

# CBCS SCHEME

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17CS52

## Fifth Semester B.E. Degree Examination, Feb./Mar. 2022 Computer Networks

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

### Module-1

- 1 a. Explain the working of HTTP along with its required and response message format. (10 Marks)
- b. Explain the P2P architecture for file sharing. (10 Marks)

OR

- 2 a. Explain the working of SMTP. Also explain mail access protocols. (10 Marks)
- b. Explain the services offered by DNS along with DNS record and message format. (10 Marks)

### Module-2

- 3 a. Explain the working of Go – Back – N protocol. (08 Marks)
- b. Draw and explain the FSM for sender site and receiver site of rdt 2.0 protocol. (08 Marks)
- c. Explain UDP segment structure. (04 Marks)

OR

- 4 a. Draw TCP segment structure and explain its field. (07 Marks)
- b. Explain three way handshaking procedure used by TCP. (05 Marks)
- c. Explain how TCP handles congestion. (08 Marks)

### Module-3

- 5 a. Explain IPv6 packet format. (06 Marks)
- b. Explain the working of OSPF routing protocol. (07 Marks)
- c. Explain any two broadcast routing algorithm. (07 Marks)

OR

- 6 a. Explain the structure of a router. (10 Marks)
- b. Write link state algorithm, consider the following networks with the indicated link costs. Apply link state routing algorithm to compute the shortest path from 'u' to all other nodes in the network.

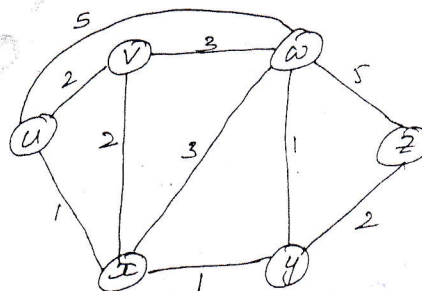


Fig.Q6(b)

(10 Marks)

**Module-4**

- 7 a. Explain three phases of mobile IP. (10 Marks)  
b. Illustrate the two different approaches for routing to a mobile node. (10 Marks)

**OR**

- 8 a. Explain 3G cellular networks architecture. (10 Marks)  
b. What is handoff? Explain the steps involved in accomplishing handoff. (10 Marks)

**Module-5**

- 9 a. Explain the working of CDN. (10 Marks)  
b. Explain three different ways of streaming stored video. (10 Marks)

**OR**

- 10 a. Explain the various packet scheduling mechanism. (08 Marks)  
b. Explain the leaky bucket policing mechanism. (08 Marks)  
c. Explain the properties of audio. (04 Marks)

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17CS53

Fifth Semester B.E. Degree Examination, Feb./Mar. 2022

## Database Management System

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

### Module-1

- 1 a. Define DBMS. Explain in detail the characteristics of database approach. How does it differ from traditional file system? (10 Marks)
- b. What are the functions of Database Administrators (DBA)? (04 Marks)
- c. Explain the Three – Schema Architecture, with a neat diagram. (06 Marks)

OR

- 2 a. Write an E – R diagram for a banking database. Assume your own entries (minimum 5 entities), attributes and relations. Also mention cardinality ratio. (10 Marks)
- b. Explain with neat sketch, the different phases of database design. (10 Marks)

### Module-2

- 3 a. Consider the following schema for a Company database :  
EMPLOYEE (Name , SSN , Address , Sex , Salary, DNo)  
DEPARTMENT (DName , DNumber , MGRSSN , MGRSTARTDATE)  
PROJECT (PName, PNumber, PLocation, DNum)  
WORKS-ON (ESSN, PNo, Hours)  
DEPENDENT (ESSN, DependentName, Sex, BDate, Relationship)  
Write the queries in relational algebra to
  - i) Retrieve the name and address of all employees who work for the 'Research' department.
  - ii) Find the names of employees who work on all projects controlled by department number 5.
  - iii) List all the projects on which employee 'Smith' is working.
  - iv) Retrieve the names of employees who have no dependents. (10 Marks)
- b. What is a Relation? Explain the characteristics of relations. (10 Marks)

OR

- 4 a. Explain the syntax of SELECT statement. Write the SQL query for the following relational algebra expression  
 $\Pi_{Bdate, Address} (\sigma_{FName = 'John' \text{ AND } LName = 'Smith'} (EMPLOYEE))$ . (06 Marks)
- b. With examples, explain aggregate function in SQL. (10 Marks)
- c. Explain how the ALTER TABLE command can be used to add and drop constraints. (04 Marks)

### Module-3

- 5 a. How is a view created and dropped? What are the problems associated with updation of views? (10 Marks)
- b. Explain the following :
  - i) Embedded SQL
  - ii) Database Stored Procedures. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 6 a. Explain the various steps in JDBC process by giving examples for each step. (10 Marks)  
 b. What is a Trigger? Explain with an example, how a trigger is created. (10 Marks)

**Module-4**

- 7 a. What is a Functional Dependency? Write an algorithm to find a minimal cover for a set of functional dependencies. (10 Marks)  
 b. What is the need of Normalization? Explain second normal form. Consider the relation EMP\_PROJ = {SSN, PNumber, Hours, EName, PName, PLocation}. Assume {SSN, PNumber} as Primary key. The dependencies are  
 $\{SSN, PNumber\} \rightarrow \{Hours\}$   
 $SSN \rightarrow \{EName\}$   
 $PNumber \rightarrow \{PName, PLocation\}$   
 Normalize the above relation into 2NF. (10 Marks)

OR

- 8 a. Explain Multivalued dependency and fourth normal form, with an example. (10 Marks)  
 b. Consider the relation schema  $R = \{A, B, C, D, E\}$ . Suppose the following dependencies hold :  
 $\{E \rightarrow A, CD \rightarrow E, A \rightarrow BC, B \rightarrow D\}$ .  
 State whether the following decomposition of R are lossless join decomposition or not, Justify.  
 i)  $\{(A, B, C), (A, D, E)\}$       ii)  $\{(A, B, C), (C, D, E)\}$ . (10 Marks)

**Module-5**

- 9 a. Explain why a transaction execution should be atomic. Explain ACID properties by considering the following transaction :  
 T1 : read (A);  
       A := A - 50;  
       write (A);  
       read (B);  
       B := B + 50;  
       write (B). (10 Marks)  
 b. Explain the Database Recovery techniques. (10 Marks)

OR

- 10 a. Draw a state diagram and discuss the typical states that a transaction goes through during execution. (10 Marks)  
 b. With an algorithm, explain two phase locking. (10 Marks)

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## Fifth Semester B.E. Degree Examination, Feb./Mar. 2022 Automata Theory and Computability

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

### Module-1

- 1 a. Define strings language and automata with examples. (05 Marks)
- b. Define DFSM. Design DFSM to accept each of the following languages:
  - i)  $L = \{w \in \{0, 1\}^* : w \text{ corresponds to the binary encoding, without leading 0's, of natural numbers that are evenly divisible by 4}\}.$
  - ii)  $L = \{w \in \{a, b\}^* : (\#_a(w) + 2 - \#_b(w)) \equiv_5 0\}.$  ( $\#_a(w)$  is the number of a's in w). (12 Marks)
- c. Differentiate Moore machines and Mealy machines. (03 Marks)

OR

- 2 a. Define NDFSM. Convert the following NDFSM to its equivalent DFSM. Refer Fig.Q.2(a). (12 Marks)

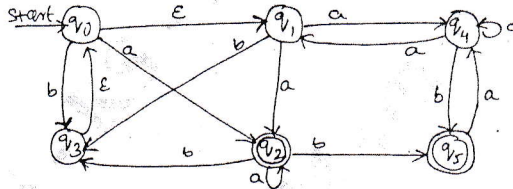


Fig.Q2(a)

- b. Let M be the following DFSM. Use min DFSM to minimize M. Refer Fig.Q.2(b). (08 Marks)

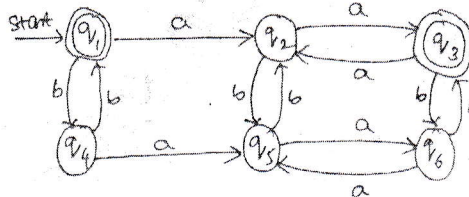


Fig.Q.2(b)

### Module-2

- 3 a. Define regular expression and write regular expressions for the following languages:
  - i)  $L = \{w \in \{a, b\}^* : |w| \text{ is even}\}$
  - ii)  $L = \{w \in \{0, 1\}^* : w \text{ corresponds to the binary encoding, without leading 0's, of natural numbers that are powers of 4}\}$
  - iii)  $L = \{a^n b^m c^p \mid n \leq 4, m \geq 2, p \leq 2\}$  (10 Marks)
- b. Build a regular expression equivalent to DFSM given below. Refer Fig.Q.3(b). (05 Marks)

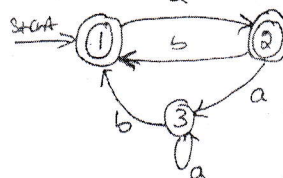


Fig.Q.3(b)

- c. Build a FSM that accepts the language defined by regular expression :  $(b \cup ab)^*$  (05 Marks)

OR

- 4 a. Define regular grammar, and show a regular grammar for the language:  
 $L = \{w \in \{a, b\}^* : |w| \text{ is even}\}$  (06 Marks)
- b. State and prove the pumping theorem for regular languages. (08 Marks)
- c. Show that the language  $L = \{a^n b^n | n \geq 0\}$  is not regular. (06 Marks)

**Module-3**

- 5 a. Define Context Free Grammar. Design a CFG for each of the following languages:  
 i)  $L = \{a^n b^{n+2} | n \geq 0\}$   
 ii)  $L = \{a^i b^j c^k | j = i + k, \forall i, j, k \geq 0\}$   
 iii)  $L = \{a^n b^m | m \geq n, m - n \text{ is even}\}$  (10 Marks)
- b. Convert the following grammar to Chomsky normal form:  
 $S \rightarrow aACa$   
 $A \rightarrow B|a$   
 $B \rightarrow C|c$   
 $C \rightarrow cC|\epsilon$  (10 Marks)

OR

- 6 a. Define PDA. Obtain a PDA to accept the language  
 $L = \{a^n b^m a^n | n, m \geq 0 \text{ and } m \text{ is even}\}$  (10 Marks)
- b. Convert the following CFG to PDA:  
 $E \rightarrow E + T | T$   
 $T \rightarrow T * F | F$   
 $F \rightarrow (E) | id$  (06 Marks)
- c. When a PDA is called as deterministic PDA? (04 Marks)

**Module-4**

- 7 a. State and prove pumping theorem for CFL. (08 Marks)
- b. Show that the following language is not context free  
 $L = \{a^n b^n c^n | n \geq 0\}$  (06 Marks)
- c. Prove that context free languages are closed under Union and concatenation. (06 Marks)

OR

- 8 a. With a neat block diagram, explain the working of basic model for Turing machine. (06 Marks)
- b. Design a Turing machine that accepts  $L = \{0^n 1^n | n \geq 0\}$ . Draw the transition diagram and show the moves for the string 0011. (10 Marks)
- c. Briefly discuss the techniques for Turing machine construction. (04 Marks)

**Module-5**

- 9 a. With a neat diagram, explain the model of linear bounded automation. (08 Marks)
- b. Explain working of multitape turning machine. (06 Marks)
- c. Explain how a post correspondence problem can be treated as a game of dominoes. (06 Marks)

OR

- 10 Write short notes on the following:  
 a. Quantum computation and quantum computers (10 Marks)
- b. Church – Turing Thesis (05 Marks)
- c. The post-correspondence problem. (05 Marks)

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