

ALIAH UNIVERSITY

End Semester Examination (Spring Semester) 2025

(B. Tech 3rd Year 6th Semester)

Subject Name: Software Engineering

Full Marks: 80

Time: 3 Hours

Subject Code: CSEUGPC17

Group A

Answer all 5 questions

1. Answer the following with at most 2 sentences. **5 X 2 = 10**
- a) What do you mean by PERT? (CO4- Remember)
- b) What do you mean by an SRS? (CO1- Remember)
- c) What do you mean by CPM? (CO4- Remember)
- d) What do you mean by coupling? (CO2- Understand)
- e) What do you mean by a feasibility study? (CO1- Understand)

Group- B

Answer any 6 questions

6 X 5 = 30

2. Describe the properties of a good and bad SRS document. **3+2** (CO1- Understand)
3. Describe the Expert Judgement and Delphi cost estimation technique. **2+3** (CO4- Understand)
4. Explain how function point metric addresses the shortcomings of LOC method for measuring the project size. (CO1- Understand)
5. Explain why spiral model is also called a Meta model. (CO1- Understand)
6. Suppose the estimated development time and cost using Putnam's expression has come out to be 12 month and ₹50000 respectively. What will be the new cost if we shrink the developing time to 2 months? (CO4- Apply)
7. Explain equivalence class partitioning and boundary value analysis. **2+3** (CO3- Understand)
8. Explain critical task and critical path with the help of a diagram. **2+3** (CO4- Understand)

Group- C

Answer any 4 questions

4 X 10 = 40

9.

- a) Using black box testing approach find the probable test cases for a software that finds if a number is negative or positive.
- b) Explain Alpha, Beta and Acceptance testing. **5+5** (CO3-Apply) (CO3- Understand)

10. Explain the concepts of Basic COCOMO, Intermediate COCOMO and Complete COCOMO **4+3+3** (CO4- Understand)

11.

- a) Describe the different classifications of coupling.
- b) Assume that the size of an embedded type software product has been estimated to be 50,000 lines of source code. Assume that the average salary of software developers is Rs. 80,000 per month. Determine the effort required to develop the software product, the nominal development time, and the cost to develop the product. **5+5** (CO2- Understand) (CO4- Apply)

12. Explain each of the phases of the Classical Waterfall Model in details using a diagram. (CO1- Understand)

13. Write a short pseudo code to calculate the factorial of a number. Draw a CFG and find its cyclomatic complexity. **2+8** (CO3- Create)

Aliah University
End Semester Examination (Spring Semester) 2025
(For 3rd Year 6th Semester B.Tech (CSE))

Paper Name: Embedded Systems
Paper Code: CSEUGPC21

**Full Marks:80
Time:3 hours**

Group A

(Answer all questions)

$$5 \times 2 = 10$$

1. What are the functions of RTOS? [CO4, Remember]
 2. Define Multithreading. [CO3, Remember]
 3. Differentiate event-triggered and time-triggered system. [CO2, Understand]
 4. What is the use of Programmable Peripheral Interface? [CO1, Remember]
 5. Differentiate sensor and actuator. Give examples of each. [CO4, Understand]

Group B

(Answer any 5 questions)

$$6 \times 5 = 30$$

1. Differentiate (3+3) [CO1, Understand]

 - a) Microprocessor vs Microcontroller
 - b) Hard and Soft Real Time Systems

2. What are the major differences in I2C and SPI communication mechanism? (3+3) [CO3, Understand]

3. What is the disadvantage of Rate-Monotonic Scheduling? Explain how it is resolved in Earliest Deadline First Scheduling? (3+3) [CO4, Understand]

4. Explain the role of Embedded System in the monitoring and control domain. (3+3) [CO4, Understand]

5. Define with examples the two types of Communication Interfaces. (3+3) [CO5, Understand]

6. Write short notes on: i) ASIC ii) Harvard Architecture. (3+3) [CO1, Remember]

Group C

(4X10=40)

(Answer any 4 questions)

1. a) Explain different classifications of embedded system with examples.

b) Explain the different components that constitute the core of an embedded system. (5+5)

[CO1, Understand]

2. a) Explain the different PLDs used in embedded system.

b) Give examples and explain the wireless communication interfaces used in embedded systems. (5+5)

[CO2, Understand]

3. a) Discuss about the memory unit used in Embedded Systems.

b) Explain the sequence of operation for communicating with I2C slave device with the help of a diagram. (5+5)

[CO3, Understand]

4. a) What is the differences between general purpose kernel and real time kernel?

b) Explain the different multitasking models in operating system context.

(5+5) [CO4, Understand]

5. a) Explain the major mechanisms for inter-process communications in real time systems.

b) Consider three periodic tasks scheduled using Rate Monotonic Scheduling (RMS):

Task	Execution Time (C)	Period (T)
T1	1 ms	4 ms
T2	2 ms	5ms
T3	4 ms	20 ms

Determine whether all tasks can be scheduled feasibly under RMS.

(5+5) [CO4, Apply]

End-Semester Examination (Spring Semester) – 2024-25
[B.Tech, CSE – 3rd Year, 6th Semester]

Paper Name: Data Science & Big Data
Paper Code: CSEUGPE02

Full Marks: 80
Time: 3 Hrs

GROUP A**[Answer any five questions]****[5 x 2 = 10]**

1. i) What do you understand by the anti-monotone property for frequent-itemset mining?
 ii) How many association rules can be produced from a k-itemset?
 iii) What is the role of feature selection in data mining?
 iv) Explain what the "confidence" measure is in rule mining.
 v) Use **Z-score normalization** to normalize 90 given mean = 70, SD = 10.
 vi) Distinguish between classification and regression.

GROUP – B**[Answer any four questions]****[4 x 5 = 20]**

2. Perform two steps of **K-means clustering** for the following 2D points with initial centroids at (2, 2) and (6,6): **Points:** (1, 2), (1, 4), (5, 6), (6, 7).
 1. Explain the Apriori algorithm for association rule mining.
 2. Categorize different types of attributes with examples.
 3. Consider the following confusion matrix and compute the accuracy, precision, recall, false positive rate, and F-measure values.

	Actually Mango	Not Actually Mango
Predicted Mango	147	23
Predicted Not Mango	12	68

6. Consider the sample dataset with three features (A, B, C) with target classes 'C1' and 'C2': $\{(8.2, 81, 7.2, \text{C1}), (8.6, 82, 8.0, \text{C1}), (9.6, 87, 8.4, \text{C1}), (6.9, 46, 5.8, \text{C2}), (7.1, 57, 4.4, \text{C2}), (5.3, 41, 5.7, \text{C2}), (8.8, 91, 9.3, \text{C1}), (8.2, 78, 7.3, \text{C1})\}$. Find the class label of the test instance (7.0, 49, 5.1) using the K-Nearest Neighbor (KNN) classifier with $k = 5$.

GROUP – C**[Answer any five questions]****[5 x 10 = 50]**

7. a) Compute **entropy** when 60% of examples belong to class Yes and 40% to class No.
 b) Given the following distance matrix, create the dendrogram using agglomerative average linkage clustering.
[3 + 7]

	1	2	3	4	5
1	0.0				
2	6.2	0.0			
3	4.4	5.4	0.0		
4	11.5	8.8	4.9	0.0	
5	8.3	8.1	6.1	4.3	0.0

8. a) Consider the following transaction database. If the minimum support is 3, construct the FP-growth tree from the database.
- | | | | |
|----------------|----------------|----------------------|----------------|
| $t_1: d, q$ | $t_2: d, n, p$ | $t_3: c, m, r$ | $t_4: m, n, p$ |
| $t_5: m, n, r$ | $t_6: d, p$ | $t_7: d, m, n, p, r$ | |
- b) Find the patterns from the obtained FP-growth tree from the above question. [5 + 5]

9. a) Given the following transaction database, find all the frequent itemsets for a minimum support value of 3 using the Apriori algorithm.
- | | | |
|----------------------|----------------|----------------|
| $t_1: a, b, n$ | $t_2: b, t, n$ | $t_3: a, e$ |
| $t_4: a, b, t, e, n$ | $t_5: e, s$ | $t_6: a, b, e$ |
| | | $t_7: b, n, t$ |
- b) Define an alternative performance metric to overcome the limitations of the support and confidence metrics in association rule mining. [7 + 3]

10. a) Compute the dissimilarity between the objects based on individual attributes for the dataset given below.
- b) What will the effective dissimilarity matrix between the objects be if all the mixed-type attributes are considered? [6 + 4]

Index	Feature-1 (nominal)	Feature-2 (numeric)	Feature-3 (ordinal)
1	B	83	Good
2	C	43	Fair
3	A	86	Excellent
4	B	39	Fair

11. Consider the following dataset $\{(3,5), (1,3), (6,4), (6,7), (8,6), (7,5)\}$.

- a) Compute the covariance matrix for the given dataset.
 b) Find the eigenvalues and unit length eigen vectors from the obtained covariance matrix.

[4 + 6]

12. a) Reduce the dataset provided in Q11 to a single dimension through Principal Component Analysis.
 b) Describe the divisive hierarchical clustering algorithm.

[6 + 4]

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Autumn Semester Examination - 2025

B.Tech 3rd Year, 6th Semester Examination

Paper Name: Computer Networks

Full Marks: 80

Paper Code: CSEUGPC19

Time: 3 hrs

Group A

1.

Answer all questions (10 × 1 = 10)

- I. Which error detection technique uses polynomial division?
a) CRC b) Checksum c) Hamming Code d) Parity
[CO3 Remembering]
- II. In HDLC, the frame used for connection termination is:
a) S-frame b) U-frame c) I-frame d) B-frame
[CO1 Remembering]
- III. ARP resolves:
a) IP to MAC b) MAC to IP c) Domain to IP d) IP to Port
[CO4 Understanding]
- IV. The default subnet mask for IPv4 class C is:
a) 255.0.0.0 b) 255.255.0.0 c) 255.255.255.0 d) 255.255.255.255
[CO4 Remembering]
- V. Slotted Aloha improves efficiency by:
a) Time synchronization b) Frequency division c) Collision avoidance d) Priority slots
[CO3 Understanding]
- VI. OSPF is a:
a) Distance Vector Protocol b) Link State Protocol
c) Hybrid Protocol d) Path Vector Protocol
[CO5 Remembering]
- VII. TCP uses _____ for connection termination.
a) 2-way handshake b) 3-way handshake c) 4-way handshake d) 5-way handshake
[CO5 Remembering]
- VIII. A device that operates at the Data Link Layer is:
a) Hub b) Switch c) Router d) Repeater
[CO1 Remembering]
- IX. The Token Bucket algorithm is used for:
a) Error Detection b) Congestion Control c) Routing d) Modulation
[CO3 Understanding]
- X. FDMA divides the channel by:
a) Time b) Frequency c) Code d) Space
[CO1 Understanding]

Group B

Answer any 4 question

$$4 \times 5 = 20$$

2. Compare Stop & Wait ARQ and Go-Back-N ARQ. [CO3 Analyzing]

3. Differentiate between Pure Aloha and Slotted Aloha. Why is Slotted Aloha preferred? [CO3 Evaluating]

4. Describe the types of persistence methods in CSMA. [CO3 Understanding]

5. How does DHCP simplify IP address management? [CO4 Understanding]

6. Describe various type of HDLC frames. [CO1 Understanding]

7. Write a short note on Hamming Code. [CO3 Understanding]

Group C

Answer any 5 question

$$\underline{5 \times 10 = 50}$$

8. Represent the following bit stream (**10100101001**) using following encoding techniques.

 - a. NRZ
 - b. NRZ-L
 - c. NRZ-I
 - d. Manchester coding
 - e. Differential Manchester encoding. [CO2 Applying] 2X5=10

9. Briefly describe TCP Header format with suitable diagram. Describe 3-way Handshaking with suitable diagram. [CO5 | Applying + Understanding] 6+4=10

10. You are given 10.0.0.0 ip address slot. You have to create 1025 sub network.

 - a. What is the new subnet mask?
 - b. Maximum how many computers can be connected with any subnetwork?
 - c. What is the broadcast address of last subnetwork?
 - d. What is the ip address of 9th PC of 7th subnetwork?
 - e. What is the broadcast address of 7th subnetwork? [CO4 | Applying Analyzing]

$$5 \times 2 = 10$$

11. a. Briefly describe about Leaky bucket algorithm with suitable diagram. [CO3 Understanding]
b. describe various types of port address with their ranges. [CO3 Applying] 6+4=10

12. a. With suitable flow diagram briefly describes about CSMA/CD in detail. [CO3 Analyzing]
c. Difference between CSMA/CA and CSMA/CD. [CO3 Understanding] 6+4=10

13. a. Discuss various ranges of IP (v4) with their default subnet mask. b. Compare RIP and OSPF. c. Explain the role of Poison Reverse in routing. [CO4/5 Analyzing Understanding] 4+3+3=10

14. Write short note any of two. 2X5=10

a. ICMP b. ARP c. DNS. D. Distance Vector Routing protocol
[CO4/5 Analyzing Understanding]

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Even-Semester (Spring) Examination - 2025

(For 6th Semester BTech, CSE)

Paper Name: Computer Graphics

Full Marks: 80

Paper Code: CSEUGPC20

Time: 3 Hrs

(Answer the Questions as per the instruction in each Group and in Sequential Order)

Group - A

1. Answer all the questions:

(10X1=10)

Sl. No.	Questions	Marks	CO	BT Level
a)	What is pixmap?	1	1	Remember
b)	What is viewport?	1	3	Understand
c)	Define frame buffer.	1	1	Remember
d)	What is resolution?	1	1	Remember
e)	Define Clipping.	1	4	Understand
f)	A point P (3, 4) is translated by (+5, -2). What are the coordinates of the new point P' after the translation?	1	2	Apply
g)	Which joint style flattens the corner by cutting off the pointy edge? a) Round b) Bevel c) Miter d) Curve	1	3	Understand
h)	Which of the following is NOT an output primitive? a) Line b) Polygon c) Circle d) Flood Fill	1	3	Understand
i)	In Bresenham's line algorithm, if the distances $d_1 = d_2$ then decision parameter P_k is: a) Positive b) Equal c) Negative d) Option a or c	1	2	Apply
j)	_____ is a rigid body transformation that moves objects without deformation.	1	2	Remember

Group - B

(Answer any 5 questions)

(6X5=30)

Sl. No.	Questions	Marks	CO	BT Level
2.	Explain how Raster Scan and Random Scan systems work. In what types of applications is each commonly used?	5+1	1	Understand
3.	Prove that two successive rotations are additive.	6	2	Understand
4.	a) Explain the concept of reflection in 2D transformation. b) Derive the transformation matrices for reflection about i) The X-axis ii) The line $y = x$	2+4	2	Remember
5.	Write short note on i) Joysticks ii) Trackball.	3+3	1	Remember
6. a) b) c)	What is homogeneous coordinate? Why is it needed? What is the matrix representation of translation in homogeneous coordinate?	2+2+2	3	Understand
7. a) b)	What is line cap? What are the different attributes of line primitives? Explain different types of line caps with diagram.	3+3	3	Remember
8.	Magnify the triangle with vertices A(0,0), B(1,1) and C(5,2) to twice its size while keeping the point C(5,2) fixed.	6	2	Apply
9.	Write short note on RGB Colour and Grey Color scale.	3+3	4	Remember

Group - C
(Answer any 4 questions)

$(10 \times 4 = 40)$

Sl No.	Questions	Marks	CO	BT Level
10.	Explain Bresenham line drawing algorithm with proper mathematical analysis and calculate the pixel positions along a line between A(20,10) and B(30,18) using it.	10	2	Understand, Apply
11.	Given the centre point coordinates (0, 0) and radius as 10. List the pixel coordinates calculated in each step for the first octant only using Mid-point circle drawing algorithm and generate coordinates of other 7 octants from it.	10	2	Understand, Apply
12.	Consider a rectangular clipping window defined by the following boundaries: $x_{min}=10$, $x_{max}=30$ and $y_{min}=10$, $y_{max}=20$. You are given a line segment with endpoints: P1=(5,5) and P2=(35,25). Using the Cohen-Sutherland line clipping algorithm, determine the clipped line segment (portion of the line inside the clipping window)	10	2	Apply
13.	Perform 45 degree rotations of triangle A(0,0), B(1,1), C(5,2) about P(-1,-1)	10	2	Apply
14.	Explain Sutherland Hodgeman polygon clipping algorithm with suitable example and list disadvantages of it.	10	3	Understand
15.	Given a triangle with points (1,1), (0,0) and (1,0). Apply shear parameter 2 on X axis and 2 on Y axis. Find out the new coordinates of the given triangle for i) shearing in X-axis ii) Shearing in Y-axis.	10	3	Apply

Aliah University

End-Semester Examination - 2025

(BTech, CSE 3rd Year, 6th Semester)

Paper Name: Compiler Design

Full Marks: 80

Paper Code: CSEUGPC18

Time: 3 Hrs

Group – A

(5X2=10)

1. Answer any five of the following questions –

- What are the various compiler construction tools? [Remember, CO1]
- Mention the role of Symbol Table Manager in compilation. [Remember, CO1]
- What are necessary conditions of any grammar to be an LL(1) parser? [Remember, CO5]
- Define Operator grammar. [Remember, CO5]
- Mention whether the following statement is true or false – (with explanation)
“All L-attributed SDDs are also S-attributed”. [Analyze, CO4]
- What do understand by the ‘propagation’ for variable and constants? [Remember, CO4]

Group – B

Answer any five of the following questions -

(5X6=30)

- Discuss the structure of a lex code. Explain with a sample lex program. [Remember, CO1]
- Construct a DFA to tokenize integer and floating constants. [Apply, CO2]
- Calculate FIRST() and FOLLOW() of all the non-terminals in the following grammar –
[Here S is the start symbol, N={S,A,B,D} and T={a,b,d,g,h, ε}] [Apply, CO3, CO4]

$$S \rightarrow ADB \mid DbB \mid Ba$$

$$A \rightarrow da \mid BD$$

$$B \rightarrow g \mid \epsilon$$

$$D \rightarrow h \mid \epsilon$$

- Write an SDT to convert any infix expression into prefix expression. [Apply, CO4, CO5]
- Write short notes on AST and DAG for intermediate code representation. Give examples. [Understand, CO4]
- Use the following grammar and perform operator precedence parsing for the input “2+3*4”. [Here, E is the only non-terminal.] [Apply, CO4, CO5]
$$E \rightarrow E+E \mid E^*E \mid id$$
- What is meant by Peephole optimization? Mention some Peephole optimization techniques with examples. [Remember, CO4]

Group – C

Answer any four of the following questions -

(10X4=40)

- a) Illustrate the different phases of a compiler with a block diagram. [Understand, CO2]
b) Explain Buffer-pair and sentinel concepts used in tokenization. [Analyze, CO2] [6+2+2]

10. Consider a grammar (given below) to solve the questions – [5+5]

[Here S is the start symbol, N={S, A, B} and T={a, b, d, e, f}]

$$S \rightarrow Bb \mid dAB \mid \epsilon$$

$$B \rightarrow ab \mid d$$

$$A \rightarrow f$$

a) Find out all LR (1) item sets for the grammar. [Apply, CO4, CO5]

b) Form a parsing table and say whether it is CLR (1) parser or not. [Analyze, CO4, CO5]

11. a) Calculate LR (0) item sets for a grammar given in Question number 7. [Apply, CO4, CO5]

b) Whether the following grammar could be used as LL(1) parser or not? [Apply, CO3, CO4]

[Here A is the start symbol, N={A,B,D} and T={a,b,d, ε}] [4+6]

$$A \rightarrow aB \mid Db$$

$$B \rightarrow AdD$$

$$D \rightarrow dB \mid \epsilon$$

12. a) Write 3-address code for the c-program segment given below. [Apply, CO4] [4+3+3]

```
x=1;  
while (x<10)  
{  
    if(a>5 && b<10)  
        p++;  
    else  
        q--;  
    x++;  
}
```

b) Represent the above 3-address code in Quadruples and Triples format. [Apply, CO4]

13. a) Differentiate between Bottom-Up and Top-Down parsing techniques. Mention types of each parser. [Remember, CO3]

b) Mention various ways to optimize a loop. Give examples. [Remember, CO4] [4+6]

14. a) Construct a DFA to accept all strings starting with '10' and have substring '11', where $\Sigma = \{0,1\}$. [Apply, CO1] [5+5]

b) Write an SDT to convert any binary number into decimal. Choose grammar as you wish. [Apply, CO4, CO5]