ToC Quiz 2; 2019 Monsoon.

Write your answer in the prescribed space (in the reverse of the paper) only. For multiple choice questions, correct answer will get $+1$ mark and wrong answer will get -0.5 mark (i.e., negative 0.5).You can do your rough work in the given white empty sheet.

1. **Let L_{PF} be the set of languages accepted by a PDA by final state. Let L_{PS} be the set of languages accepted by a PDA by empty stack. Which of the following is true? (A) $L_{PF} \subseteq L_{PS}$(B) $L_{PF} = L_{PS}$(C) $L_{PS} \subseteq L_{PF}$(D) none of these**
2. **Let $L_1 = 0^*1^*$, $L_2 = \{0^n1^n | n \geq 0\}$, $L_3 = 0^*$. Then the languages that can be recognized by a DPDA by empty stack will be (A) only L_1 and L_2(B) only L_1(C) All of these languages (D) only L_2**
3. **Let the CFG, G be $S \rightarrow aSb|SS|\epsilon$ then which of the following is true? (A) G is not ambiguous (B) $(x \in L(G), y \in L(G)) \Rightarrow (xy \notin L(G))$(C) $L(G)$ is regular (D) a DPDA by final state can recognize $L(G)$**
4. **The CFG, $S \rightarrow AC|CB, C \rightarrow aCb|\epsilon, A \rightarrow aA|a, B \rightarrow Bb|b$ generates (A) a^+b^+(B) a^*b^*(C) $\{a^ib^j | i \geq 0, j \geq 0\}$(D) $\{a^ib^j | i \neq j\}$**
5. **In a PDA, if stack size is finite, the language accepted by the machine is (A) context free (B) regular (C) equivalent to DPDA by final state (D) none of these**
6. **Nullable variables in $S \rightarrow AB, B \rightarrow C|A, B \rightarrow \epsilon$ is the set (A) {S, A, B} (B) {A, B} (C) {S, A, B, C} (D) none of these options is correct.**
7. **Let L_{PF} be the set of languages accepted by a DPDA by final state. Let L_{PS} be the set of languages accepted by a DPDA by empty stack. Which of the following is true? (A) $L_{PF} \subseteq L_{PS}$(B) $L_{PF} = L_{PS}$(C) $L_{PS} \subseteq L_{PF}$(D) none of these**
8. **Consider the CFG G: $S \rightarrow aSa|bSb|a|b$. $L(G) =$? (A) All palindromes (B) All odd length palindromes (C) Strings that begin and end with the same symbol (D) All even length palindromes.**
9. **Consider the CFG : $S \rightarrow aB|bA; B \rightarrow b|bS|aBB; A \rightarrow a|aS|bAA$. Which of the following string is in $L(G)$.(A) $aaaabb$ (B) $aabbbb$(C) $aabbab$(D) $abbbba$**
10. **Useless symbols in $S \rightarrow AB, A \rightarrow \epsilon, B \rightarrow \epsilon$ is the set (A) $\{S, A, B\}$(B) $\{A, B\}$(C) ϕ(D) none of these**

Big_answer_question (3.5 + 3.5 + 3 =10 Marks): Let M = ({p, q}, {0, 1}, {z_0, X}, δ, p, z_0, ∅) be a pushdown automaton where δ is given by δ(p, 1, z_0) = {(p, Xz_0)}, δ(p, ε, z_0) = {(p, ε)}, δ(p, 1, X) = {(p, XX)}, δ(q, 1, X) = {(q, ε)}, δ(p, 0, X) = {(q, X)}, δ(p, 0, z_0) = {(p, z_0)}, δ(q, ε, z_0) = {(q, ε)}. By giving the trace (sequence of IDs) findout whether the following strings are in the language of the machine by emptystack (i.e., in N(M)) or not, (i) 0011011 (ii)1110110 (iii) Give transition diagram of the PDA which can recognize N(M) by final state (follow the procedure given in the class). You have to give only transition diagram clearly. Unclear answers can get zero (if not negative marks).

Write your answers below. **Answers (or any symbols) written anywhere else, can make your script invalid.**

Answers to multiple choice questions:

1	2	3	4	5	6	7	8	9	10
B	D	D	D	B	D	C	B	C	C

Answers to Big_answer_question:

(ii)

(iii)