



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058, India
(Autonomous College Affiliated to University of Mumbai)

ESE
22nd Nov 2019

Max. Marks: 60

Class: T.E. (V) Computers/IT

Course Code: CE55/IT54

Duration: 180 min.

Time: 10 am -1 pm

Name of the Course: Theoretical Computer Science

Instructions:

- (1) All questions are compulsory
- (2) Draw neat diagrams
- (3) Assume suitable data if necessary

Q. No.		Max Marks
Q.1 a	Pumping lemma 3 rules Proof of each rule for given Language	3 Marks 3 Marks
Q.1 b	Tuple information STF (State Function) MAF(Machine Function) Transition Diagram Validation using example	1 Mark 1 Mark 1 Mark 2 Marks 1 Mark
Q.2 a	Correct NFA for $(00 + 1)^*$ Correct NFA for $1(0 + 1)$ Correct NFA for $(00 + 1)^* 1(0 + 1)$	1 Mark 1 Mark 1 Mark
Q.2 b	For correct equations Applying Arden's theorem Correct regular Expression	0.5 Mark 1.5 Mark 1 Mark
Q.2 c	Removal of state which is not reachable from start state Box Representation Transition check for unmatched cell Transition diagram of Minimized DFA	1 Mark 1 Mark 2 Mark 2 Mark
	Correct Tuple information(Mealy) State function Transition diagram Transition diagram of moore machine	1 Mark 1 Mark 2 Mark 2 Mark
Q.3 a	Removal Of null Productions Removal of Unit productions Converting simplified grammar in CNF Define G' in CNF	1 Mark 1 Mark 3 Marks 1 Mark

Q.3 b	<p>OR</p> <p>Removal Of null Productions Removal of Unit productions Removal of Useless variables</p>	<p>2 Marks 2 Marks 2 Marks</p>
	<p>Define the grammar G with GNF condition for given problem Converting the CFG to GNF</p>	<p>2 Marks 4 Marks</p>
Q.4 a	<p>Diagram of Chomsky hierarchy of formal languages. Explanation of Four types of grammar with condition and Examples</p>	<p>2 marks 4 Marks</p>
Q.4 b	<p>Define Recursively Enumerable languages Recursive languages with example.</p>	<p>3 marks 3 Marks</p>
Q.5 a	<p>Define Post correspondence problem condition. Solution for given Post correspondence problem</p>	<p>2 Marks 4 Marks</p>
Q.5 b	<p>Define $M = \{Q, \Sigma, \Gamma, \delta, q_0, z_0, F\}$ with respect to solution. Write transition function δ. Transition diagram.</p>	<p>2 Marks 3 Marks 1 mark</p>
<p>OR</p>		
	<p>Convert the given CFG to GNF Define $M = \{Q, \Sigma, \Gamma, \delta, q_0, z_0, F\}$ with respect to solution. Write transition function δ.</p>	<p>2 Marks 1 Mark 3 marks</p>