

Exam. Code : 206702

Subject Code : 4622

M.Sc. (Computer Science) Semester—II
MCS-204 : FORMAL SPECIFICATION AND
VERIFICATION

Time Allowed—3 Hours] [Maximum Marks—100

Note :—(1) There are total **EIGHT** questions. Candidates are required to attempt any **FIVE** questions. All questions carry equal marks.

(2) The students can use only non-programmable and non-storage type calculator.

1. What is the role of formal specification languages ? Discuss the common features of formal specification languages. 20
2. Compare First Order Logic (FOL) with the propositional logic by discussing the pros and cons of FOL and propositional logic. Discuss the terms and predicates of FOL. What is universal and existential quantification ? 20
3. Discuss how Hoare logic can be extended to deal with the languages involving advanced constructs such as procedures with parameters, non-determinism, concurrency, communication and fairness. 20
4. What type of logical errors can occur in formal specifications ? Discuss any two techniques for detecting errors in formal specifications. What is the relationship (if any) between FOL and formal specifications ? 20

5. (a) What is Dijkstra's weakest pre-condition semantics ?
What is strongest post-condition ?
- (b) What is the need of data refinements ? Discuss data refinement with the help of an example. 10+10
6. What are the safety and liveness properties ? How specification and verification of reactive programs is done ? 20
7. What is the use of deductive and model-theoretic approaches ? Explain these approaches. 20
8. Write short notes on the following :
 - (a) Hoare logic to prove correctness of factorial of number program
 - (b) Stack and Queue as abstract data types. 10+10