Unit -III

3. (a) Consider G whose Production are S→aA S | a, A→SbA | SS | ba. Show that S⇒ aabbaa and construct a derivation tree whose yield is aabbaa. 6

   (b) Construct a reduced grammar equivalent to the grammar

   S→ aAa, A→ Sb bcc | DaA, C→ abb | DD, E→ ac, D→ aDA 10

   Or

3. (a) Reduce the following CFG to GNF :

   S→ ABb | a, A→ aaA, B→ bAb. 8

   (b) Construct a Pushdown Automation A accepting

   $L = \{\omega c\omega^T \mid \omega \in \{a,b\}^*\}$ by final state. 8

Unit - IV

4. (a) Construct a Turing Machine for the Language

   $L = (\omega\omega^R = \omega \in \{a,b\}^*)$ by final state. 8

   (b) Explain the following :

   (i) Halting Problem of Turing Machine.

   (ii) Rice Theorem (4+4=8)

   Or

4. (a) Explain the following :

   (i) Multitape Turing Machine.

   (ii) Universal Turing Machine (4+4=8)

   (b) Design a Turing Machine over {1,b} which can compute a concatenation function over $\Sigma = = \{1\}$. If the Input, the output has to be $w_1 w_2$ 8

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