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Question Paper Code : X 60383

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020
Fifth Semester

Computer Science and Engineering

CS 2303/CS 53/CS 1303/10144 CS 504 – THEORY OF COMPUTATION
(Regulations 2008/2010)

(Common to PTCS 2303 – Theory of computation for B.E. (Part-Time) Fifth
Semester-Computer Science and Engineering – Regulations 2009)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions

PART – A

(10×2=20 Marks)

1. Draw the transition diagram (automata) for an identifier.
2. What is a non deterministic finite automaton ?
3. Construct NFA for the regular expression a^*b^* .
4. Is regular set is closed under complementation ? Justify.
5. What is a CFG ?
6. Define the term Ambiguity in grammars.
7. State the pumping lemma for CFLs.
8. What are the applications of Turing Machine ?
9. What is meant by recursive enumerable language ?
10. Define PCP.



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) Explain about Finite automata and Regular expressions. (8)
 ii) Discuss about the closure properties of regular languages. (8)

(OR)

- b) i) Prove that the following languages are not regular (8)

$$\{0^n 1^m \mid n \leq m\}$$

$$\{0^n 1^{2^n} \mid n \geq 1\}$$

- ii) Discuss on equivalence and minimization of Automata. (8)
13. a) i) Is the grammar $E \rightarrow E + E / E * E / id$ is ambiguous ? Justify your answer. (6)

- ii) Find the context free languages for the following grammars.

1) $S \rightarrow asbs / bsas / \epsilon$

2) $S \rightarrow asb / ab.$

(10)

(OR)

- b) i) Construct the PDA for $L = \{ww^R \mid w \text{ is in } (a + b)^*\}$ (10)

- ii) Discuss the equivalence between PDA and CFG. (6)



14. a) i) Explain Turing machine as a computer of integer functions with an example. **(10)**
ii) Remove ϵ productions from the given grammar. **(6)**
(OR)
- b) Write short notes on the following :
- i) Two-way infinite tape TM. **(8)**
ii) Multiple tracks TM. **(8)**
15. a) i) If L_1 and L_2 are recursive language then $L_1 \cup L_2$ is a recursive language. **(6)**
ii) Prove that the halting problem is undecidable. **(10)**
(OR)
- b) i) State and prove the post's correspondence problem. **(10)**
ii) Write a note on NP problems. **(6)**
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