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Total Number of Pages: 02

Course: MCA  
Sub\_Code: MCA03001

3<sup>rd</sup> Semester Regular/Back Examination: 2023-24

SUBJECT: Software Engineering

BRANCH(S): MCA (2 Yrs)

Time: 3 Hour

Max Marks: 100

Q.Code : N386

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right-hand margin indicate marks.

**Part-I**

**Q1 Answer the following questions: (2 x 10)**

- a) What is Throwaway Prototype? Why it is used?
- b) Write down the disadvantages of Waterfall Model.
- c) List any two Non-Functional Requirements from both, developer and end user's perspective each.
- d) List the shortcomings of questionnaires in requirements gathering.
- e) While designing the modularity of projects, which factors are to be included for developer.
- f) Define the differences between the procedure-oriented and object-oriented models.
- g) How walkthroughs are useful for verification?
- h) Write down all the types of equivalence partitions.
- i) System complexity is directly related to System maintenance cost. Justify.
- j) List the components of the software that can be reused.

**Part-II**

**Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)**

- a) Discuss the phases of Software development life cycle. Explain in detail.
- b) Differentiate between Waterfall Model and Prototyping Model.
- c) Discuss the organization of a software requirements specification.
- d) What do you understand with the term "requirement elicitation"? Discuss any two Techniques.
- e) Explain the Boehm's spiral life cycle development model with suitable diagrams and benefits, shortcomings.
- f) Why using an object-oriented design is preferred over a function-oriented design?
- g) What do you mean by Coding standard? Also, write down the types of code reviews with relevant examples.
- h) What is meant by Software Quality? List the inherent attributes of Software Quality.
- i) Define the term: "risk management". State the approach to identify best risk reduction Method when there are many risk reduction approaches exist.

- j) What do you mean by software maintenance? Why does the software need maintenance?
- k) Describe Alpha and Beta testing along with their advantages and disadvantages.
- l) Give a comparative study of code inspection, reviews and walk-through.

### Part-III

#### Only Long Answer Type Questions (Answer Any Two out of Four)

- Q3** Why recent Software industries are deploying development practices like spiral model while gradually removing the need for the waterfall model in case of large projects? State the advantages and disadvantages of it as a result? Explain with relevant examples. **(16)**
- Q4** What do you mean by functional requirements and non-functional requirements in a SRS with their advantages & disadvantages? Write in detail, both the requirements for establishment of a hospital. **(16)**
- Q5** a) Define and discuss functional independence? State why functional independence is integral factor for a good software design? **(8x2)**  
b) What is object-oriented design? Discuss in detail with suitable diagrams and example.
- Q6** What do you mean by Software Testing? Explain the different types of testing and their features with the help of relevant diagrams in detail. **(16)**

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Total Number of Pages: 02

Course: MCA  
Sub\_Code: MCA03002

3<sup>rd</sup> Semester Regular/Back Examination: 2023-24

SUBJECT: Compiler Design

BRANCH(S): MCA (2 Yrs)

Time: 3 Hour

Max Marks: 100

Q.Code: N400

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right-hand margin indicate marks.

Part-I

Q1 Answer the following questions: (2 x 10)

- Define regular expression. Give example.
- What are the features of a Lexical analyzer?
- What is semantic rule? How to evaluate the semantic rules?
- Describe in brief about types of LR parsers.
- Define Boot strapping.
- List out the rules for FIRST and FOLLOW.
- What is common sub expression elimination?
- What are the advantages of heap storage allocation?
- What are the limitations of recursive descent parser?
- Differentiate Parse tree and Syntax tree with an example.

Part-II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- Construct Deterministic Finite Automata to accept the regular expression :  $(0+1)^*(00+11)(0+1)^*$
- Write the production rules to eliminate the left recursion and left factoring problems.
- Discuss all the phases of compiler with a diagram.
- Discuss in brief about LL (1) Grammars.
- Write the steps to convert Non-Deterministic Finite Automata (NFA) into Deterministic Finite Automata (DFA).
- Write Rules to construct FIRST Function and FOLLOW Function.
- What is control and data flow analysis? Explain with example.
- What is translator? Write down the steps to execute a program.
- Explain in brief about Type checking and Type Conversion.

- j) Differentiate between Static and Dynamic Storage allocation Strategies.
- k) Explain in detail "Dead Code Elimination".
- l) Explain in brief about peephole optimization techniques.

### Part-III

#### Only Long Answer Type Questions (Answer Any Two out of Four)

- Q3** a) Write the algorithm to create Predictive parsing table with the scanning of input string. (8)
- b) Define Symbol table? Explain about the data structures used for Symbol table. (8)
- Q4** a) Write the properties of LR parser with its structure. Also explain the techniques of LR parser. (8)
- b) What do you mean by code optimization? Explain machine dependent and Independent optimization with suitable examples. (8)
- Q5** a) What is a common sub-expression and how to eliminate it? Explain with example. (8)
- b) Show that the following grammar is CLR (1) but not SLR(1). (8)
- $S \rightarrow A aA b \mid B bB a$
- $A \rightarrow \epsilon$
- $B \rightarrow \epsilon$
- Q6** Write a short note with example to optimize the code: (4x4)
- i. Dead code elimination
  - ii. Variable elimination
  - iii. Code motion
  - iv. Reduction in strength