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Question Paper Code : 21308

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2013.

Fifth Semester

Computer Science and Engineering

CS 2303 / CS 53 / CS 1303 / 10144 CS 504 – THEORY OF COMPUTATION

(Common to Seventh Semester – Information Technology)

(Regulation 2008/2010)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is meant by DFA?
2. Define the term Epsilon transition.
3. What is a regular expression?
4. Name any four closure properties of Regular languages.
5. What is a CFG?
6. Define the term Ambiguity in grammars.
7. What is meant by Greibach Normal Form?
8. List the closure properties of Context Free Languages.
9. What is meant by recursively enumerable language?
10. Define the class NP problem.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Construct DFA to accept the language (10)
 $L = \{ w \mid w \text{ is of even length and begins with } 11 \}$
- (ii) Write a note on NFA and compare with DFA. (6)

Or

- (b) (i) Convert the following NFA to a DFA (10)

δ	a	b
p	{p}	{p,q}
q	{r}	{r}
r	{ ϕ }	{ ϕ }

- (ii) Discuss on the relation between DFA and minimal DFA. (6)
12. (a) (i) Discuss on regular expressions. (8)
- (ii) Discuss in detail about the closure properties of regular languages. (8)

Or

- (b) (i) Prove that the following languages are not regular
- (1) $\{0^{2n} | n \geq 1\}$
- (2) $\{a^m b^n a^{m+n} | m \geq 1 \text{ and } n \geq 1\}$ (8)
- (ii) Discuss on equivalence and minimization of automata. (8)
13. (a) (i) Explain about Parse trees. For the following grammar (8)

$$S \rightarrow aB|bA$$

$$A \rightarrow a|aS|bAA$$

$$B \rightarrow b|bS|aBB$$

For the string aaabbabbba, Find

- (1) Leftmost derivation
- (2) Rightmost derivation
- (3) Parse tree.
- (ii) Construct PDA for the language

$$L = \{ww^R | W \text{ in } (a + b)^*\}. \quad (8)$$

Or

- (b) Explain in detail about equivalence of Pushdown automata and CFG. (16)

14. (a) (i) Construct the following grammar in CNF (8)

$A \rightarrow BCD|b$

$B \rightarrow Yc|d$

$C \rightarrow gA/c$

$D \rightarrow dB|a$

$Y \rightarrow f.$

(ii) Discuss about programming techniques for turing machines. (8)

Or

(b) (i) Explain about the closure properties of CFL. (8)

(ii) Explain in detail about Pumping lemma for CFL. (8)

15. (a) (i) Explain about "A language that is not Recursively Enumerable". (8)

(ii) Prove L_{ne} is recursively enumerable. (8)

Or

(b) (i) Discuss on undecidable problems about Turing Machine. (10)

(ii) Explain about the PCP. (6)