Reg. No.									

INTERNATIONAL CENTRE FOR APPLIED SCIENCES

(Manipal University)

III SEMESTER B.S. DEGREE EXAMINATION – NOV. 2017

SUBJECT: FORMAL LANGUAGES AND AUTOMATA THEORY (CS 233)

(BRANCH: CS)

Wednesday, 8 November 2017

Time: 3 Hours **Max. Marks: 100**

- ✓ **Answer ANY FIVE full Questions.**
- ✓ **Missing data, if any, may be suitably assumed**

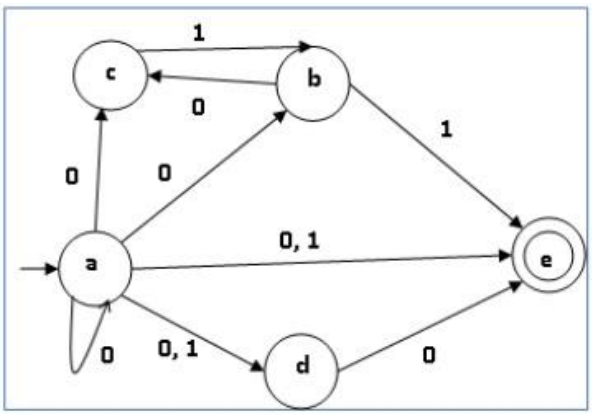
1A. With example for each explain the different types of grammars given by Chomsky.

1B. When do you say the grammar is ambiguous? How do u check it? Check whether the given a grammar: E->E+E, E->E*E, E-> (E), E->id, is ambiguous or not using the derivation tree method to derive (id+id)*id+id.

1C. Give a grammar that generate all possible valid variables(will contain a sequence of letters, digits, underscore and can start with letter or underscore treating upper and lowercase letters separately)of a language "C", **(8+8+4)**

2A. Obtain a NPDA to accept a string of balanced parentheses. The parentheses considered are (,{,[.

2B. Convert the below given NFA to its equivalent DFA



(10+10)

3A. Explain the conditions used to check whether the given PDA is deterministic or not? Check Whether the PDA{ δ(q0,a,a)=(q0,aa), δ(q0,a,a)=(q0, λ),δ(q0,b,a)=(q1,a), δ (q1, λ ,a) =(q2 , λ), δ (q1,a,a)=(q2, λ)is deterministic PDA or not?

3B. When do you say that the grammar is in Greibach Normal Form(GNF)? Convert the below grammar to its equivalent GNF on input alphabet (0,1)

S->AB1/0, A->00A/B, B->1A1

(8+12)

4A. Design a Turing Machine(TM) to accept a language L={0^n1^n|n>=1} and show the sequence of moves made by the TM to accept the string 0011.

4B. Draw a DFA to accept all the strings ending with 100 on input (0,1) and show by some samples that the DFA drawn by you is correct.

(12+8)

5A. Prove that there exists some Nonderministic Finite Accepter (NFA) that accepts the languages generated by regular grammars.

5B. What is right linear grammar? Construct a right linear grammar for L(aab*a). show how to derive a string" aabbba "?

(10+10)

6A. Obtain the regular expression for
   i. Strings of a's and b's having odd length
   ii. Strings of a's and b's with alternative a's and b's

6B. Draw an NFA to accept the strings of a's and b' ending with either "aba" or "ba" and the transition table.

6C. construct a grammar to generate a language on input alphabet (a,b) such that the language will contain exactly 3 a's and ending with a. Give two patterns of such a grammar. **(6+8+6)**

7A. Construct a Turing Machine accepting a language of palindrome over {a,b}* with each string of even length.

7B. Give an algorithm to convert the context-free grammar to its equivalent CNF. Explain the algorithm with an example. **(10+10)**

8A. How do you construct a NPDA for given context free grammar?

8B. Using the above steps construct a NPDA for the given grammar { S->aABC, A->aB/a, B->bA/b, C->aCB/a}.

8C. Differentiate between Pushdown automata and Turing Machine. **(7+7+6)**