Reg. No. ☐☐☐☐☐☐☐☐

V Semester B.C.A. Degree Examination, April - 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.   What is Finite Automata? Mention its types.
2.   Define trap state?
3.   State any two differences between DFA and NFA.
4.   Draw a DFA to accept strings of a's & b's having atleast one a.
5.   State Arden's Theorem.
6.   Obtain a regular expression representing strings of a's and b's having length 2.
7.   State pumping lemma for regular languages.
8.   Define grammar in finite Automata.
9.   Define LMD and RMD.
10. Define CNF.
11. List the properties of Regular languages.
12. Define Post correspondence problem.

SECTION - B

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

13. Mention five differences between DFA, NFA ε - NFA.
14. Construct a DFA to accept the strings of a's and b's ending with the string abb.
15. Explain various applications of finite Automata.
16. Obtain the DFA for the following NFA using Lazy Evaluation method.

[P.T.O.
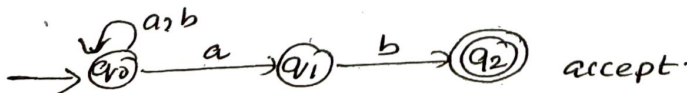
17. Obtain an ε-NFA which accepts strings of a's and b's starting with the string ab.

18. Explain Chomsky's Hierarchy.

19. Is the following grammar ambiguous?

$E \rightarrow E + E$

$E \rightarrow {}^{.}E + E$

$E \rightarrow E * E$

$E \rightarrow E / E$
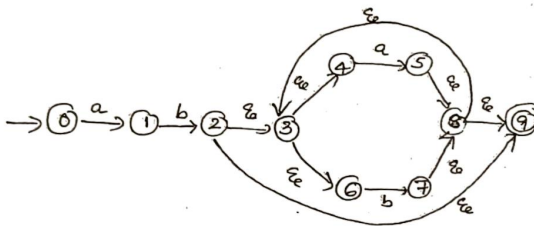
$E \rightarrow (E) / I$

$I \rightarrow id$

20. Explain Haltinig problem of Turing machine.

SECTION - C

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

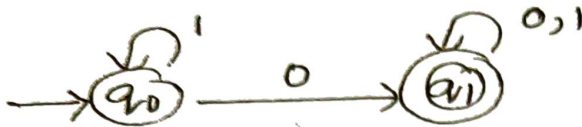21. Convert the following ε-NFA to its equivalent DFA.

22. Minimize the states of the following DFA

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

23. Obtain Regular expression for the following DFA.

24. Convert the given CFG to CNF

$S \rightarrow OA \mid 1B$

$A \rightarrow OAA \mid 1S \mid 1$

$B \rightarrow 1BB \mid OS \mid 0$

25. Obtain PDA to accept the language $L = \{a^n b^n \mid n \geq 1\}$ by a final state.

SECTION - D

Answer any **one** question. Each question carries **ten** marks. $(1 \times 10 = 10)$

26. "Draw a DFA to accept decimal strings divisible by 3" using divisible by k method.

27. Obtain the Turing Machine to accept the language $L = \{0^n 1^n \mid n \geq 1\}$.