

**GS-642**

VI Semester B.C.A. Examination, May/June 2019
(CBCS - F+R) (2016-17 & onwards)

COMPUTER SCIENCE**BCA 601 : Theory of Computation**

Time : 3 Hours

Max. Marks : 100

Instruction : Answer all sections.**SECTION - A**Answer **any ten** questions. Each question carries **two** marks.**10x2=20**

1. Define DFA. With Mathematical Representation.
2. Define Alphabet and Symbol with example.
3. What is trap state ?
4. Define Regular Expression.
5. Design RE (Regular Expression) for the language containing any number of a's and b's ending with aa.
6. What is Pumping Lemma ?
7. Mention the types of chomsky hierarchy grammer.
8. Define PDA (push down Automata).
9. Define GNF (Greibach Normal Form).
10. What is turing machine ?
11. Define PCP (Post Correspondence Problem).
12. State Arden's Theorem.

LIBRARY
Surana College
No. 16, South End Road,
BANGALORE - 560 004

P.T.O.

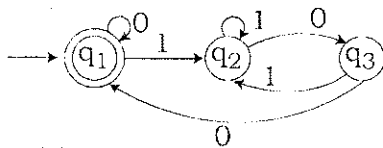


SECTION - B

Answer **any five** questions. Each question carries **five** marks.

5x5=25

13. Construct a DFA to accept strings of 0's & 1's ending with 101.
14. Write difference between DFA and NFA.
15. Convert the DFA to Regular Expression.



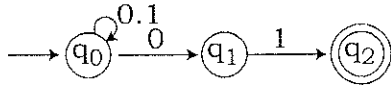
16. State and Prove Pumping Lemma.
17. Obtain a CFG (Context free grammar) for the following Language
 $L = \{a^n b^n | n \geq 1\}$.
18. Explain Halting Problem of Turing machine.
19. Eliminate the unit production from the grammar.
 - $S \rightarrow AB$
 - $A \rightarrow a$
 - $B \rightarrow c$
 - $B \rightarrow b$
 - $C \rightarrow D$
 - $D \rightarrow E$
 - $E \rightarrow a$
20. Show that the following grammar is ambiguous.
 - $E \rightarrow E + E$
 - $E \rightarrow E - E$
 - $E \rightarrow E * E$
 - $E \rightarrow E | E$
 - $E \rightarrow [E]$
 - $E \rightarrow id$



SECTION - C

Answer **any three** questions. Each question carries **fifteen** marks. **3x15=45**

21. Convert the following NFA to DFA.



22. Minimize the given DFA using table filling Algorithm.

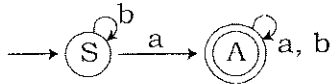
→	δ	0	1
	A	B	D
	B	C	E
	C	B	E
	D	C	E
	E*	E	E

23. Construct a PDA to accept the language $L(M) = \{ww^R | w \in (a+b)^*\}$ where w^R is the reverse of w by final state acceptance.

24. Find the language accepted by CFG .

- (a) $G = \{V, T, P, S\}$
 $V = \{s\}$
 $T = \{a, b\}$
 $S = S$
 $P = \{S \rightarrow aS | b\}$

(b) Obtain a grammar to generate string $S = \{a, b\}$ having atleast one a.



(c) Obtain a CFG for the language.
 $L = \{wcw^R | w \in \{a, b\}^*\}$

25. Obtain a Turing machine to accept the language $L = \{a^n b^n | n \geq 1\}$.

SECTION - D

Answer **any one** questions.

1x10=10

26. Construct the NFA with E-moves for $(0+1)^* 1(0+1)$

27. Explain the types of Turing Machine.

LIBRARY
 Surana College
 No.16, South End Road,
 BANGALORE - 560 004

1111111111