahman Science and Technology University

Department of Computer Science and Engineering

3rd Year 2nd Semester B.Sc. Engineering Examination-2019

Course No: CSE357

Time: 3 Hours

N.B.

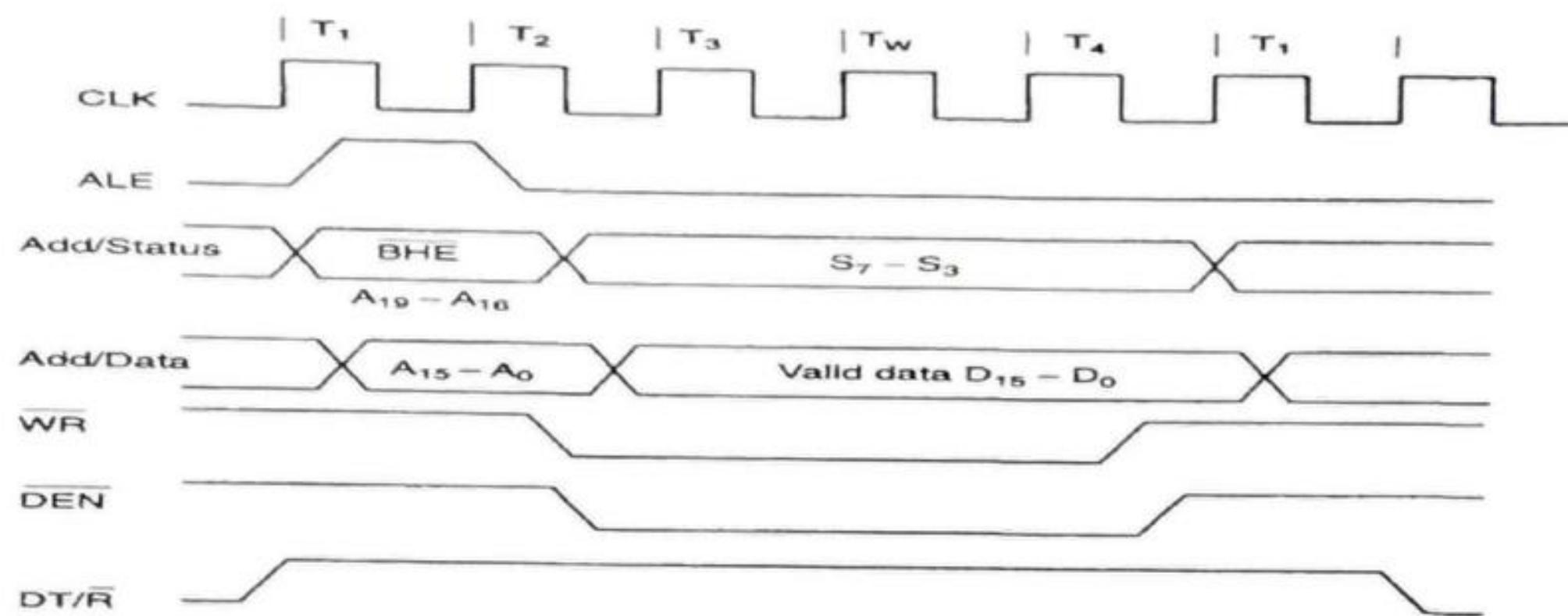
Course Title: Microprocessor & Microcontroller

Full Marks: 60

- i. Answer any Six (6) out of Eight (8) questions.
- ii. All of the questions are of equal values.

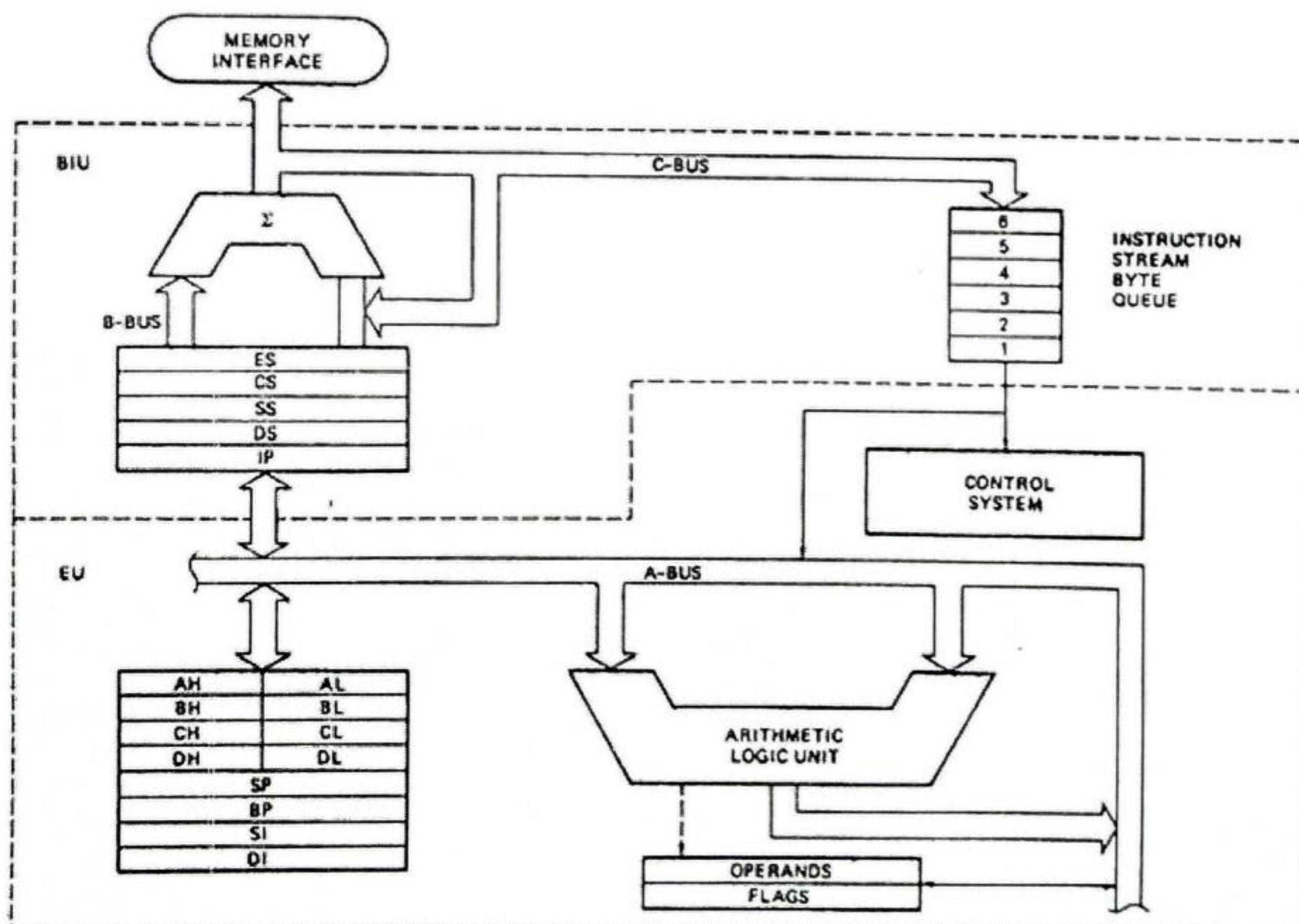
1. (a) What are the differences between Microprocessor and Microcontroller? 2
- (b) Why INTEL named the 8086 Microprocessor as '8086'? Briefly explain the internal architecture of 8086 CPU (Draw the block diagram also). 4
- (c) Why we need to use latch for 8086 microprocessors? 2
- (d) Define system bus. Address bus is unidirectional and data bus bidirectional, what do you think about it? 2

2. (a) 5



Describe this timing diagram. Write an instruction which can generates this timing diagram.

- (b) 5



Describe the architecture of 8086 microprocessor from the figure.

3. (a) Describe Addressing mode of microprocessor with proper example. 4
- (b) If the last two instructions are not written in any assembly language program, what will happen? 2

MOV AH, 4CH
INT 21H
MAIN ENDP

- (c) Write an assembly language program to convert the following input into desired output. 4

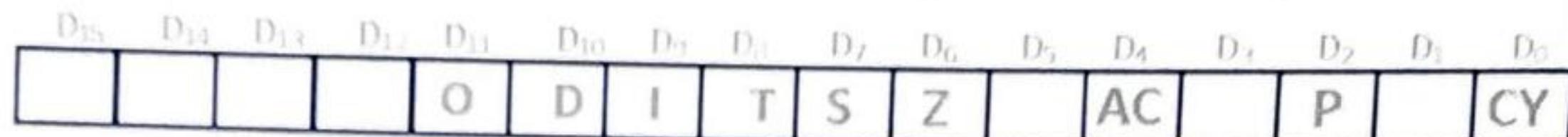
Input: ABC

Output: A

B

C

4. (a) Briefly Explain the Logical Address, Base Segment Address and Physical Address. 3
- (b) What is the position of the Stack Pointer After the Pop Instruction? 2
- (c) Described the flag register? How you programmatically check the status register? 5



5. (a) Write a program to add a data byte located at offset 0500H in 2000H segment to another data byte available at 0600H in the same segment and store the result at 0700H in the same segment. 2
- (b) Explain the use of SI and DI register during string operations. 3
- (c) What is the maximum memory addressable size by the 8086? Explain briefly the string addressing mode with the help of an example? What is the purpose of index registers in 8086? 3
- (d) What do you mean by I/O mapped I/O and memory mapped I/O? Explain with example. 2
6. (a) Write an assembly language program to convert a binary number into hexadecimal number. 4
- (b) Write all possible assembly language instructions for the following things: 4
- Converting an ASCII digit to a number.
 - Converting a lowercase letter to an uppercase letter.
 - Clearing a register.
 - Testing a register zero.
- (c) Suppose that a stack segment is declared as follows: 2
- .STACK 100h
- What is the hex contents of SP when the program begins?
 - What is the maximum hex number of words that the stack may contains?
7. (a) Write an assembly language program for 8086 microprocessors to add 1 to 100. 5
- (b) Write some code to 3
- Place the top of the stack into AX, without changing the stack contents.
 - Place the word that is below the stack top into CX, without changing the stack contents, you may use AX.
- (c) Write down the differences between address and addressing mode with suitable examples. 2

8. (a) Explain the execution of the following code with memory operation and changing of values in different register. 5

```
0100: E8 04 00          CALL    m1
0103: B8 02 00          MOV     AX, 2
0106: C3                RET
0107:                   m1     PROC
0107: BB 05 00          MOV     BX, 5
010A: C3                RET
```

- (b) Define hardware and software interrupt. Which pins of 8086 are responsible for executing the interrupt procedure? 2
- (c) Computer runs without any RAM is it true or false. Defend your answer with suitable examples. 3