

**GANPAT UNIVERSITY**  
**B. TECH SEM-VII (Information Technology)**  
**FIRST INTERNAL EXAMINATION – SEPT 2024**  
**2CEIT701: Compiler Design**

**TIME: 1 Hour****TOTAL MARKS: 20**

- Instructions:**
- 1) Figures to the right indicate full marks.
  - 2) Be precise and to the point in your answer.
  - 3) Assume suitable data, if necessary.
  - 4) The text just below marks indicates the Course Outcomes Numbers, (CO) followed by the bloom's taxonomy level of the question, i.e., R: Remembering, U: Understanding, A: Applying, N: Analyzing, E: Evaluating, C: Creating.

**Q.1 Do as Directed:****[5]****(i) Eliminate Left Recursion from following grammar.****2A** $E \rightarrow Na \mid Tb$  $N \rightarrow ET \mid ah$  $T \rightarrow ThE \mid h$ **Answer:****Step-1 (1 Marks)** $E \rightarrow ETa \mid aha \mid Tb$  $T \rightarrow ThE \mid h$ **Step-2 (1.5 Marks)** $E \rightarrow ahaE' \mid TbE'$  $E' \rightarrow TaE' \mid \epsilon$  $T \rightarrow hT'$  $T' \rightarrow hET' \mid \epsilon$ **(ii) Eliminate Left Factoring from following grammar.** $S \rightarrow Abcd \mid Abc \mid Abcbc \mid Abcc$  $A \rightarrow abd \mid ab$ **Answer: (2.5 Marks)** $S \rightarrow AbcS'$  $S' \rightarrow d \mid \epsilon \mid bc \mid c$  $A \rightarrow abA'$  $A' \rightarrow d \mid \epsilon$ **Q.2 Define the following terms: (each 1 Marks)****[5]****1. Lexemes-** The sequence of character in a source program matched with a pattern for a token is called lexeme.**1R****2. Tokens-** Sequence of character having a collective meaning is known as token.**3. Assembler-** Assembler is a translator which takes the assembly code as an input and generates the machine code as an output.**4. Linker-** Linker makes a single program from a several files of relocatable machine code.**5. Pre-Processor:** A preprocessor is a program that modifies source code before sending it to a compiler for processing.**Q.3 Find the FIRST () and FOLLOW () set for the following grammar.****[4]** $S \rightarrow ABS \mid PQx$ **2A** $A \rightarrow yx \mid m \mid \epsilon$  $B \rightarrow bC$  $C \rightarrow cC \mid \epsilon$  $P \rightarrow pP \mid \epsilon$  $Q \rightarrow qQ \mid \epsilon$

**Answer:**

NT	FIRST() (2 Marks)	FOLLOW() (2 Marks)
S	{y,m,b,p,q,x}	{}
A	{y,m, ε}	{b}
B	{b}	{y,m,b,p,q,x}
C	{c, ε}	{y,m,b,p,q,x}
P	{p, ε}	{q,x}
Q	{q, ε}	{x}

**Q.4 Construct LL (1) Parsing Table for the given grammar.**

**S→W**

**W→ZXY | XY**

**Y→c | ε**

**Z→a | d**

**X→Xb | ε**

**Answer:**

**Step-1 Remove Left Recursion (1 Marks)**

**S→W**

**W→ZXY | XY**

**Y→c | ε**

**Z→a | d**

**X→X'**

**X'→bX' | ε**

**Step-2 First and Follow of Grammar (4 Marks)**

NT	First	Follow
S	{a,b,c,d,ε}	{}
W	{a,b,c,d,ε}	{}
Y	{c,ε}	{}
Z	{a,d}	{b,c,\$}
X	{b,ε}	{c,\$}
X'	{b,ε}	{c,\$}

No.	Production Rule
1	S→W
2	W→ZXY
3	W→XY
4	Y→c
5	Y→ε
6	Z→a
7	Z→d
8	X→X'
9	X'→bX'
10	X'→ε

**Step-3 LL(1) Parser Table (1 Marks)**

NT	a	b	c	d	\$
S	S→W	S→W	S→W	S→W	S→W
W	W→ZXY	W→XY	W→XY	W→ZXY	W→XY
Y			Y→c		Y→ε
Z	Z→a			Z→d	
X		X→X'	X→X'		X→X'
X'		X'→bX'	X'→ε		X'→ε

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