



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal-500043, Hyderabad

B.Tech V SEMESTER END EXAMINATIONS (REGULAR/ SUPPLEMENTARY) - FEBRUARY 2024

Regulation: UG20

COMPILER DESIGN

Time: 3 Hours (COMMON TO CSE | CSE (AI&ML) | CSIT | IT) Max Marks: 70

Answer ALL questions in Module I and II

Answer ONE out of two questions in Modules III, IV and V

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

MODULE – I

- (a) What advantages are there to a language-processing system in which the compiler produces assembly language rather than machine language? [BL: Understand| CO: 1|Marks: 7]
- (b) Discuss the phases of compiler indicating the inputs and outputs of each phase in translating the statement “amount = principle + rate *36.0”. [BL: Apply| CO: 1|Marks: 7]

MODULE – II

- (a) Write about context free grammar. With an example to describe about ambiguous grammar. [BL: Understand| CO: 2|Marks: 7]
- (b) Construct stack implementation of shift reduce parsing for the following grammar
 $E \rightarrow E + E$
 $E \rightarrow E * E$
 $E \rightarrow (E)$
 $E \rightarrow id$ and the input string $id_1 + id_2 * id_3$ [BL: Apply| CO: 2|Marks: 7]

MODULE – III

- (a) Evaluate the expressions for the SDD annotated parse tree for the expression $3 * 5 + 4n$. [BL: Understand| CO: 3|Marks: 7]
- (b) Illustrate the methods of implementing three address statement and implement the following statement. $(x + y) * (y + z) + (x + y + z)$ [BL: Apply| CO: 3|Marks: 7]
- (a) Differentiate between S-attributed and L-attributed definitions with suitable examples. [BL: Understand| CO: 4|Marks: 7]
- (b) Write syntax directed translation scheme for the following flow control statements.
 $S \rightarrow \text{if } E \text{ then } S_1 | \text{if } E \text{ then } S_1 \text{ else } S_2$. [BL: Apply| CO: 4|Marks: 7]

MODULE – IV

- (a) Summarize about type checking and type conversion. Explain all allocation strategies in run-time storage environment. [BL: Understand| CO: 5|Marks: 7]

(b) Outline the specification of simple type checker for the expressions

$E \rightarrow \text{literal}$

$E \rightarrow \text{id}$

$E \rightarrow E1 \text{ mod } E2$

$E \rightarrow E1[E2]$

[BL: Apply| CO: 5|Marks: 7].

6. (a) What are typical entries in symbol table? Describe the data structures used to implement the table. [BL: Understand| CO: 5|Marks: 7]

(b) Using necessary figure, illustrate how the caller and callee cooperate in managing various tasks in stack allocation strategy when a procedure is activated? [BL: Understand| CO: 5|Marks: 7]

MODULE – V

7. (a) Interpret about code optimization. State its advantages. Discuss various code optimization schemes in detail. [BL: Understand| CO: 6|Marks: 7]

(b) Construct and explain the DAG for the following basic block

$d := b * c$

$e := a + b$

$b := b * c$

$a := e - d$

[BL: Apply| CO: 6|Marks: 7]

8. (a) Elaborate on register allocation issue in the design of code generator with an example.

[BL: Understand| CO: 6|Marks: 7]

(b) Consider the following basic block, in which all variable are integers and ** denotes exponentiation

$a := x ** 2$

$b := 3$

$c := x$

$d := c * c$

$e := b * 2$

$f := a + d$

$g := e * f$

Apply the following optimization techniques to this basic block, in order to compute the result of each transformation.

i) Common sub expression elimination

ii) Algebraic simplification

iii) Constant folding

[BL: Apply| CO: 6|Marks: 7]

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