15621

Reg. No. | | | | | | | | |

VI Semester B.C.A. Degree Examination, September/October - 2022
COMPUTER SCIENCE
Theory of Computation
(CBCS Scheme)

Time : 3 Hours **Maximum Marks : 100**

Instructions to Candidates :
Answer all sections.

SECTION - A

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

1. Define Automata.
2. Draw a DFA to accept strings of even number of a's.
3. What is trap state?
4. Define pumping Lemma?
5. Design a RE over $\sum = \{a, b\}$ for the language accepting string of exactly length 2?
6. Define E-closure.
7. What are the different types of grammar?
8. What is parsing?
9. Define GNF.
10. Define Nullable variable.
11. What is Turing Machine?
12. State post correspondance problem.

SECTION - B

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

13. Construct a DFA to accept strings of O's and I's representing zero modulo 5.
14. Write the differences between DFA and NFA.
15. Convert the DFA to Regular Expression.

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16. State and prove Kleene's Theorem.

17. Prove that s → a s b s/b s a s/ $\sum$ is ambigurus.

18. Obtain CFG for the following language

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

19. Explain Halting problem of Turning Machine.

20. Eliminate unit production from the following grammar.

S → AB

A → a

B → C

B → b

C → D

D → E

E → a

SECTION - C

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

21. Construct a NFA with E for (0+1)*1(0+1).

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. Transform the CFG into GNF

S → AB

A → BS | 1

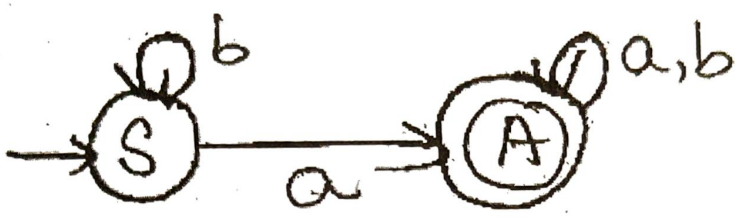
B → SA | 0

24. a) Find the language accepted by CFG. (5)

$G=\{V,T,P,S\}$, $V=\{S\}$, $T=\{a,b\}$

$S=S$, $P=\{S\rightarrow aS/b\}$.

b) Obtain a grammar to generate string $S=\{a,b\}$ having atleast one 'a'. (5)



c) Obtain a PDA for the language (5)

$L=\{wcw^R / wE(a,b)^*\}$

25. Obtain a Turing machine that accepts the language $L=\{a^nb^n \mid n\geq 1\}$.

SECTION - D

Answer any **1** question. (1×10=10)

26. Explain the types of Turning Machine

27. Write a note on Chomsky's Hierarchy of language.
