Dr. Kabil Sharma

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -3 EXAMINATION- December-2021
V Semester

MAX. MARKS:35

COURSE CODE: 18B11CI513
COURSE NAME: Formal Language and Automata Theory
COURSE CREDITS: 03

MAX. TIME: Two Hours

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

1. For accepting all the string generated by language $L=\{a^n b^m c^m d^n | n,m>=1\}$ which type of machine is most appropriate. Justify your answer and also design the machine? [5]

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3. Prove that the class of CFL are closed under concatenation operation? [3]

4. Prove that the class CFL are not closed under intersection operation? [3]

5. Define Instantaneous Description of PDA and Turing Machine with example? [3]

6. Design a PDA for acceptance of given language by Empty Stack
   $L=\{w \in \{0,1\}^* | w$ has equal number of 0's and 1's in any order$\}$ [5]

7. A Grammar $G= (\{S\}, \{0,1\}, P, S)$ is defined such as $P =\{S \to aSbb | abb\}$. You need to construct the PDA for acceptance the Grammar G by Empty Stack. Also generate a string from given grammar G and accept this string by your constructed PDA. [3+2]

8. Find the language accepted by given Automata $M=(\{q_0,q_1\}, \{0,1\}, \{Z_0,X\}, \delta, q_0, Z_0, \phi)$ and the transaction function (δ) is defined in Table below.

Current State	Input Symbol	Top of Stack Symbol	New State	New Top of Stack Symbol
q_0	0	Z_0	q_0	XZ_0
q_0	0	X	q_0	XX
q_0	1	X	q_1	ε
q_0	1	X	q_1	ε
q_1	1	X	q_1	ε
q_1	ε	X	q_1	ε
q_1	ε	Z_0	q_1	ε

Is this machine is a deterministic machine? Also write few strings which are not accepted by this machine? [3]

9. With help of pumping lemma prove that language $L=\{a^n b^n c^n | n > 1\}$ is not a CFL? [3]