

2022

M.Sc.

2nd Semester Examination

COMPUTER SCIENCE

PAPER—COS-202

Full Marks : 50

Time : 2 Hours

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

COS-202 MODULE 1 (AUTOMATA THEORY)

Group - A

Answer any four questions.

4×2

1. Define grammar. Is any grammar possible without a start symbol? Give reason.

(Turn Over)

2. Find the type of the following grammar :

$$S \rightarrow ASB|d$$

$$A \rightarrow aA|b$$

$$dB \rightarrow bb$$

3. Define DFA and NFA.

4. Define pumping lemma.

Group - B

Answer any *two* questions.

2×4

5. Describe Chomsky hierarchy for grammar with example.
6. What are the differences between mealy Machine and Moore machine?
7. Construct a grammar for the language $L =$ Set of all string over a, b containing at least two a .

8. Simplify the following CFG

$S \rightarrow aAa$

$A \rightarrow Sb \mid bCC \mid DaA$

$C \rightarrow ab \mid DD$

$D \rightarrow aDA$

$E \rightarrow aC$

$F \rightarrow b \mid aAD$

Group - C

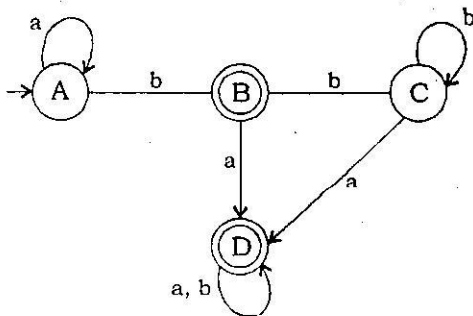
Answer any one question.

1×8

9. Construct a FA for the RE $10+(0+11)0^*1$. Minimize the following FA by using equivalent method.

Present State	Next State	
	I/P = 0	I/P = 1
→ A	E	C
B	C	A
C	B	G
D	G	A
E	F	B
F	E	D
Ⓒ	D	G

10. Show that $L = \{a^n b^n \mid n \geq 1\}$ is not regular. Construct a RE from the following FA using Arden's theorem.



[Internal assessment - 5]

**COS-202 MODULE 2
(COMPILER CONSTRUCTION)**

Group - A

Answer any *two* questions.

2×4

1. What are the functions of error handler?

2. Define annotated parse tree.
3. State the problems in Top Down Parsing.
4. Differentiate tokens, patterns, and lexeme.

Group - B

Answer any *two* questions. 2×4

5. (a) Consider the following Grammar:

$$A \rightarrow ABd|Aa|a$$

$$B \rightarrow Be|b$$

Remove left recursion. 2

- (b) Do left factoring in the following grammar:

$$A \rightarrow aAB|aA|a$$

$$B \rightarrow bB|b \quad 2$$

6. Calculate FIRST and FOLLOW for the following grammar?

$$S \rightarrow xABC$$

$$A \rightarrow a|bbD$$

$$B \rightarrow a | \epsilon$$

$$C \rightarrow b | \epsilon$$

$$D \rightarrow c | \epsilon$$

4

7. Consider the following grammar:

$$S \rightarrow Aa | bAc | Bc | bBa$$

$$A \rightarrow d$$

$$B \rightarrow d$$

Construct SLR parsing table.

4

8. (a) Draw the syntax tree and DAG for the following expression:

$$(a*b)+(c-d)*(a*b)+b$$

(b) Write quadruples, triples and indirect triples for the expression:

$$-(a*b)+(c+d)-(a+b+c+d)$$

2+2

Group - C

Answer any one question.

1×8

9. (a) What are basic blocks? Write the algorithm for partitioning into Blocks.

- (b) What is flow graph? Give one example.
- (c) What is common sub-expression and how to eliminate it? Explain with example.
- (d) Define Dead-code elimination with example.
(1+2)+(1+1)+2+1

10. (a) Explain the Type Checking with suitable examples.

(b) Differences between SLR, CLR, LALR parsers?

(c) Construct CLR Parsing table for the given grammar

$S \rightarrow CC$

$C \rightarrow aC/d$

2+2+4

[Internal assessment - 5]
