SM – 623

VI Semester B.C.A. Examination, May/June 2018
(CBCS) (F +R)
(2016 – 17 & Onwards)
COMPUTER SCIENCE
BCA 601 : Theory of Computation

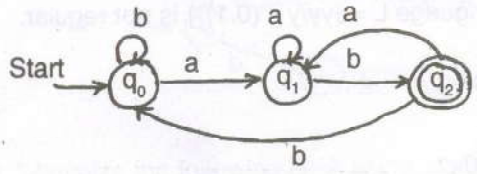
Time : 3 Hours Max. Marks : 100

Instruction : *Answer* ***all*** *Sections.*

SECTION – A

Answer **any ten** questions. **Each** question carries **two** marks. **(10×2=20)**

1. What is finite automata ? Explain with block diagram.
2. What is trap state ? Explain with a simple example.
3. What are the moves made by the following DFA while processing the string abaab ? Find if the string is accepted or rejected by DFA.



4. Design a regular expression over Σ ={a, b} for the language accepting string of exactly length 2.
5. State pumping Lemma for regular languages.
6. State Arden's theorem.
7. Define grammar. Give one example.

P.T.O.

8. Mention any two applications of context free grammar.

9. Define Nullable variable.

10. Define GNF.

11. Define turing machine.

12. Define recursively enumerable language.

SECTION – B

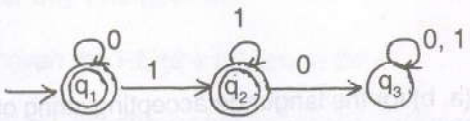
Answer **any five** questions. **Each** question carries **five** marks. **(5×5=25)**

13. Construct a DFA to accept string of 0's and 1's representing zero modulo five.

14. Define NFA. Obtain a NFA to accept the language L = {w/w∈ $abab^n$ or aba^n where n ≥ 0}.

15. Using pumping Lemma prove the language L = {yy/y∈ (0.1)*} is not regular.

16. Convert the DFA to Regular Expression.



17. Define context free grammar.

    Consider a grammar G = (V, T, P, S) where V = {S} T = {a, b} S = S P = {S→aS|b}. Find the language accepted by G.

18. Explain Chomsky hierarchy of grammar.

19. Eliminate useless symbols from the following grammar

S → aAa

A → Sb

A → bcc

A → DaA

C → abb

C → DD

E → ac

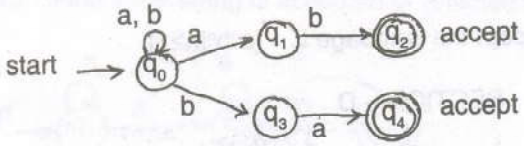
D → aDa

20. What are the different types of turing machine ?

SECTION – C

Answer **any three** questions. **Each** question carries **fifteen** marks. **(15×3=45)**

21. Convert the following NFA to DFA using lazy evaluation method.



22. Minimize the following DFA using table filling algorithm.

	δ	a	b
→	A	B	C
	B	G	C
*	C	A	C
	D	C	G
	E	H	F
	F	C	G
	G	G	E
	H	G	C

23. Define pushdown automata. Obtain a PDA to accept the language $L = \{a^n b^n | n \geq 1\}$.

24. a) Obtain a grammar to generate string consisting of any number of a's and b's with atleast one a or atleast one b. **(5+5+5)**

    b) For the following production

    $S \rightarrow AB$

    $A \rightarrow aaA | \in$

    $B \rightarrow Bb | \in$

    Write the left most and right most derivation for the string aab.

    c) For the grammar G with production rules

    $E \rightarrow E + E$

    $E \rightarrow E * E$

    $E \rightarrow id$

    Where V = {E} T = {id} S = {E}, obtain the right most derivation and the parse tree for the string W = id + id * id.

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

SECTION – D

Answer **any one** question. **(10×1=10)**

26. Convert the RE $(a + b)^* abb$ to DFA.

27. Write short notes on halting problem of turing machine and post correspondence problem.