

# Aliah University

End Semester Examination - 2024

(For 6<sup>th</sup> Semester B. Tech CSE Programme)

Paper Name: Computer Networks

Paper Code: CSEUGC19

**Full Marks: 80**

**Time: 3 Hrs**

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Group - A

(10X1=10)

1. Answer any ten (10) questions

- a. What is TTL?
- b. What is the default subnet mask of the ip address 16.192.168.5 ?
- c. What is Ping?
- d. What is the port address of FTP?
- e. What is attenuation?
- f. Which layer of the OSI reference models is responsible for concession control?
- g. What do you mean by 10BASE5?
- h. What is socket?
- i. Give the example of routed protocol
- j. Give the example of **interdomain** routing protocol.
- k. What is subnet mask?
- l. Differentiate between IPv4 and IPV6

Group - B

(Answer any 4 questions)

(4X5=20)

- 1. Briefly describe various types of persistence methods.
- 2. Differentiate between OSI and TCP/IP reference models.
- 3. How many types of HDLC frames are there? Describe various types of HDLC frames in detail.
- 4. Briefly describe Sliding Window protocol.
- 5. Describe ARP protocol.
- 6. Describe various types of port address along with their ranges.

**Group - C**  
**(Answer any 5 questions)**

(5x10=50)

- 8.** Briefly describe about Pure ALOHA and Slotted ALOHA in detail. **5X2=10**

**9.** You are given **10100110** bit stream. Draw the graph using  
a. Manchester coding,      d. NRZ-I      **D** Differential Manchester  
c. NRZ                        e. NRZ-L

**10.** You are given **172.16.0.0** ip address slot. You have to create **24** sub networks. **5X2=10**  
a. What will be the new subnet mask?  
b. What will be the network address of 8<sup>th</sup> network?  
c. What will be the broadcast address of 10<sup>th</sup> network  
d. What will be the ip address of 11th pc of 12<sup>th</sup> network?  
e. What will be the broadcast address of the last network?

**11.** Briefly describe CSMA/CD with flow diagram. Differentiate between TCP and UDP. **7+3=10**

**12.** Briefly describe about Leaky Bucket algorithm. Briefly describe 4-way hand-shaking **6+4=10**

**13.** Describe about TCP header format with a suitable diagram. What is Route poisoning in RIP? **7+3=10**  
**5+5=10**

**14.** Write short notes (any two)  
(a) RARP  
(b) Bellman-Ford Algorithm  
(c) TDMA  
(d) CRC  
(e) ICMP

# Aliah University

## End-Semester Examination - 2024

(BTech, CSE 3<sup>rd</sup> Year, 6<sup>th</sup> Semester)

Paper Name: Compiler Design

Full Marks: 80

Paper Code: CSEUGPC18

Time: 3 Hrs

### Group - A

(10X1=10)

#### 1. Mention whether the statements given below are true or False -

- a) Left recursive grammars could be used as LL (1) parser.
- b) Type mismatch error is detected during Semantic Analysis phase.
- c) "yytext" is a pointer variable in a lex code.
- d) L-Attributed SDTs can't have Synthesized syntax directed definitions.
- e) DAG representation can form cycle.
- f) Operator grammars never have two consecutive non-terminals.
- g) Peephole optimization technique is needed for optimizing a slice of program at a time.
- h) "aababaab" is a correct string of regular expression=(a(ab)\* ) \*
- i) Preprocessor directives are expanded during Lexical analysis phase.
- j) CLR is the most powerful LR parser.

### Group - B

(6X5=30)

Answer any six of the following questions -

- 2. Discuss the structure of a yacc code. Explain with an example. [5]
- 3. Discuss Buffer-pair and sentinel concepts used in tokenization. [5]
- 4. Write a Syntax Directed Translation to count number of '0's in any binary number. Consider any grammar suitable for the same. [5]
- 5. Differentiate between Bottom-Up and Top-Down parsing techniques. Mention types of each parser. [5]
- 6. Mention various ways to optimize a loop. Give examples. [5]
- 7. Write short notes on AST and DAG, and form AST and DAG for the following statement –  
$$P = (A+B)^*C + (A-B)^*(A+B)$$
 [5]
- 8. 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,e,ε}] [5]

$$S \rightarrow ABaD \mid DbB$$

$$A \rightarrow Ba \mid \epsilon$$

$$B \rightarrow e \mid \epsilon$$

$$D \rightarrow d$$

[PTO]

(10X4=40)

**Group - C**

Answer any four of the following questions -

9. a) Construct a Non-deterministic Finite Automata (NFA) for the following C-program segment -

```
for (i=0; i<n; i++)
{
    if(a>5 || b<6)
        p++;
    else
        q++;
}
```

b) Convert the NFA into its corresponding Deterministic Finite Automata. [5+5]

10. a) Write 3-address code for the c-program segment given in question 9(a). [4+3+3]

b) Represent the above 3-address code in Quadruples and Triples format.

11. Consider a grammar (given below) to solve the questions -

$$\begin{aligned} S &\rightarrow L = R \\ S &\rightarrow R \\ L &\rightarrow *R \\ L &\rightarrow a \\ R &\rightarrow L \end{aligned}$$

[Here S is Start symbol, T = {=, a, \*} and N = {S, L, R}]

a) Find out all LR (0) item sets for the grammar.

b) Form a parsing table and say whether it is SLR (1) parser or not. [5+5]

12. a) Calculate LR (1) item sets for a grammar given below-

$$\begin{aligned} S &\rightarrow AaAb | BbBa \\ A &\rightarrow \epsilon \\ B &\rightarrow \epsilon \end{aligned}$$

[Here S is Start symbol, N = {S, A, B} and T = {a, b, \epsilon}]

b) Define Operator grammar. Briefly explain the parsing concept of operator precedence parsing. [5+5]

13. a) What is meant by Peephole optimization? Mention some Peephole optimization techniques with examples.

b) Write semantic rules in the following grammar to evaluate resultant value of any prefix expression - [eg.- +34=7, +2\*47=30 etc] [5+5]

$$S \rightarrow +SS \mid *SS \mid a \quad \text{where } T = \{+, *, a\}$$

# ALIAH UNIVERSITY

## End Semester Examination (Spring Semester) 2024 (B. Tech 3<sup>rd</sup> Year 6<sup>th</sup> 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?
  - b) What do you mean by cohesion?
  - c) What do you mean by coupling?
  - d) What do you mean by slack time?
  - e) What is the main advantage of Iterative Waterfall Model over Classical Waterfall Model?

### Group- B Answer any 6 questions

**6 X 5 = 30**

- 2. Explain the concept of Critical Path when scheduling a software project with an example.
- 3. Give five differences between white box testing and black box testing.
- 4. Describe Iterative Waterfall Model with a diagram.
- 5. Suppose the estimated development time and cost using Putnam's expression has come out to be 9 month and ₹10000 respectively. What will be the new cost if we have to develop it within 3 months?
- 6. Explain why spiral model is also called a Meta model.
- 7. Explain the Classical Waterfall Model with a diagram.
- 8. Explain in short prototyping model and evolutionary model. **2.5+2.5**

**Group- C**  
**Answer any 4 questions**

**4 X 10 =40**

**9.**

- a) Explain Alpha, Beta and Acceptance testing.  
b) Using black box testing approach find the probable test cases for a software that computes the square root of an input integer which can assume values in the range of 0 to 8000. **5+5**

**10.** Explain the Basic COCOMO model in details. Explain how is Intermediate COCOMO better than Basic COCOMO? **6+4**

**11.** Write a short pseudo code to find whether a number is prime or not. Draw a CFG and find its cyclomatic complexity. **2+8=10**

**12.**

- a) Assume that the size of an organic type software product has been estimated to be 100,000 lines of source code. Assume that the average salary of software developers is Rs. 100,000 per month. Determine the effort required to develop the software product, the nominal development time, and the cost to develop the product.  
b) Write five characteristics of a good SRS document. **6+4**

**13.** Explain the different type of classification of cohesiveness and coupling. **5+5**

**End – Semester Examination (Spring Semester) – 2023-24****[B.Tech, CSE – 3<sup>rd</sup> Year, 6<sup>th</sup> 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) How many association rules can be produced from a k-itemset?  
 ii) What do you understand by downward closure property of Apriori Principle for the itemsets?  
 iii) What data transformation is required for ratio-scaled attributes to apply Euclidean distance?  
 iv) Why data normalization is needed?  
 v) How min-max normalization differs from the standardization (z-score).  
 vi) Distinguish between unsupervised and supervised learning.

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

2. Explain the Apriori algorithm for association rule mining.  
 3. Describe the different steps in Data Mining.  
 4. Categorize different types of attributes with examples.  
 5. Explain the following terms in the context of association rule mining: support of an itemset, confidence of an association rule, and frequent itemset.  
 6. Consider the sample dataset with three features (A, B, C) with target classes ‘X’ and ‘Y’: {(9.6, 88, 8.3, X), (6.2, 47, 5.3, Y), (8.1, 83, 7.3, X), (8.5, 83, 8.1, X), (6.7, 52, 4.2, Y), (8.3, 75, 7.4, X), (5.9, 40, 5.1, Y), (8.9, 92, 9.2, X)}. Find the class label of the test instance (6.3, 42, 5.2) using the K-Nearest Neighbor (KNN) classifier with  $k = 4$ .  
 7. Consider the following confusion matrix and compute the values of accuracy, precision, recall, false positive rate and F-measure from it.

	<b>Actually Horse</b>	<b>Not Actually Horse</b>
<b>Predicted Horse</b>	150	15
<b>Predicted Not Horse</b>	5	70

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

8. a) Differentiate between agglomerative and divisive hierarchical clustering algorithms.  
 b) Given the following distance matrix, create the dendrogram using agglomerative complete linkage clustering.

**[3 + 7]**

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>1</b>	<b>0.0</b>				
<b>2</b>	<b>2.2</b>	<b>0.0</b>			
<b>3</b>	<b>6.4</b>	<b>5.2</b>	<b>0.0</b>		
<b>4</b>	<b>10.2</b>	<b>9.0</b>	<b>4.3</b>	<b>0.0</b>	
<b>5</b>	<b>9.1</b>	<b>8.0</b>	<b>5.2</b>	<b>3.1</b>	<b>0.0</b>

9. Consider the following dataset  $\{(4,3), (2,1), (3,5), (5,6), (7,8), (6,7)\}$ .
- Compute the covariance matrix for the given dataset.
  - Find the Eigen values and unit length Eigen vectors from the obtained covariance matrix. [4 + 6]
10. a) Reduce the dimension of the dataset provided in Q9 to single dimension through Principal Component Analysis. [6 + 4]
- b) Describe the k-means clustering algorithm.
11. a) Given the following transaction database, find all the frequent itemsets for minimum support value 3 using Apriori algorithm.
- |                |                |                |                      |
|----------------|----------------|----------------|----------------------|
| $t_1: a, c, m$ | $t_2: c, t, m$ | $t_3: a, e$    | $t_4: a, c, t, e, m$ |
| $t_5: e, s$    | $t_6: a, c, e$ | $t_7: c, m, t$ |                      |
- b) Define an alternative performance metrics to overcome the limitation of support and confidence metrics in association rule mining. [7 + 3]
12. a) Consider the following transaction database. If minimum support is 3, construct the FP-growth tree from the database.
- |             |                      |                |                |                |
|-------------|----------------------|----------------|----------------|----------------|
| $t_1: e, s$ | $t_2: a, d, e$       | $t_3: d, m, t$ | $t_4: a, d, m$ | $t_5: d, t, m$ |
| $t_6: a, e$ | $t_7: a, d, t, e, m$ |                |                |                |
- b) Find the patterns from the obtained FP-tree growth algorithm from the above question. [5 + 5]
13. a) Compute the dissimilarity between the objects based on individual attributes for the dataset given below.
- b) What will be the effective dissimilarity matrix between the objects by considering all the mixed type attributes? [6 + 4]

<i>Object Identifier</i>	<i>test-1 (nominal)</i>	<i>test-2 (ordinal)</i>	<i>test-3 (numeric)</i>
1	M	Excellent	47
2	N	Fair	24
3	P	Good	66
4	Q	Excellent	28

14. Define the entropy measure. Compute the entropy and information gain for all the attributes for the given dataset to identify for the root node in the construction of ID3 decision tree algorithm. [2 + 8]

SI No	Age	Income	Graduate	Credit Rating	Buys Laptop (Class Label)
1	<35	High	No	Fair	No
2	<35	High	No	Excellent	No
3	35-50	High	No	Fair	Yes
4	>50	Medium	No	Fair	Yes
5	>50	Low	Yes	Fair	Yes
6	>50	Low	Yes	Excellent	No
7	35-50	Low	Yes	Excellent	Yes
8	<35	Medium	No	Fair	No
9	<35	Low	Yes	Fair	Yes
10	>50	Medium	Yes	Fair	Yes
11	<30	Medium	Yes	Excellent	Yes
12	35-50	Medium	No	Excellent	Yes
13	35-50	High	Yes	Fair	Yes
14	>50	Medium	No	Excellent	No

# Aliah University

Even-Semester (Spring) Examination - 2024

(For 3<sup>rd</sup> Year 6<sup>th</sup> Semester BTech. CSE)

Paper Name: Computer Graphics

Paper Code: CSEUGPC20

Full Marks: 80

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)

- a) What is frame buffer?
- b) What is resolution?
- c) Name one locator device.
- d) Define miter join.
- e) Data Glove is a \_\_\_\_\_ device.
- f) What is rotation transformation?
- g) Who is known as the father of Computer Graphics?
- h) What is the purpose for using clipping in computer graphics?
- i) In Bresenham's line algorithm, if the distances  $d_1 > d_2$  then decision parameter  $P_k$  is \_\_\_\_\_.
- j) a) Positive b) Equal c) Negative d) Option a or c
- k) Show reflection of a triangle an object about the Y axis.

## Group - B

(Answer any 5 questions)

(5X6=30)

- 2. Compare Raster Scan and Random Scan techniques. 6
- 3. Draw a line with endpoints (20,10) to (30,18) using Bresenham's line drawing algorithm. 6
- 4. a) What is composite transformation? 2+4  
b) What is shear transformation? Draw a shear transformation of a square (0,0),(1,0), (1,1),(0,1) using x-direction shear with  $sh_x = 2$ . 6
- 5. Write brief description on any two input devices. 3+3
- 6. Given the centre point coordinates (0, 0) and radius as 10, generate all the points to form a circle using Mid-point Circle drawing algorithm. 6
- 7. a) Define line caps? What are the different types of line caps? Explain them. 3+3  
b) Explain different types of line joins with diagrams.
- 8. What are the logical classifications of Input Devices? Explain with suitable examples. 2+4

## Group - C

(Answer any 4 questions)

(10X4=40)

- 9. a) Prove that two successive rotations are additive. 5+5  
b) Magnify the triangle with vertices A(1,1), B(3,2) and C(5,2) to twice its size while keeping the point C(5,2) fixed.
- 10. Perform Cohen-Sutherland line clipping of the line  $P_1P_2$  with  $P_1(10,30)$  to  $P_2(80,90)$  against a window A(20,20), B(90,20), C(90,70), D(20,70). Mention co-ordinates to say which portion is visible. 10
- 11. What are window and viewport? Derive the window to viewport transformation and also identify the geometric transformation involved. 10
- 12. Explain Sutherland Hodgemann polygon clipping algorithm with a suitable example and comment on its shortcoming. 10
- 13. Write short note on RGB Colour and CMY Colour scale. 5+5
- 14. Perform 45 degree rotations of a triangle A(0,0), B(1,1), C(5,2) about P(-1,-1) 10

**Aliah University**  
**End Semester Examination(Spring Semester) 2024**  
**(For 3<sup>rd</sup> Year 6<sup>th</sup> Semester B.Tech(CSE))**

**Paper Name:** Embedded Systems  
**Paper Code:** CSEUGPC21

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

**Group A**  
**(Answer all questions)**

**5X2=10**

1. What is an embedded system?
2. List 5 application areas where embedded systems are used.
3. What are the characteristics of large Scale Embedded System?
4. Define release time and deadline.
5. What is hyperperiod?

**Group B**

**(Answer any 5 questions)**

**6X5=30**

1. Differentiate :
  - a) Harvard V/s Von-Neumann Processor/Controller Architecture
  - b) General Purpose Operating System vs Real Time Operating System
2. What are the characteristics of Embedded System?
3. Explain the different components that constitute the core of an embedded system.
4. Explain how Embedded System function in the Control and Monitoring domain.
5. What are Sensors and Actuators? Give two examples of each. (4+2)
6. Differentiate between FPGA and CPLD.

**Group C**  
**(Answer any 4 questions)** **(4X10=40)**

1. a) Explain different classifications of embedded system with examples.
- b) Differentiate operational and non-operational attributes. (5+5)
2. a) Describe the I/O subsystem used in Embedded System.
- b) Discuss about the memory unit used in Embedded Systems. (5+5)
3. a) Differentiate Rate Monotonic Scheduling and Earliest Deadline First Scheduling algorithm.
- b) Schedule the following processes by any of the priority based real time scheduling algorithm.

Processes	Execution Time (C)	Time period (T)
P1	3	20
P2	2	5
P3	2	10

(5+5)

4. Write short notes on (2.5X4)
  - a) Microcontrollers
  - b) Digital Signal Processor
  - c) Zigbee
  - d) Hard Real Time System and Soft Real Time System
5. a) Define with examples the two types of Communication Interfaces.  
b) Explain the sequence of operation for communicating with SPI Bus with the help of a diagram.  
(3+7)