K22P 0302

Reg. No. : .....

Name : .....

III Semester M.C.A. Degree (C.B.S.S. – Regular)
Examination, November 2021
(2020 Admission)
MCA3C02 : THEORY OF COMPUTATION

Time : 3 Hours Max. Marks : 60

SECTION – A

Answer **all** questions. **Each** question carries **two** marks.

1. For $\Sigma = \{a,b\}$, construct DFA that accept the sets consisting of all strings with at least one a.
2. Explain the steps for finding the equivalence of Regular Grammar and finite automata.
3. Explain DPDA and its properties.
4. Explain normal forms in propositional calculus.
5. Show that $[(p \vee q) \wedge (r \vee \neg q)] \rightarrow (p \vee r)]$ is a tautology by making a truth table, and then again by using an argument that considers the two cases "q is true" and "q is false".
6. State and prove addition theorem on probability.
7. Define nondeterministic Turing machine.
8. Determine the number of possible relations in an antisymmetric set with 9 elements.
9. State and prove multiplication theorem of probability.
10. Give a proof to find sum of n natural numbers using the principle of mathematical induction.

P.T.O.

SECTION – B

Answer **all** questions. **Each** question carries **eight** marks.

11. A) Construct a Turing machine to accept all even palindromes over $\Sigma = \{a, b\}$.

OR

B) Give a note on the undecidability of the Post Correspondence problem with example.

12. A) Obtain PDNF and PCNF of $(Q \wedge \vee (R \vee S)$.

OR

B) Determine the validity of the following arguments.

"If you study well then you will pass in your exam".

"Not study well; you will not pass in your exam."

13. A) Generate a CSG for the language where $L = \{a^N b^N c^N \mid N >= 0\}$.

OR

B) Give a note on CNF and GNF.

14. A) Explain any one algorithm with suitable example for state minimization in finite automata.

OR

B) State and prove pumping lemma for regular languages. Prove that $L=\{a^n b^n \mid n >= 0\}$ is not regular.

15. A) A large software development company employs 500 computer programmers. Of them, 150 are proficient in Python, 200 in Java, 100 in C, 30 in Python and Java, and twenty programmers are proficient in all three languages above. Determine the number of computer programmers that are not proficient in any of these three languages.

OR

B) State and prove Bayes' Theorem with suitable example.