

5. Attempt ALL :

- |                                     |    |
|-------------------------------------|----|
| (a) Define two-way finite automata. | 2½ |
| (b) What is Regular Set ?           | 2½ |
| (c) What is ambiguous grammar ?     | 2½ |
| (d) Define PDA.                     | 2½ |

**TKN/KS/16/5977**

**Bachelor of Computer Application (B.C.A.)  
Semester—IV (C.B.S.) Examination  
THEORY OF COMPUTATION**

**Paper—III**

Time—Three Hours]

[Maximum Marks—50

- Note :—** (1) All questions are compulsory and carry equal marks.  
(2) Draw neat and labelled diagram wherever necessary.

**EITHER**

1. (a) Build a DFA for the following language.

$L = \{w \mid w \text{ is a binary string that contains 01 of a substring}\}$  5

- (b) Define NFA and prove equivalence of DFA and NFA. 5

**OR**

- (c) Build a DFA for the following language over the alphabets  $\{0, 1\}$  : of the set of all strings such that each block of five consecutive symbols contains at least two 0's. 5

(d) Construct DFA for the following NFA :

	0	1	
→p	{p, q}	{p}	
q	{r}	{r}	
r	{s}	φ	
*s	{s}	{s}	5

**EITHER**

2. (a) State and prove the theorem of pumping lemma for regular set. 5
- (b) Prove the context free grammar accepts the word palindrome over the alphabets {0, 1}. 5

**OR**

- (c) Explain the closure properties of regular set. 5
- (d) Define CFG and give applications of CFG and CFL. 5

**EITHER**

3. (a) Explain the process of eliminating useless symbols from CFG. 5

(b) Define CNF. Convert following grammar into CNF :

$$S \Rightarrow AS \mid BABC$$

$$A \Rightarrow A1 \mid 0A1 \mid 01$$

$$B \Rightarrow 0B \mid 0$$

$$C \Rightarrow 1C \mid 1 \quad 5$$

**OR**

- (c) Define GNF and closer properties of CFL. 5
- (d) Explain pumping lemma for CFG. 5

**EITHER**

4. (a) Design a PDA for  $L_{ww}R$ . 5
- (b) Convert the grammer

$$S \rightarrow 0S1 \mid A$$

$$A \rightarrow 1A0 \mid S \mid \epsilon$$

to a PDA that accepts the same language by empty stock. 5

**OR**

- (c) Give the instantaneous description of PDA. 5
- (d) Explain the process of converting grammar to PDA. 5