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No. of Printed Pages : 3

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.

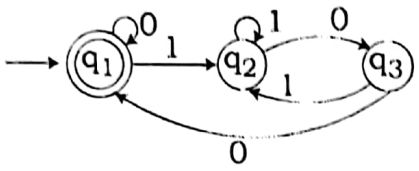
SECTION - B

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 $L = \{a^n b^n | n \geq 1\}$.

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.

$E \rightarrow E + E$

$E \rightarrow E - E$

$E \rightarrow E * E$

$E \rightarrow E \mid E$

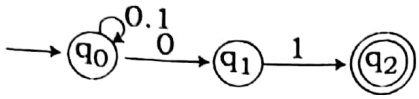
$E \rightarrow |E|$

$E \rightarrow id$

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.

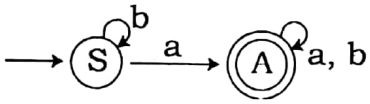
	δ	0	1
→	A	B	D
	B	C	E
	C	B	E
	D	C	E
*	E	E	E

23. Construct a PDA to accept the language $L(M)=\{ww^R|w\epsilon(a+b)^*\}$ 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.
$L=\{wcw^R|w\epsilon\{a, b\}^*\}$

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

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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