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# GS-642

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## 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.**

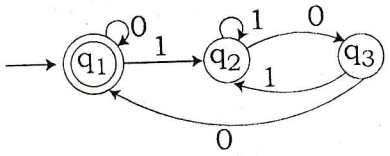
## SECTION - B

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.

$E \rightarrow E + E$

$E \rightarrow E - E$

$E \rightarrow E * E$

$E \rightarrow E \mid E$

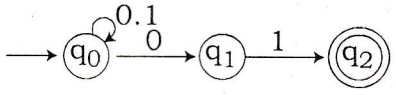
$E \rightarrow [E]$

$E \rightarrow id$

## 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.

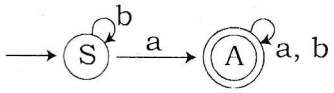
| | δ | 0 | 1 |
|---|---|---|---|
| → | A | B | D |
| | B | C | E |
| | C | B | E |
| | D | C | E |
| * | E | E | E |

**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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