

TE sem V Computer R-19 e scheme

Duration: 3hrs

Max Marks: 80

- N.B. :** (1) Question No 1 is Compulsory.
 (2) Attempt any three questions out of the remaining five.
 (3) All questions carry equal marks.
 (4) Assume suitable data, if required and state it clearly.

- 1 Attempt any FOUR [20]
- a Explain the use of checksum in TCP segment and How it is calculated? 5
- b Describe connection oriented and connectionless services. 5
- c Generate CRC for message 101111 where binary divisor is 1011 5
- d Discuss ARP and explain its use in computer network communication. 5
- e What is three ways handshaking technique used in transport layer? 5
- 2 a How virtual communication is carried out in ISO-OSI reference model? [10]
- b Why framing is used at DLL? Also explain its different types. [10]
- 3 a Discuss format structure for TCP segment. [10]
- b What are the different types of socket and how it is useful for client server communication? [10]
- 4 a What is dynamic routing? Which algorithms are used for it? [10]
- b What is congestion? Discuss different techniques to prevent and control congestion. [10]
- 5 a Explain different types of cables used in Guided transmission media. [10]
- b How CSMA/CD protocol is useful to control collision in computer network? [10]
- 6 a How DNS is useful for web browsing? Explain name resolution process? [10]
- b How selective repeat ARQ protocol helps to control flow in computer network [10]

T.E. ^{1st} Sem (R-19-20 (Scheme)) Computer

(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.

- a) Write steps for converting CFG to CNF form. Convert the following CFG to CNF. [10]
 $S \rightarrow ASB \mid \epsilon$ $A \rightarrow aAS \mid a$ $B \rightarrow SbS \mid A \mid bb$
- b) Convert following RE to NFA-c and convert it to minimised DFA corresponding to it
 $(0+11)^*(10)(11+0)^*$ [10]

Q3.

- a) Construct a PDA for accepting $L = \{a^n b^m c^n \mid m, n \geq 1\}$ [10]
- 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.

- 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.

- 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

(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 Solve all questions below.

20

- a) Differentiate between NFA and PDA
- b) Design a DFA for accepting all strings over $\{0,1\}$ divisible by 4.
- c) Design a Mealy machine to replace each occurrence of sub-string '011' by '010', where $\Sigma = \{0, 1\}$.
- d) Explain Chomsky hierarchy

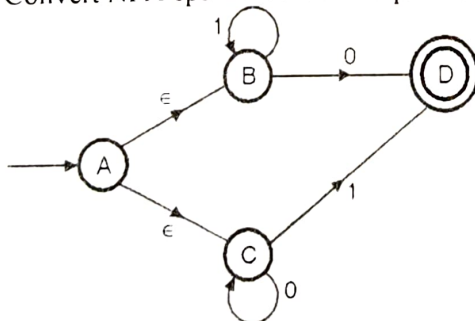
Q2

- a) Find the grammar in Chomsky Normal form equivalent to grammar having $P: S \rightarrow aAD, A \rightarrow aB \mid bAB, B \rightarrow b, D \rightarrow d$. 10
- b) Write down Arden's Theorem. Using Arden's theorem, construct a regular expression corresponding to the state diagram shown below. 10



Q3

- a) Convert NFA epsilon moves to equivalent Minimized DFA. 10



- b) State Pumping lemma for Regular Languages. Let $L = \{w.w^k : w^k \text{ is reversal of } w, w \in \{0,1\}^*\}$; Show that L is not regular. 10

Q4

- a) Explain the types of Turing machines in detail. 10
- b) Let G be the grammar $S \rightarrow aB \mid bA, A \rightarrow a \mid aS \mid bAA, B \rightarrow b \mid bS \mid aBB$. For the string aaabbabbba. Find Leftmost, Rightmost derivation and Parse tree? 10

Q5

- a) Construct a PDA equivalent to following CFG P: $S \rightarrow 0BB, B \rightarrow 0S \mid 1S \mid 0$. Test if 010000 is in the languages. 10
- b) Design a Turing machine to find 2's complement of a binary number. Show simulation of device on input '1010100'. 10

Q6 Write note on (Any 04)

- a) Post Correspondence Problem 05
- b) Halting Problem. 05
- c) Acceptance by PDA 05
- d) Applications of regular expression and finite automata 05
- e) Universal Turing Machine 05
- f) Closure properties of Regular Languages. 05

