K24P 2022

Reg. No. : .....

Name : .....

III Semester M.C.A. Degree (C.B.S.S. – Reg./Supple./Imp.) Examination, November 2024
(2021 Admission Onwards)
MCA3C02 : THEORY OF COMPUTATION

Time : 3 Hours Max. Marks : 60

PART – A

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

1. Define the term quantifier. Explain different types of quantifiers.
2. With the help of example, explain about set.
3. What are mutually exclusive and exhaustive events ?
4. What are random variables ?
5. Define the term Grammar.
6. Which are the properties of regular languages ?
7. What you mean by the term "Parsing" ?
8. Explain about PDA.
9. What are undecidable problems ?
10. What is a Multi-dimensional Turing machine ? **(10×2=20)**

PART – B

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

11. a) In a group of 100 people, 65 like cricket, 40 like tennis and 55 like volleyball. All of them like one of the three games. If 25 like both cricket and tennis. 24 like both tennis and volleyball and 22 like both cricket and volley ball then
    1) How many like to play all the three games ?
    2) How many like to play cricket only ?
    3) How many like to play tennis only ? **8**

    OR

    b) 1) Construct the truth table for $(P \rightarrow Q) \wedge (Q \rightarrow P)$. **4**
    2) Prove $(P \rightarrow Q) \leftarrow \rightarrow (\neg P \vee Q)$. **4**

P.T.O.

12. a) If $P(A) = 0.5$, $P(B) = 0.6$, $P(A \cap B) = 0.2$. Find $P(A \cup B)$, $P(A')$, $P(A \cap B')$, $P(A' \cap B')$. 8

OR

b) A bag contains 8 balls, of which 5 are red and 3 are white. A man drawn two balls at random one after another without replacement. What is the probability one of the balls drawn is white and the other red ? What would be the value of these probabilities if a ball drawn is replaced before another ball is drawn ? 8

13. a) Find a dfa that accepts all the strings on {0, 1}, except those containing the substring 001. 8

OR

b) Show that the language $L = \{awa : w \in \{a, b\}^*\}$ is regular. Also prove L^2 is regular. 8

14. a) What are context free grammars ? Explain Chomsky normal form. 8

OR

b) Construct a pda that accepts the language generated by a grammar with productions $S \rightarrow aSbb|a$. 8

15. a) Explain in detail the post correspondence problem and the Turing machine halting problem. 8

OR

b) 1) Explain about Turing machines. 4

2) Write a note on non-deterministic Turing machine. 4

(5×8=40)