

Roll Number:

Thapar Institute of Engineering and Technology, Patiala

Computer Science and Engineering Department

BE-MBA (VI Semester) MST

UCS802: Compiler Construction

March 2022

Time: 2 Hours; MM: 35

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Note: Attempt any 5 questions out of the 7 questions. Make Suitable assumptions with reasoning, if required.

Q1. Consider a regular expression $a(a/b)a^*b$

- a) Using the syntax tree method, draw the annotated syntax tree. Find the *firstpos*, *lastpos* and *followpos*. (4)
- b) Construct the DFA for the above regular expression using the syntax tree method. (3)

Q2. Diagrammatically represent various phases of compiler and explain each phase in short. (7)

Q3.a) Give the First and Follow set for the grammar given below: (4)

$$\begin{aligned} E &\rightarrow T X \\ X &\rightarrow + E \\ X &\rightarrow \epsilon \\ T &\rightarrow \text{int } Y \\ T &\rightarrow (E) \\ Y &\rightarrow * T \\ Y &\rightarrow \epsilon \end{aligned}$$

b) Remove left recursion from the grammar given below: (3)

$$\begin{aligned} S &\rightarrow Sa|(T) \\ T &\rightarrow T, S|S \end{aligned}$$

Q4.a) Explain ambiguous grammar with example. (3)

b) Draw the NFA using Thompson's construction for the expression $(a/b)^*ab^*(a/b)$ (4)

Q5.a) Consider the grammar $G = (\{S\}, \{a, *, +\}, P, \{S\})$, where P is set of productions $P = \{S \rightarrow SS + \mid SS * \mid a\}$. Construct the leftmost and rightmost derivation tree for 'aaa*a++'. (4)

b) Left factor the grammar given below: (3)

$$\begin{aligned} S &\rightarrow A \\ A &\rightarrow Ad / Ae / aB / aC \\ B &\rightarrow bBC / b \\ C &\rightarrow g \end{aligned}$$

PTO

Q6. Draw the LL(1) Predictive Top-Down Parsing table for the grammar given below:

(7)

$S \rightarrow A$
 $A \rightarrow BC/DBC$
 $B \rightarrow Bb/\epsilon$
 $C \rightarrow c/\epsilon$
 $D \rightarrow a/d$

Q7. Generate the LR(1) Set of Items and ACTION GOTO Table for the grammar given below:

(7)

$S \rightarrow BC / b$
 $B \rightarrow bB/a$
 $C \rightarrow cC / c$