

(3 Hours)

[Total Marks: 80]

- Note: (1) Question 1 is compulsory**  
**(2) Solve any three questions out of remaining**  
**(3) Assume suitable data wherever necessary**

- Q.1** Solve any four **[20]**
- (a) Explain principle differences between connection less and connection oriented communication.
  - (b) What is channel allocation problem?
  - (c) Find the error, if any, in the following IPv4 addresses.  
(i) 221.24.7.8.20    (ii) 75.45.351.14
  - (d) Differentiate between TCP and UDP.
  - (e) Write short note on SMTP.
- Q.2** (a) Describe OSI reference model with a neat diagram. **[10]**  
(b) Explain different framing methods. **[10]**
- Q.3** (a) Explain different types of guided transmission media in detail. **[10]**  
(b) Explain sliding window protocol using selective repeat technique. **[10]**
- Q.4** (a) Explain Link State Routing with suitable example. **[10]**  
(b) What is need of DNS and explain how DNS works? **[10]**
- Q.5** (a) Explain IPv4 header format in detail. **[10]**  
(b) Explain Three Way Handshake Technique in TCP. **[10]**
- Q.6** (a) Explain leaky bucket algorithm and compare it with token bucket algorithm. **[10]**  
(b) Write short notes on: (i) TCP Timers (ii) HTTP **[10]**

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- Note: 1. Question no.1 is compulsory.  
2. Attempt any three out of remaining five.  
3. Assumptions made should be clearly indicated.  
4. Figures to the right indicates full marks.  
5. Assume suitable data whenever necessary.

**Question 1 Solve any four.**

**5 marks each**

- A What are the basic building blocks of Data warehouse?
- B Explain Page Rank technique in detail.
- C Compare OLTP and OLAP.
- D Differentiate between Agglomerative and Divisive clustering method.
- E Discuss data visualization Technique.
- F Explain issues in Data mining.

**Question 2**

**10 marks each**

- A Explain Decision Tree based Classification Approach with example. Discuss Metrics for evaluating Classifier Performance.
- B Describe the steps involved in Data Mining when viewed as a process of Knowledge Discovery.

**Question 3**

**10 marks each**

- A Differentiate between Star schema and Snowflake schema. Design Star schema for company sales with three dimensions such as Location, Item and Time.
- B Explain Data Pre-processing.

**Question 4**

**10 marks each**

- A Differentiate between top-down and bottom-up approaches for building data warehouse. Discuss the merits and limitations of each approach. Also explain the practical approach for designing a data warehouse.
- B What is Web mining? Explain Web structure Mining and Web Usage Mining in detail.

**Question 5**

**10 marks each**

- A Explain multilevel and multidimensional association rule mining in detail.
- B A database has five transactions. Let minimum support count = 2 and minimum confidence = 60 %. Find all frequent item sets using Apriori Algorithm. List strong association rules.

TID	Items
100	1,3,4
200	2,3,5
300	1,2,3,5
400	2,5
500	1,3,5

**Question 6**

**10 marks each**

- A Explain K-Means clustering algorithm. Discuss its advantages and limitations. Apply K-Means algorithm for the following data set with 3 clusters.

Data Set = {2,3,6,8,9,12,15,18,22}

- B Consider the data given below. Create adjacency matrix. Apply complete link algorithm to cluster the given data set and draw the dendrogram.

	A	B	C	D	E
A	0	2	6	10	9
B	2	0	3	9	8
C	6	3	0	7	5
D	10	9	7	0	4
E	9	8	5	4	0

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- N.B. (1) Question one is Compulsory.  
 (2) Attempt any 3 questions out of the remaining.  
 (3) Assume suitable data if required.**

- Q. 1 Solve any Four out of the following 20M
- a. Explain the Software Process Framework.
  - b. Explain the Waterfall model.
  - c. Explain the Functional requirements.
  - d. Explain 3Ps in software project spectrum.
  - e. Explain the software testing process.
- Q2 a. Explain SQA and its types? 10 M
- b. Explain the Agile process model of software development 10 M
- Q. 3 a) Explain the any five characteristics of SRS 10M
- b) Explain the COCOMO model. 10M
- Q. 4 a) Explain Coupling. Explain different types with detailed example. 10M
- b) Explain the principles of software testing. 10 M
- Q. 5 a) Explain requirement model. 10M
- b) Explain software Re-engineering 10M
- Q. 6 Solve **any Four** 20M
- a. Explain the XP.
  - b. Explain the development of use case.
  - c. Different between Alpha and Beta Testing.
  - d. What is SCM?
  - e. Explain the Six Sigma for software Engin

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(3 hours)

[80 marks]

NOTE:

1. Question No 1 is compulsory
2. Attempt any three questions from remaining.
3. Assume suitable data if necessary and state the same.

Q1. [20]

a) Show that grammar represented by production rules given below is ambiguous.

$$S \rightarrow S + S \mid S - S \mid S * S \mid S/S \mid (S) \mid a$$

- b) Construct a Moore machine to output remainder modulo 4 for any binary number.
- c) Differentiate between NPDA and PDA.
- d) Explain Chomsky Hierarchy.

Q2. [10]

a) Write steps for converting CFG to CNF form. Convert the following CFG to CNF. [10]

$$S \rightarrow ASB \mid \epsilon \quad A \rightarrow aAS \mid a \quad B \rightarrow SbS \mid A \mid bb$$

b) Convert following RE to NFA- $\epsilon$  and convert it to minimised DFA corresponding to it

$$(0+11)^*(10)(11+0)^* \quad [10]$$

Q3. [10]

a) Construct a PDA for accepting  $L = \{a^n b^m c^n \mid m, n \geq 1\}$

b) Give formal Definition of Pumping Lemma for Regular Language. Prove that the following language is not regular.  $L = \{wrw^r \mid w \in \{a,b\}^*, r \in \{c\}, |w| \geq 1\}$  [10]

Q4. [03]

a) Construct CFG for following

i. Alternate sequence of 0 and 1 starting with 0 [03]

ii. Do not contain 3 consecutive a over {a,b} [04]

iii.  $L = \{x \in \{0,1\}^* \mid x \text{ has equal number of 0's and 1's}\}$  [03]

b) Explain applications for FA, PDA and TM [10]

Q5. [10]

a) Construct a Moore machine to convert all occurrences of 100 to 101 in a string over  $\{0,1\}^*$ . convert it to equivalent Mealy Machine [10]

b) Design a TM accepting all palindromes over  $\{0,1\}$  [10]

Q6. Write short note (Solve Any 4) [20]

- a) Decision Properties of Regular Languages
- b) Post Correspondence Problem
- c) Variants of Turing Machine
- d) Acceptance by a PDA
- e) Conversion of Moore to Mealy Machines

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