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Total Number of Pages: 02

Course: MCA
Sub_Code: MCA03001

3rd Semester Regular/Back Examination: 2024-25

SUBJECT: Software Engineering

BRANCH(S): MCA (2 Yrs)

Time: 3 Hours

Max Marks: 100

Q.Code: R035

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)

- Classify a software and a computer program with example for each.
- State the merits and demerits of the waterfall model for the software development.
- What do you mean by a requirement of a software product as per IEEE standard?
- State two non-functional requirements of a software product.
- Why cost estimation plays an important role in the process of software development?
- State the categories of risks from which a software project might get affected.
- Why software reliability plays a major role in development of a software product?
- State the drawbacks of using CASE tools.
- Write the need for reverse engineering and re-engineering.
- State some quality factors of software product as proposed by McCall.

Part-II

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

- What do you mean by software crisis? State the reasons for it and how it is handled.
- State how the project risks are handled by spiral model during software development.
- What are the major phases in the spiral model of the software development? Explain.
- Discuss various types of COCOMO model. Explain the phase wise distribution of effort.
- What do you understand by the term "requirements elicitation"? Discuss any two methods of it in detail.
- What are the advantages of using LOC or FP metric to measure size of a software product? List the significant drawbacks of LOC being used as a software size metric.
- Discuss the benefits and limitations of code reviews and walkthroughs. Does these methods have any limitations. Justify.

- h) What do you mean by a CASE tool and a CASE environment? State advantages of using CASE tools.
- i) What is a software failure? Explain the necessary and sufficient condition for software failure. Why we must identify between the fault and failure? Justify.
- j) Define module coupling and briefly state its different types. Can a system be ever de-coupled? Justify.
- k) What do you understand by change control and version control? State its importance. Differentiate between a revision and version of a software product.
- l) What do you mean by drivers and stubs. State their significance.

Part-III

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

- Q3** What is a prototype in the context of software development? Explain the prototyping model of software development with the help of schematic diagram. Explain the two types of prototyping models of software engineering. Why a working software prototype is created before developing a final working product? Justify with reasons. **(16)**
- Q4** Why correct requirement determination plays an important role in the process of software development? State the problems in the formulation of requirements for a software product. Why traceability of requirements is important? Why traceability is used? Outline in brief, the needed features of a good SRS document. Also, Explain the IEEE standard for SRS document of a software product to be developed. **(16)**
- Q5** Discuss Lehmann's law of Software Maintenance. Why software needs maintenance. Write down different categories of maintenance. Which category needs maximum effort and why? Discuss the major requirements of ISO 9001 and compare it with SEI-CMM model. Can a program be correct and still not be reliable? Explain. **(16)**
- Q6** State the purpose, advantages, and limitations of software testing. Compare and contrast between black box and white box testing with schematic diagram and examples. Explain in detail, the different types of System testing in detail with examples. **(16)**

Registration No.:

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Total Number of Pages: 02

Course: MCA
Sub_Code: MCA03002

3rd Semester Regular/Back Examination: 2024-25

SUBJECT: Compiler Design

BRANCH(S): MCA (2 Yrs)

Time: 3 Hours

Max Marks: 100

Q.Code: R068

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)

- Differentiate S-attribute and L-attribute definitions.
- What are the features of a Lexical analyzer?
- Describe the representation of 3-address code with an example.
- Define tokens, patterns, and lexemes.
- What are the advantages of heap storage allocation?
- Explain in detail about Backpatching Technique.
- Define Dead-code elimination with example.
- State the principles for designing calling sequences.
- What is semantic rule? How to evaluate the semantic rules?
- State the use of machine Idioms.

Part-II

Q2

Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)

(6 x 8)

- Explain in detail about the various types of Top - down parsing.
- Eliminate left recursion in the following grammar.
 $A \rightarrow ABd \mid Aa \mid a$
 $B \rightarrow Be \mid b$
- Compare synthesized attributes and inherited attributes.
- Discuss in brief about LL(1) Grammars.
- Differentiate between Top down and bottom up parsing techniques.
- Describe in detail the flow of control optimization. Identify the methods to eliminate the unreachable code, load, and store data.
- Define Ambiguous Grammar? Check whether the grammar: $S \rightarrow aAB$, $A \rightarrow bC/cd$, $C \rightarrow cd$, $B \rightarrow c/d$, is Ambiguous or not?
- How to a design a call sequences and analyze the principles of activation records with an example.

- i) 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) Analyze Peephole optimization with suitable examples.

Part-III

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

- Q3** a) Prove that the following two regular expressions are equivalent by showing that the minimum state DFA's are same: (8)
- a) $(a + b)^*$
 - b) $(a^* + b^*)^*$
- b) Explain in detail the tool for generating Lexical-Analyzer with an example program. (8)
- Q4** a) Analyze the give grammar to construct predictive parser $S \rightarrow +SS \mid *SS \mid a$ with the string "+*aa". (8)
- b) What is the purpose of code optimization? Explain in detail about loop Optimization with example. (8)
- Q5** a) For the following grammar construct SLR parser and parse (a,a,\wedge) (8)
- $S \rightarrow a \mid \wedge \mid (R)$
 - $T \rightarrow S, T \mid S$
 - $R \rightarrow T$
- 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** a) Generate an intermediate code for the following code segment with the required syntax-directed translation scheme: (8)
- ```

if (a > b)
 x = a + b
else
 x = a - b

```
- b) Draw the syntax tree and DAG for the following expression: (8)
- $(a*b)+(c-d)*(a*b)+b$