ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END-SEMESTER EXAMINATION : JANUARY 2021** (Academic Session: 2020 – 21)		
Name of the Program: (Example: B. Sc./BBA/MA/B.Tech.)	MCA	**Semester:** (I/III/ V/ VII/IX)	III
Paper Title :	FORMAL LANGUAGE & AUTOMATA THEORY	**Paper Code:**	ECS52101
Maximum Marks :	40	**Time duration:**	3 Hrs
Total No of questions:	8	**Total No of Pages:**	2
(Any other information for the student may be mentioned here)			

Answer all the Groups

Group A

Answer all the questions of the following $5 \times 1 = 5$

1. **a)** A DFA which accepts even number of 0's and odd number of 1's consists of _____ number of states.

b) Define Grammar.

c) C is a _____ Language

i) Regular ii) Context Free iii) Context Sensitive iv) Recursive

d) State Pegionhole principle.

e) What is parsing

GROUP –B

Answer *any three* of the following $3 \times 5 = 15$

2. Construct the DFA over $\Sigma=\{a,b\}$ for $L_3= L_1 \cup L_2$, where $L_1=\{\omega | \eta_a(\omega) \bmod 3 > \eta_b(\omega) \bmod 3\}$ & $L_2=$ {ω| every strings holds either "101" as a substring or "000" as a substring}

3. State a DFA that accepts the language L over $\Sigma=\{a,b\}$ such that number a's and b's is divisible by 2 and 3 respectively. Construct the homomorphic image of L provided $\Gamma=\{0,1\}$, h(a)= "0" & h(b)= "1".

4. Explain the necessity of push down automata with respect to deterministic finite automata. State the working principle of push down automata with diagram.

5. Suppose G_1 is a context free grammar with λ-productions, after removal of λ-productions if there exists a grammar G_2without unit production. Can we state that G_1&G_2 are equivalent? - state your answer with reason.

GROUP –C

Answer *any two* of the following $2 \times 10 = 20$

6. Construct a DPDA which accepts the language $L=\{a^m b^n c^m | m,n>0\}$. State the difference between DFA and PDA.

7. If L_1 and L_2 are the regular language, then prove that $L_1 \circ L_2$ and $(L_1)^*$ is regular.

8. Construct the state diagram of the deterministic finite automaton of a binary adder. State a context free grammar which represents the set of integer numbers in C.
