Registration No: | | | | | | | | | | |

Total Number of Pages: 02

Course: MCA
Sub_Code: MCA03001

3rd 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 × 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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Course: MCA
Sub_Code: MCA03002

3rd 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)

a) Define regular expression. Give example.
b) What are the features of a Lexical analyzer?
c) What is semantic rule? How to evaluate the semantic rules?
d) Describe in brief about types of LR parsers.
e) Define Boot strapping.
f) List out the rules for FIRST and FOLLOW.
g) What is common sub expression elimination?
h) What are the advantages of heap storage allocation?
i) What are the limitations of recursive-descent parser?
j) 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)

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

$S \rightarrow A\ aA\ b \mid B\ bB\ a$

$A \rightarrow \varepsilon$

$B \rightarrow \varepsilon$

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

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Total Number of Pages : 02

Course: MCA
Sub_Code: MCA03001

3rd Semester Regular/Back Examination: 2022-23
SUBJECT : Software Engineering
BRANCH(S): MCA (2 Yrs)
Time : 3 Hour
Max Marks : 100
Q.Code : L225

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) Differentiate between system engineering and software engineering.

b) What are the drawbacks of spiral model?

c) Differentiate between "Known risk" and "predictable risk".

d) What is cyclomatic complexity?

e) List the advantages and disadvantages of using LOC as a metric.

f) What is meant by Boundary value analysis?

g) What is Regression Testing?

h) What are the common approaches in debugging?

i) Differentiate hard real time & soft real time systems.

j) What are the characteristics of SRS?

Part-II

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

a) List and describe good characteristics of a good software.

b) Describe how to prepare a software requirement specification (SRS) document. List possible users and use of SRS for each user.

c) Illustrate functional and nonfunctional requirements in Software Engineering

d) Discuss Object Oriented Analysis (OOA) and modeling in detail.

e) Write elaborately on Unit testing and Regression testing. How do you develop test suites?

f) What is UML? Explain the following in context to UML.
A) Use Case Diagram
B) Sequence Diagram
C) State Diagram
D) Classes and Objects

g) Explain why it is important to model the context of a system that is being developed. Give two examples of possible errors that could arise if software engineers do not understand the system context.

h) What is SDLC? Explain the MIS oriented SDLC model.

i) Consider a large-scale project for which the manpower requirement is K= 600PY and the development time is 3 years 6 months. What is the manpower cost after 1 year and 2 months? Calculate the peak time.

j) Explain COCOMO estimation model in software project management.

k) Write short notes on Finite State Machine (FSM).

l) What are the risk management activities? Is it possible to prioritize the risks? Explain with suitable example.

Part-III

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

Q3 What is waterfall model for software development? Explain the situation in which the spiral model for software development should be preferred over waterfall model. A program to be developed to simulate the operations of a scientific calculator. List the facilities to be provided by this calculator. Analyse this using a DFD 0-level and 1-level diagram. **(16)**

Q4 Define cohesion and coupling. Explain various types of each of them. Wat are CASE tools? With a suitable diagram, explain the categories of CASE tools. **(16)**

Q5 Explain Software Reverse Engineering and Software Reengineering. Briefly describe Service Oriented Architecture (SOA) in software engineering. **(16)**

Q6 What are the different architectural styles applied for software development? Explain with diagrams. What is acceptance testing? Explain briefly alpha testing and beta testing with suitable examples. **(16)**

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Total Number of Pages: 02

Course: MCA (2 Yrs)
Sub_Code: MCA03002

3rd Semester Regular / Back Examination: 2022-23
SUBJECT: Compiler Design
BRANCH(S): MCA (2 Yrs)
Time: 3 Hour
Max Marks: 100
Q.Code: L287

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) Define regular expression. Give example.
b) What are the features of a Lexical analyzer?
c) What are the limitations of recursive descent parser?
d) Define Boot strapping.
e) What are the advantages of heap storage allocation?
f) List out the rules for FIRST and FOLLOW.
g) What is common sub expression elimination?
h) Describe in brief about types of LR parsers.
i) What is semantic rule? How to evaluate the semantic rules?
j) 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 × 8)

a) Describe how various phases could be combined as a pass in a compiler?
b) Eliminate left recursion in the following grammar
A → ABd | Aa | a
B → Be | b
c) Differentiate between NFA and DFA.
d) Discuss in brief about LL(1) Grammars.
e) Differentiate between Top down and bottom up parsing techniques.
f) Construct FIRST and FOLLOW for the Grammar:
E→E+T / T
T→T*F / F
F→ (E) / id.
g) Define Ambiguous Grammar? Check whether the grammar: **S→aAB, A→bC/cd, C→cd, B→c/d**, is Ambiguous or not?
h) Define Intermediate code generator. Explain in brief about different forms of Intermediate code generation.
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) Explain in brief about peephole optimization techniques.

Part-III

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

Q3 a) What is intermediate code? Translate the expression **(a+b)/(c+d)*(a+b/c)-d** into quadruples, triples and indirect triples. (8)

b) Define Symbol table? Explain about the data structures used for Symbol table. (8)

Q4 a) What is an activation record? What is its content? When is it created? Explain with an example. (8)

b) What do you mean by code optimization? Explain machine dependent and independent optimization with suitable examples. (8)

Q5 a) For the following grammar construct SLR parser and parse (a,a,^) (8)

S→ a| ^|(R)
T →S,T|S
R →T

b) Show that the following grammar is CLR(1) but not SLR(1). (8)

S →A aA b | B bB a
A →ε
B →ε

Q6 a) Consider the following grammar: (8)

A → A & B/ B
B → B @ C/ C
C → C # D/ D
D → id

What can you say about the precedence and associativity of operator &, @ and #?

b) Show that following grammar is SLR(1) but not LL(1). (8)

S →S A | A
A →a