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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)**

**B.Tech II Year II Semester Regular Examinations October-2020
FORMAL LANGUAGES AND AUTOMATA THEORY
(Common to CSE & CSIT)**

Time: 3 hours

Max. Marks: 60

PART-A

(Answer all the Questions 5 x 2 = 10 Marks)

- | | | | |
|----------|----------|--|-----------|
| 1 | a | Differentiate NFA and DFA. | 2M |
| | b | Construct a r.e for the language which accepts all strings with at least two c's over the set $\Sigma = \{c,b\}$. | 2M |
| | c | What is a ambiguous grammar? | 2M |
| | d | Define Deterministic PDA. | 2M |
| | e | When we say a problem is decidable? Give an example of undecidable problem. | 2M |

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

- | | | | |
|----------|----------|---|-----------|
| 2 | a | Define Moore machine. Construct Mealy machine corresponding to Moore machine. | 5M |
|----------|----------|---|-----------|

States (Q)	Next States		Output
	I/P=0	I/P=1	
→q1	q1	q2	0
q2	q1	q3	0
q3	q1	q3	1

- | | | | |
|--|----------|---|-----------|
| | b | Write a procedure for conversion of NFA to DFA. | 5M |
|--|----------|---|-----------|

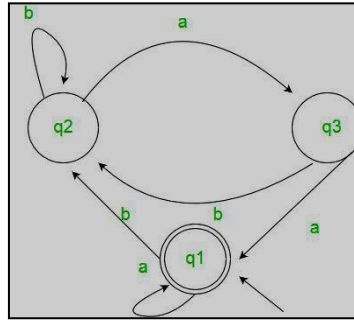
OR

- | | | | |
|----------|----------|---|-----------|
| 3 | a | Define relations on set and explain its property with an example. | 5M |
| | b | Define NFA and DFA. Construct DFA for the given NFA. | 5M |

	Next state	
	0	1
→ q0	q0,q1	q0
q1	q2	q1
q2	q3	q3
⊙ q3	-	q2

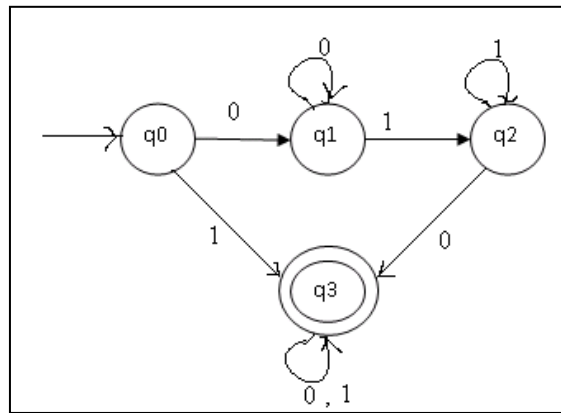
UNIT-II

- 4 a Construct an equivalent FA for the given regular expression $(0+1)^*(00+11)(0+1)^*$ **5M**
 b State Arden's theorem and construct the regular expression for the following FA using Arden's theorem. **5M**



OR

- 5 a Prove $R=Q+RP$ has unique solution, $R=QP^*$ **5M**
 b Explain about the Arden's theorem, Construct RE for given FA **5M**



UNIT-III

- 6 a Write the procedure for Convert the grammar into CNF. **4M**
 b Convert the following grammar into CNF. **6M**
 $S \rightarrow bA/aB$ $A \rightarrow bAA/aS/a$ $B \rightarrow aBB/bS/a$.

OR

- 7 a What is linear grammar? Explain in detail with example. **5M**
 b Explain the closure properties of context free languages. **5M**

UNIT-IV

- 8 a Construct a PDA, which recognizes all strings that contain equal number of 0's & 1's. **6M**
 b A PDA is more powerful than a finite automaton. Justify this statement. **4M**

OR

- 9 a Construct an equivalent PDA for the following CFG: **7M**
 $S \rightarrow aAB \mid bBA$
 $A \rightarrow bS \mid a$
 $B \rightarrow aS \mid b$
 b Explain the formal definition of PDA. **3M**

UNIT-V

- 10 Explain conversion of regular Expression to TM with example. **10M**

OR

- 11 a Explain Universal Turing machine **7M**
 b Describe Turing reducibility. **3M**

END