Sardar Patel Institute of Technology
Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous College Affiliated to University of Mumbai)

Mid Semester Examination Synoptic
March 2020

Max. Marks: 20 **Duration: 60Mins**
Class: T.E. **Semester: VI**
Course Code:CE61Branch:Computer
Name of the Course: System Programming and Compiler Construction

Question No.	
Q.1	Compute *firstpos, followpos* and *lastpos* for the syntax tree generated from the augmented regular expression (a|b)*abba#. Syntax tree – 1 marks Firstpos of all nodes- 1 mark Lastpos of all nodes-1 mark Followpos of all nodes - 2 marks
Q.2	(A) Consider the following context free grammar: S→a|aAb|abSb A→aAAb|bS Is the grammar ambiguous or unambiguous? Justify by giving parse tree using leftmost or rightmost derivation. Any String accepted by the grammar:- 0.5 mark Atleast 2 leftmost or rightmost derivation shown in the parse tree- 1 mark Reason for ambiguous grammar:- 0.5 mark (B) Why the algorithm of one pass macro processor cannot handle the invocation of one macro within the. Justify with the help of an example. Example:- 1 mark Justification with the help of a relevant example:- 2 marks **OR** (B) State the reason for the given statement: - "The body of a macro processor should not contain any labels." How this feature can be dealt by the macro processor? Example:- 1 mark Justification with the help of a relevant example:- 2 marks
Q.3	Illustrate the design of an absolute loader with the help of any example. Example- 2 marks Algorithm- 2 mark Explanation- 1 mark
Q.4	Apply the algorithm of two pass assembler to assemble the following SIC source program. Design suitable data structures if required.

```
SUM       START   4000
FIRST     LDX     ZERO
          LDA     ZERO
LOOP      ADD     TABLE,X
          TIX     COUNT
          JLT     LOOP
          STA     TOTAL
          RSUB
TABLE     RESW    2000
COUNT     RESW    1
ZERO      WORD    0
TOTAL     RESW    1
          END     FIRST
```

Refer the following OPTAB

Mnemonic	Opcode
ADD	18
JLT	38
LDA	00
LDX	04
RSUB	4C
STA	0C
TIX	2C

Object Code and Location Counter values:- 4 marks

LOC				Object Code
4000	SUM	START	4000	
4000	FIRST	LDX	ZERO	045788
4003	LDA	ZERO		005788
4006	LOOP	ADD	TABLE, X	18C015
4009	TIX	COUNT		2C5785
400C	JLT	LOOP		384006
400F	STA	TOTAL		0C578B
4012	RSUB			4C0000
4015	TABLE	RESW	2000	
5785	COUNT	RESW	1	
5788	ZERO	WORD	0	000000
578B	TOTAL	RESW	1	
	END	FIRST		

Symbol table :- 1 mark

OR

Apply the algorithm of two pass assembler to assemble the following SIC source program. Design suitable data structures if required.

```
SUM       START   4000
          LDX     ZERO
CLOOP     TD      INDEV
          JEQ     CLOOP
          RD      INDEV
          STCH    RECORD, X
          TIX     B200
          JLT     CLOOP
INDEV     BYTE    X 'F5'
RECORD    RESB    200
ZERO      WORD    0
B200      WORD    200
```

Refer the following OPTAB

Mnemonic	Opcode
JEQ	30
JLT	38
LDX	04
RD	D8
STCH	54
TD	E0
TIX	2C

Object Code and Location Counter values:- 4 marks

LOC	SUM	START	4000	Object Code
4000		LDX	ZERO	0440DE
4003	CLOOP	TD	INDEV	E04015
4006		JEQ	CLOOP	304003
4009		RD	INDEV	D84015
400C		STCH	RECORD, X	54C016
400F		TIX	B200	2C40E1
4012		JLT	CLOOP	384003
4015	INDEV	BYTE	X 'F5'	F5
4016	RECORD	RESB	200	
40DE	ZERO	WORD	0	000000
40E1	B200	WORD	200	0000C8

Symbol table :- 1 mark