Pr.1) “Systems Programming and Operating Systems”, by D.M. Dhamdhere, Second Edition , Page No.91 (Fig. 4.5)

Problem statement : Apply PassI of a two-pass Assembler to the following assembly language code and generate Intermediate Code (IC), Symbol Table, Literal Table and POOL Table according to IC VarientI.

```
          START   101
          READ    N
          MOVER   BREG    ONE
          MOVEM   BREG    TERM
AGAIN     MULT    BREG    TERM
          MOVER   CREG    TERM
          ADD     CREG    ONE
          MOVEM   CREG    TERM
          COMP    CREG    N
          BC      LE      AGAIN
          DIV     BREG    TWO
          MOVEM   BREG    RESULT
          PRINT   RESULT
          STOP
N         DS      1
RESULT    DS      1
ONE       DC      ‘1’
TERM      DS      1
TWO       DC      ‘2’
          END
```

Solution : Following tables are used as input along with the above mentioned assembly language code input to solve the problem. While implementing in the laboratory, you can hard code these tables in any suitable data structures.

OPTAB

Mnemonic Opcode	Class	Code for mnemonic
STOP	IS	00
ADD	IS	01
SUB	IS	02
MULT	IS	03
MOVER	IS	04
MOVEM	IS	05
COMP	IS	06
BC	IS	07
DIV	IS	08
READ	IS	09
PRINT	IS	10
START	AD	01
END	AD	02
ORIGIN	AD	03
EQU	AD	04
LTORG	AD	05
DC	DL	01
DS	DL	02

Registers

AREG	1
BREG	2
CREG	3
DREG	4

Condition Codes

LT	1
LE	2
EQ	3
GT	4
GE	5
ANY	6

Solution

Intermediate Code (IC)

Source Code (Input to PassI of assembler)				Location Counter (LC)	Intermediate Code (IC) (Output of PassI of assembler)		
Label	Opcode	Operand1	Operand2		IC for Opcode	IC for Operand1	IC for Operand2
	START	101			(AD,01)	(C,101)	
	READ	N		101	(IS,09)	(S,01)	
	MOVER	BREG	ONE	102	(IS,04)	(2)	(S,02)
	MOVEM	BREG	TERM	103	(IS,04)	(2)	(S,03)
AGAIN	MULT	BREG	TERM	104	(IS,03)	(2)	(S,03)
	MOVER	CREG	TERM	105	(IS,04)	(3)	(S,03)
	ADD	CREG	ONE	106	(IS,01)	(3)	(S,02)
	MOVEM	CREG	TERM	107	(IS,05)	(3)	(S,03)
	COMP	CREG	N	108	(IS,06)	(3)	(S,01)
	BC	LE	AGAIN	109	(IS,07)	(2)	(S,04)
	DIV	BREG	TWO	110	(IS,08)	(2)	(S,05)
	MOVEM	BREG	RESULT	111	(IS,05)	(2)	(S,06)
	PRINT	RESULT		112	(IS,10)	(S,06)	
	STOP			113	(IS,00)		
N	DS	1		114	(DL,02)	(C,1)	
RESULT	DS	1		115	(DL,02)	(C,1)	
ONE	DC	‘1’		116	(DL,01)	(C,1)	
TERM	DS	1		117	(DL,02)	(C,1)	
TWO	DC	‘2’		118	(DL,01)	(C,2)	
	END				(AD,02)		

Symbol Table (SYMTAB)

Symbol	Address
N	114
ONE	116
TERM	117
AGAIN	104
TWO	118
RESULT	115

Literal Table (LITTAB) and Pool Table (POOLTAB) : NIL (As no literals in the source code)