Roll No. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)
B.E / B.Tech END SEMESTER EXAMINATIONS, APRIL / MAY 2025
Computer Science and Engineering
CS6202 & Theory of Computation
(Regulation 2018 RUSA)

Time: 3 Hours | Answer ALL Questions | Max. Marks 100

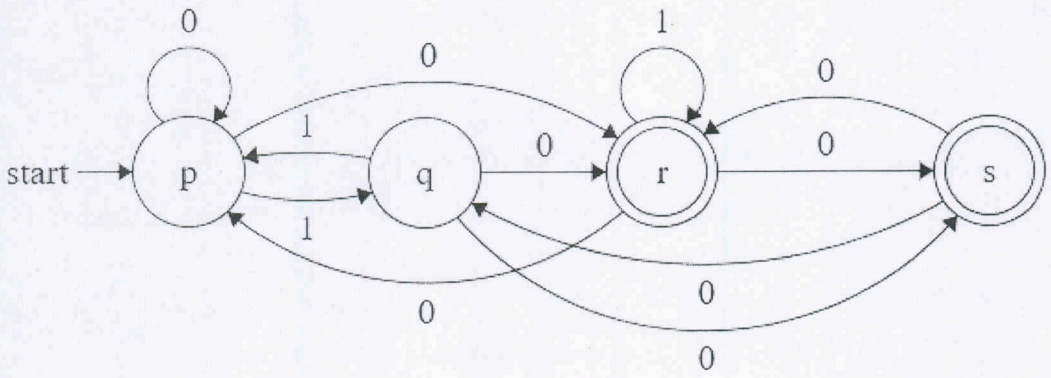
PART-A (10 x 2 = 20 Marks)

1. Differentiate between DFA and NFA.
2. Design a ε-NFA for the set of strings consisting of zero or more a's followed by zero or more b's followed by zero or more c's.
3. Write a regular expression that describes the rules for recognizing identifiers in the C programming language.
4. If L and M are regular languages, prove that L-M is a regular language
5. Show that the grammar E → E+E | E*E | (E) | id is ambiguous.
6. Define Greibach Normal Form
7. Define the language of a PDA acceptance by final state.
8. Define a recursively enumerable language.
9. What are the actions performed in one move of a multi-tape Turing Machine?.
10. What is the undecidable problem? Give examples.

Part – B (8 x 8 = 64 marks)

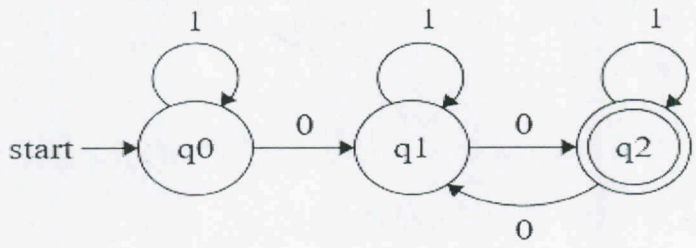
(Answer any EIGHT questions)

11. Convert the following NFA to a DFA.



12. i) Convert the regular expression (01+1)* + 011(0+1)* to NFA with ε-transitions (4)
ii) Define pumping lemma for regular languages and prove the language L={0^n1^n | n>=0 } is not regular. (4)

13. Find the regular expression equivalent to the following DFA.



14. Construct the minimum-state automata equivalent to DFA given by transition table.

	0	1
→A	B	F
B	G	C
*C	A	C
D	C	G
E	H	F
F	C	G
G	G	E
H	G	C

15. Prove that if L is a CFL and R is a regular language, then L ∩ R is a CFL.
16. Write the steps to convert the CFG to PDA. Convert the following grammar to a PDA.
S → 0AA, A → 0S | 1S | 0
17. Convert the grammar S→AA | 0, A→SS | 1 to a GNF.
18. Design a pushdown Automata for the language L = {ww^R| w is in {0,1}* }. Show the instantaneous description of the PDA for the string 1001.
19. Design a deterministic PDA to accept the language L={ $0^n1^{m+n}1^m$ | m, n >= 0}
Show whether the input 001111 is accepted by your DPDA.
20. Design a Turing machine for the language consisting of an equal number of 0's and 1's. Give an instantaneous description for the string 1001.
21. Proper subtraction m-n is defined by max(m-n,0), that is, the result is m-n if m>=n and 0 if m<n. Design a Turing machine to compute proper subtraction.
22. Prove that If both language L and its complement are RE, then L is recursive.

Part – C (2 x 8 = 16 Marks)

23. Begin with the grammar S → ASB | ϵ, A → aAS | a, B → SbS | A | bb
Eliminate ϵ-productions, unit productions, any useless symbols, and put the resulting grammar into Chomsky Normal Form.
24. Explain the construction of an instance of Post's correspondence problem (PCP) from an instance of modified PCP (MPCP) with an example.