100457

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).
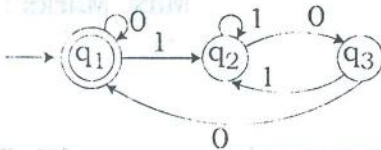
12. State Arden's Theorem.

P.T.O.

SECTION - B

Answer **any five** questions. Each question carries **five** marks.   **5x5=25**

13. Construct a DFA to accept strings of O's & L'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 grammer) for the following Langauge $L = \{a^n b^n | n \geqslant 1\}$.

18. Explain Halting Problem of Turing machine.

19. Elimintate the unit production from the grammer.

    $S \rightarrow AB$

    $A \rightarrow a$

    $B \rightarrow c$

    $B \rightarrow b$

    $C \rightarrow D$

    $D \rightarrow E$

    $E \rightarrow a$

20. Show that the following grammer 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.
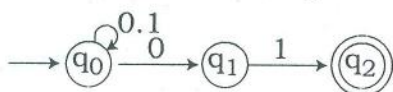
22. Minimize the given DFA using table filling Algorithm.

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 .
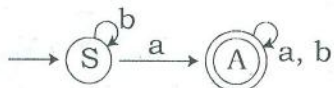   (a)　$G = \{V, T, P, S\}$
    　　　$V = \{s\}$
    　　　$T = (a, b)$
    　　　$S = S$
    　　　$P = \{S \rightarrow aS|b\}$
    (b)　Obtain a grammer to generate string $S = \{a, b\}$ having atleast one a.

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

27. Explain the types of Turing Machine.

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