BANGLADESH UNIVERSITY OF PROFESSIONALS
Military Institute of Science and Technology
B.Sc. in Computer Science and Engineering,
Term Final (Spring) Examination 2023: Jul-Sep 2023

Student Group: 72 < Earned Credit Hours ≤ 108

Subject: CSE 305, Microprocessors, Micro-controllers and Assembly Language

Time: 3.00 hours **Full Marks: 180**

INSTRUCTIONS:

a. Use **SEPARATE** answer scripts for each section.
b. **Question-1** in **Section-A** and **Question-5** in **Section-B** are compulsory
c. Answer any other **TWO** questions out of **THREE** from each section.
d. Figures in the margin indicate full **marks**.
e. Assume reasonable data if necessary.
f. **Symbols** and **abbreviations** used have their usual meanings.

SECTION-A

Question 1 (Compulsory) **Marks**

a. Analyze how protection among tasks or users are ensured in 80286. **10**

b. Suppose a segment register contains $(000F)_{16}$ which points to a segment descriptor which is described in memory as $(0000912021146789)_{16}$. Analyze **6+6+6+2 =20**
   (i) From where in memory the segment starts,
   (ii) Size of the segment in bytes,
   (iii) Who can use this segment and
   (iv) Type of the segment (code/data/stack).

Question 2

a. In 80286, once you are in "protected mode", you cannot come back to "real mode" without "rebooting" the processor. How 80386 handles this problem? **12**

b. Analyze 80386 segment descriptor. **18**

Question 3

a. Find the specialty of port C in comparison to port A or Port B of an 8255. **8**

b. The control register of an 8255 contains $(F7)_{16}$. Analyze the operation of the 8255 ports. **12**

c. Compare the "minimum mode" and "maximum mode" of operation of an 8086. **10**

Question 4

a. List and describe the steps INTEL microprocessors will take when they respond to an external interrupt. **12**

b. Explain why Pentium is known as "Super scalar" processor. **6**

c. Illustrate how paging memory management of Pentium is different from that of 80386 processor. **12**

SECTION-B

Question 5 **(Compulsory)**

Scenario :

Entrepreneur Mr. X runs a modest business. His products are safe at normal temperatures (below 25 degree Celsius), but their quality deteriorates at temperature above 30 degrees Celsius. Mr. X cannot afford to have the air conditioning on all the time because of his poor financial situation and rising utility costs. Therefore, he seeks a low cost device that can alert him when to active the air conditioning.

Now, he wants to design and developed a microcontroller-based (Arduino) System that will do the following :

(i) Under 25 degree Celsius a Green LED will turn ON.
(ii) Between 25 degree and 30 degree a Yellow LED will turn ON (in low intensity).
(iii) Above 30 degree Celsius the Red LED will blink.

You need to answer the followings based on the above scenario :

a. Determine the hardware requirements. **5**

b. Draw the hardware connections. **10**

c. Write down the code (Arduino Code) accordingly to the hardware connection of b. **15**

Question 6

a. Briefly discuss the following functions of "INT 21h" with necessary code snippet. **3*3=9**

(i) Single-key input
(ii) Single-character output
(iii) Character string output

b. Find out the value of DL register and Carry Flag status after the execution of each code snippet. **6*2=12**

(i)
```
MOV CL,03h
MOV DL,18h
SHL DL,CL
```

(ii)
```
MOV CL,03h
MOV DL,-18h
SAR DL,CL
NEG DL
```

c. Using only MOV, ADD, SUB, INC, DEC and NEG change the following high level language assignment statements into low level assembly language. Assume, A, B, C are Byte variables. **9**

(i) A = B – A
(ii) A = -(A + 1)
(iii) C = 2 (A + B)
(iv) B = 3 * B + 7
(v) A = 1 + B – A

Question 7

a. Illustrate with examples how overflow is detected from both signed and unsigned numbers in 8086. **10**

b. Construct an assembly program that will prompts the user to enter a character, and on subsequent lines prints its ASCII code in binary, and the number of 1 bit in its ASCII code. **10**

c. Construct a program in assembly language to display the following pattern. For example, n = 5 will print the below where n is the user input. **10**

```
1
2 3
3 4 5
4 5 6 7
5 6 7 8 9
```

Note that, the range of n is 0 to 5.

Question 8

a. Describe the effect of MUL and IMUL on the status flags of 8086. For the following instructions find out the new value of AH, AL and CF/OF. **15**

(i) MUL BL; if AL contains 80h and BL contains FFh

(ii) IMUL BL ; if AL contains 80h and BL contains FFh

b. Write a procedure FACTORIAL that will compute N! for a positive integer N. The procedure should receive N in CX and return N! in AX. Assume that there will be no overflow. **10**

c. Briefly discuss the following instructions with appropriate examples: **5**

(i) CALL

(ii) RET

B.Sc. in Computer Science and Engineering

Term Final (Spring) Examination 2023: Jul-Sep 2023

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Subject:CSE 317, Data Communications

Full Marks: 180

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INSTRUCTIONS:

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SECTION-A

Question 1 (Compulsory)

a. Explain the terms 'protocol' and 'standards' with example. 8

b. An analog signal is depicted in Figure 1(b) ranging the amplitude from -40V to +40V. Consider the level, L = 8, this analog signal is required to convert into digital form. Calculate normalized PAM, normalized quantized value, normalized error, quantized code, and encoded words for 25.6V and -5.8V. 14

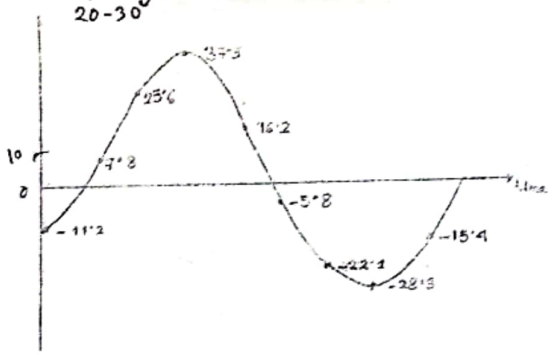

Figure : 1(b)

c. Draw the graph of the Manchester and Differential Manchester schema using data stream 01001110, assuming that the last signal level has been positive. 8

Question 2

a. Compare and contrast network layer delivery and transport layer delivery. 10

b. Dialog control and synchronization are two responsibilities of the session layer in the OSI model. Which layer do you think is responsible for these duties in the internet model? Explain your answer. 10

c. Figure 2(c) shows part of an internet with two routers and five LANs. Computer B sends a message to Computer H via different LAN and routers. Show the contents of the packets and frames at the network and data link layer for each hop interface. 10

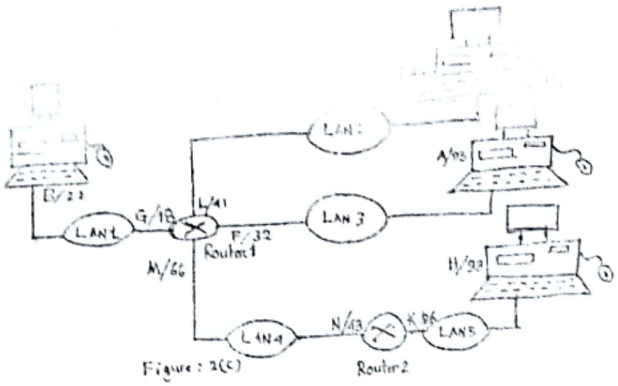

Figure : 2(c)

Question 3

a. "Based on Fourier analysis, a digital signal is a composite analog signal." Justify your answer with a neat diagram. 10

b. A network bandwidth of 1 Mbps can pass only an average of 1200 frames per minute with each frame carrying an average of 1000 bits. Find the throughput of this network. Also state the implications of this finding with respect to Bandwidth. 10

c. Explain the signaling scheme 4D PAM5 with a neat diagram. 10

Question 4

a. You have an optical fiber noisy channel with a 10 GHz bandwidth. The SNR of that channel is 127. Calculate the appropriate bit rate and signal level. 7

b. List three different techniques in Serial transmission and explain the differences. 8

c. Briefly explain the 4-QAM implementation with the help of the necessary diagram. Which of the four digital-to-analog conversion techniques are most susceptible to noise? Defend your answer. 15

SECTION-B

Question 5 (Compulsory)

a. Compare between synchronous and statistical TDM. 5

b. "Privacy and Anti-jamming can be achieved by spreading" – judge by statement with suitable example. 10

c. Hamming code is used to correct single bit error. Assume that the data bit to be transmitted is 1011101. Using Hamming code, calculate the bit sequence at the sender side. Suppose a bit is flipped during transmission and the position of that error is the last digit of your student ID. Now, show the steps at the receiver site to correct the error. 12

Question 6

a. Illustrate and explain the geometric concept for finding minimum Hamming distance for error detection. Calculate the bandwidth of the light from 1000nm to 1200nm wavelength range assuming the propagation speed $2x10^8 m/s$. 10

b. A sender needs to send four data items 0x3456, 0xABCC, 0x02BC and 0xEEEE. Find the checksum at the sender site and find the checksum at the receiver site if the second data item is changed to 0xABCE. 10

c. Point out the values of g(x) that can guarantee a single-bit error is caught. 5

(i) $x+1$ 0011

(ii) x^3 1000

d. One radio transmitter is using the Barker sequence (10110111000) where the data bit rate is chip rate/N. Sketch the spread signal for the original signal 10. 5

Question 7

a. Distinguish between ALOHA and CSMA/CD protocol. 6

b. Illustrate and explain the flow diagram of CSMA/CD. A CSMA/CD network is running at 1Gbps over 1km cable with no repeater. The signal speed is 2000km/sec. Calculate the minimum frame size. 10+4 = 14

c. Explain four physical topologies of token passing controlled-access protocol. 10 star Ring Bus

Question 8

a. Distinguish between a forwarding port and a blocking port. 5

b. Briefly describe the reasons of preamble and SFD in 802.3 Ethernet frame format. An Ethernet MAC sublayer receives 1510 Bytes of data from the upper layer. Is it possible to encapsulate the data in one frame? If not, how many frames are required to be sent? What is the size of data in each frame? 4+6 = 10

c. List the goals of the Gigabit Ethernet. Briefly explain the methods of half-duplex mode of Gigabit Ethernet. 4+6 = 10

d. How does a VLAN reduce network traffic? 5

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Subject: CSE 307, Operating System

Time: 3.00 hours Full Marks: 180

INSTRUCTIONS:

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SECTION-A

Question 1 (Compulsory)

a. Explain how the limitation of contiguous memory allocation is overcome using link list memory allocation? 08

b. Write short notes on: 10
(1) Boot block and
(2) i-node.

c. Suppose that a disk drive has 1000 cylinders numbered 0 to 999. The head pointer is currently at cylinder 60. The queue of pending request is as follows: 12
520, 35, 790, 50, 175, 450, 390, 210, 855, 675
Starting from the current head pointer, calculate the total seek time (in cylinders) that the disk arm satisfy all pending request, for following disk scheduling algorithm:
(1) Look 60 35 50 175 210 390 450 520 675 790 855
(2) C-Look and
(3) SSTF.

Question 2

a. For avoiding race condition, solution requirement 3 states that – "No processes running outside it's critical region may block another process". Identify and explain how this requirement may be violated in following code regarding "lock variable" involving 2 processes: 8

```
int lock = 0;
while(lock);
lock = 1;
// Enter critical section;
access shared variable;
//leave critical section;
lock=0;
```

b. Though the peterson solution is designed to prevent race condition among the processes, yet, it has some imitations. Discuss the limitations of peterson solution. 10

c. Explain the usages of semaphore with appropriate examples/figure. 12

Question 3

a. Compare between program and process. 10

b. Does any hierarchy exists for processes? Justify your answer. 10

c. Discuss the overhead of process creation and context switching. 10

Question 4

a. Security must be ensured at four levels to be effective. Briefly discuss those four levels of security measures. 8

b. Explain how secure communication may be ensured over insecure medium? 10

c. Consider the instruction "count = read (fd, buffer, nbytes)"; where read is an example of a system call. Illustrate with a diagram the steps of making a system call for read. 12

SECTION-B

Question 5 (Compulsory)

a. Establish a complete operating system with the Cloud, Virtualization and Security Protocol. Write the advantages and disadvantages of the designed operating system. 10

b. Analyse which one is the best performed operating system among batch, multiprogramming and time sharing in doing multiple tasks remotely. 10

c. Explain the process of using interrupt driven I/O in a system to manage a single serial port and pooling I/O to manage front end processors as a terminal concentrator. 10

Question 6

a. Explain the necessity of virtualization. Compare different types of virtualization. Recommend which one is better in term of security. 10

b. Define Spinning and Switching. Recommend one that gives more advantages in multiprocessors synchronization. 10

c. List the necessities to handle load balancing in multiprocessor system. Explain the process of allocating some processes among different nodes by applying Graph-Theoritic Deterministic algorithm. 10

Question 7

a. Design a typical I/O system using Bus. Mention some advantages of the designed I/nO system in controlling multiple resources. 10

b. Differentiate among Pooling I/O, Vector I/O, Kernel I/O and Interrupt I/O. 10

c. List various security problems in a multiprogramming and time sharing environment where several users share the system simultaneously. Give your idea to solve the security problems. 10

Question 8

a. Define some recent threats and attacks. Share your idea to secure the process that can handle those threats and attacks. 10

b. State the process of cryptography. Explain secret key cryptography to transfer the message "I like MIST" with encryption and decryption (let the encrypted key is 15). 10

c. What is Access Control Matrix in protection? Explain three processes for the implementation of Access Matrix. Explain which implementation of Access Matrix is more suitable for the following operations: 10

(a) Granting read access to a file for all users.
(b) Revoking write access to a file for all users.
(c) Granting write access to a file to Jamal, Liza, Comol and Jhon.
(d) Revoking write access to a file from Jana, Malika, Milon and Shahid.

Term Final (Spring) Examination 2023: Jul-Sep 2023

Student Group: 72 < Earned Credit Hours ≤ 108

Subject: CSE 301, DataBase Management System

Time: 3.00 hours | Full Marks: 180

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SECTION-A

Question 1 **(Compulsory)**

a. Analyze the scenario mentioned below and answer the questions that follow: 8+7

i. A car insurance company maintains a database for its customers who may each own one or many cars. Each car and owner (customers) may be associated with zero to many recorded accidents. The insurance company maintains the following data:

1. Customer – customer_ID, Driving_License_No, Name, Address
2. Car – Registration_No, Make, Model, Year
3. Accident – Report_No, Location, Date
4. Amount paid for damage.

Construct an ER Diagram for the Car Insurance Company.

ii. Propose a Schema for the above ER Diagram by constructing appropriate tables and clearly bringing out the relationships between them.

b. Analyze the "Employee Schema" and construct a SQL query to identify departments with at least two SALESMEN in each grade. Return Department Name, Grade and Number of Employees. 15

Support your answer with a logical explanation for the different steps of your query.

Question 2

We know that a Database Management System (DBMS) refers to the technology for creating and managing databases. With that as a backdrop, answer the questions that follow:

a. List out the advantages of using the DBMS. 5

b. Explain "Data Independence." 5

c. Explain the "Three Tier Architecture." Describe it with the help of a neat and labelled diagram. 10

d. List out the advantages of Normalisation.

e. List out the criteria that need to be satisfied for a table to be in First Normal Form, Second Normal Form and Third Normal Form respectively. 5

Question 3

Refer to the "Sales Schema" and answer the questions that follow:

a. Construct a SQL query to find those customers who are served by a salesperson and the salesperson earns commission in the range of 0.12 to 0.14 (Both inclusive). Return cust_name as "Customer", City as "City", name of salesman as "Salesman" and commission as "Commission." 8

b. Construct a SQL query to find all orders executed by the salesperson and ordered by the customer whose grade is greater than or equal to 200. Compute 'purch_amt*commission' as "Commission_Amt". Return ord_no, cust_name, commission as 'Commission%' and calculated commission amount as 'Commission_Amt.' 8

c. Construct a SQL query to find those salespeople who generated orders for their customers but are not located in the same city. Return ord_no, cust_name, customer_id and salesman_id. 8

d. Construct a SQL query to locate the orders made by customers. Return order number and customer name. 6

Question 4

a. Consider the Exam Cell of an university. It records the marks that students get in different exams for different course offerings. Each student can take multiple course offerings and will require to take multiple exams for each course offering. The records maintained in the Exam Cell are as follows: 8+7

1. Student – Student_ID, Name, Program
2. Course offering – Course_No, Semester, Year, Room_No, Timing
3. Exam – Exam_ID, Exam_Name, Place, time
4. Marks obtained by students in each exam.

i. Construct an ER diagram for the Exam Cell.

ii. Propose a Schema for the above ER diagram by constructing appropriate tables and clearly bringing out the relationships between them.

b. Analyze the "Employee Schema" and construct a SQL query to find those employees of Grade 3 and 4 and work in the department of FINANCE or AUDIT and whose salary is more than the salary of ADELYN and experience is more than FRANK (That is, joined the office before FRANK). Return complete information about the employees entered by date on which hired. 15

Support your answer with a logical explanation of the different steps of your query.

SECTION-B

Question 5 **(Compulsory)**

a. "Schedules under Multiversion Timestamp Ordering protocol may not be possible under Timestamp Ordering Protocol" – Verify this statement using the schedule shown in Figure 5(a). 20

b. "Thomas write rule makes use of the view serializability by ignoring the obsolete write operations from the transactions that issue them" – Illustrate this statement with the help of a transaction schedule. Also explain why the obsolete write can be ignored with proper example. 10

Question 6

a. Describe the Multiple Granularity Scheme. Explain the purpose of introducing intention mode locks in this scheme. Also explain how the intension mode lock works. 12

b. Consider the transaction T4 and the database graph shown in Figure 6(b). Find out whether the transaction follows Graph-based protocol. State the advantages and disadvantages of this protocol as well. 10

c. Demonstrate the need for lock conversion in the two phase locking protocol using proper examples. 08

Question 7

a. *Deadlock* is a potential evil associated with lock based protocol. Consider the partial schedule shown in figure 7(a). Find out whether the schedule has a deadlock using a wait-for graph. 4+4=08

"One of the solutions to prevent starvation in deadlock recovery system is to never choose the oldest transaction in the deadlock set as the victim." – justify this statement with proper example.

b. Differentiate between the two deadlock prevention schemes – "Wound-Wait and Wait-Die" based on the number of rollbacks using proper schedules. 10
Explain Whether starvation is possible under these two schemes.

c. Describe the ACID properties of transactions using a mock transaction. 12

Question 8

a. Explain why bucket overflow occurs in hash file organization. Describe the open hashing and closed hashing scheme using proper examples. 10

b. Differentiate between B+ tree index file and B tree index file. 08

c. Define the following terminologies: 12
   i. Conflict serializability
   ii. Recoverable schedule
   iii. Non-clustering index
   iv. Uniform and Random hash-function

T1	T2	T3
write(A)	read(A)	
	write(A)	
write(B)		
		read(B)
		write(B)
	read(B)	
		read(A)
		write(A)

Figure 5(a)

T4: LOCK_X(D)
LOCK_X(G)
LOCK_X(J)
LOCK_X(K)
UNLOCK(K)
UNLOCK(G)
UNLOCK(J)
LOCK_X(H)
LOCK_X(I)
UNLOCK(H)
UNLOCK(I)
UNLOCK(G)

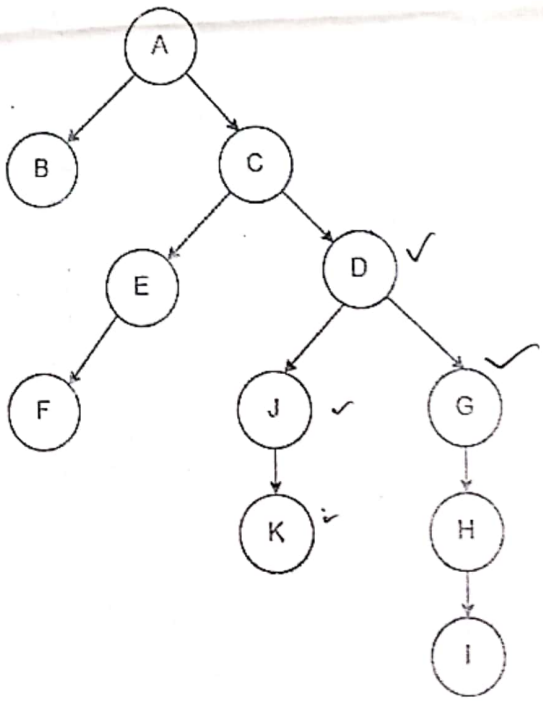

Figure 6(b)

T5	T6	T7
Lock_X(A) ✓ read(A)		
		Lock_X(B) ✓ read(B) Lock_S(A) read(A)
	Lock_S(B) read(B) Lock_X(C) read(C)	
	write(C)	write(B)
Lock_X(C) read(C) write(A) write(C)		

Figure 7(a) : A partial schedule

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SECTION-A

Question 1 (Compulsory) **Marks**

a. **10**

L-> D | L D
D -> T I ;
T-> int | float | char
I-> id | I , id

Consider the above grammar for identifier declaration. Based on this grammar, determine whether it is suitable for a top-down or bottom-up parser.
If the grammar is suitable for bottom-up parsing, then apply the shift-reduce process and build bottom-up parser for the following statements:

int id1; float id2;

If not, justify your answer by discussing the characteristics of the grammar.

b. (i) Inspect the grammar of Question-1(a) and determine whether you need to modify the grammar before constructing a predictive top-down parser or not? Justify your response. If so,make the necessary changes and use the modified grammar for the following questions; otherwise, use the given grammar. **4+8+8**

(ii) Find FIRST and FOLLOW for each non-terminal.

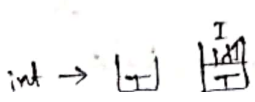
(iii)Construct a predictive parsing table using the FIRST and FOLLOW set.

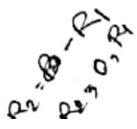
Question 2

a. Discuss the trade-offs between using a compiler and an interpreter. **10**

b. Compiler is a language processing system which converts a source code to a target machine code. Now, demonstrate the translation done by each phases of the compiler for the following statement considering all the variables are integer numbers. **20**

result = - num1 * 10 + num2 * 40





Question 3

a. Suppose, a situation arises where the lexical analyzer is unable to proceed because none of the patterns for tokens matches a prefix of the remaining input. How will the lexical analyzer recover from this phase? **10**

b. Consider the following grammars and patterns for identifying tokens in a programming language : **10**

expr -> *term operator term* | id *assignment_op term*
term -> num | id
operator -> + | - | * | /
assignment_op -> = | += | -= | *= | /=

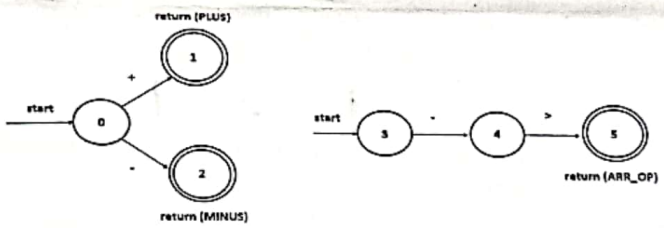
For the given grammar, write down the patterns for identifying the tokens "number", "identifier","operator" ,"assignment-op". Also draw the transition diagrams for each of the patterns.

(i) **Number:** Consider of any non-zero number of digits(0-9) but starting digit cannot be zero (0). Decimal points are followed by any non-zero number of digits. This part is optional. There must be at least one digit before the decimal number. Exponential part not considered.

(ii) **Identifier:** Identifier can contain any number of letters or digits or underscore (_).But it cannot start with any digit.

(iii) **Operators** and **assignment operators:** Operators mentioned in the grammar.

c. Consider the following two transition diagrams for arithmetic operator ('+' and '-' only) and arrow operators ('->') for C language respectively : **10**



If both the transition diagrams are matched in parallel, then how to resolve the case where both the diagrams will reach to the accepting states for '->' input?

Question 4

a. Explain whether the following grammars are LL(1) or not; your answer will not be accepted without proper explanation. **10**

i. S-> XX , X->xX|y
ii. S-> ASab|B, A-> a| ∈ , B->bb

b. Explain the back-tracking procedure of recursive-descent top-down parser with proper algorithm and example. **10**

c. Perform left-factoring in the following grammar. **10**

i. F-> n | n [A] | n(A)
ii. S-> bSS' | a ; S' -> SaaS | SaSb |b

S → Ab | Ba | ab
A → a B → b

a b

SECTION-B

Question 5 (Compulsory)

a. Figure – 5(a) represents a Syntax-Directed Definition (SDD) to keep track of block information in the programs. Identify the class of the SDD shown in Figure-5(a) and justify your answer. **07**

PRODUCTION	SEMANTIC RULES
$Ss \rightarrow S\ ;\ Ss_1$	$S.block = Ss.block$ $Ss_1.block = Ss.block$
$Ss \rightarrow \varepsilon$	
$S \rightarrow B$	$B.block = S.block$
$B \rightarrow \{\ Ss\ \}$	$Ss.block$ = child ($B.block$)
$S \rightarrow$ other	other.$block$ = $S.block$;

Figure-5(a): Syntax Directed Definition (SDD) for Block information

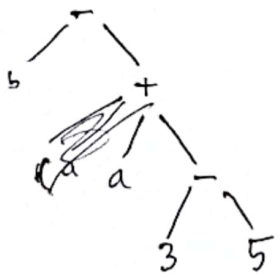
b. Following grammar generates a binary number with a decimal point. Design a L-attributed SDD to compute the decimal value of a binary string generated by the grammar and using the designed SDD illustrate that, the value of binary string 101.110 is the decimal number 5.75. **15**

S -> L . L | L
L -> L B | B
B -> 0 | 1

c. Appling the Syntax-Directed Definition (SDD) shown in Figure-5(c), build a syntax tree represented as a record for the string "b – (a + 3 -5)" and list down the steps of tree construction. **08**

PRODUCTION	SEMANTIC RULES
$E \rightarrow E_1 + T$	E.*node* = new *Node*('+', E_1.*node*, T.*node*)
$E \rightarrow E_1 - T$	E.*node* = new *Node*('-', E_1.*node*, T.*node*)
$E \rightarrow T$	E.*node* = T.*node*
$T \rightarrow (\ E\ )$	T.*node* = E.*node*
$T \rightarrow$ id	T.*node* = new *Leaf* (id, id.entry)
$T \rightarrow$ num	T.*node* = new *Leaf*(num, num.*val*)

Figure-5(c): Syntax Directed Definition (SDD) for Syntax Tree



Question 6

a. Considering the Syntax-Directed Definition (SDD) in Figure-6(a), build an annotated parse tree and corresponding dependency graph for the declaration, " float arr[4][5][2] ; ". **15**

PRODUCTION	SEMANTIC RULES
T → B id C ;	T.*t* = C.*t* C.*b* = B.*t*
B → int	B.t = integer
B → float	B.t = float
C → [num] C_1	C.t = array (num.*val*, C_1.*t*)
C → ε	C_1.*b* = C.*b* C.*t* = C.*b*

Figure-6(a): Syntax Directed Definition (SDD) for type checking

b. Briefly explain the elements of a general activation record for procedure call with appropriate examples. **07**

c. Explain how nonlocal data on the stack can be accessed using the access control link of the activation record with appropriate examples. **08**

Question 7

a. Illustrate three address code for the code segment shown in Code7(a) which turns a 10*10 matrix A into an identity matrix. Assume that, the real-valued array elements take 8 bytes each and the matrix A is stored in row-major form. **10**

```
for i from 1 to 10 do
    for j from 1 to 10 do
        A[i,j] = 0.0;
for i from 1 to 10 do
    A[i,i] = 1.0;
```

Code-7(a): Creating Identity Matrix-A

```
// code for procedure proc1
action1
call proc2
action2
halt

// code for procedure proc2
action3
call proc2
return
```

Code-8(a): Pseudo Code

b. Partition the three address instructions that you have generated in question-7(a) into a set of basic blocks and construct flow graph. **10**

c. Compare among the following data structure for representing intermediate representations: **10**

(i) Quadruples
(ii) Triples
(iii) Indirect Triples

Question 8

a. For the three address code shown in Code-8(a), write down generated machine code using static allocations for procedure **proc1** and **proc2**. Use pseudo instruction **ACTION** to represent the sequence of machine instructions to execute the statement **action1**, **action2** and **action3**.Start the code for procedure **proc1** at address **200** and **proc2** at address **350**.Furthermore assume that each ACTION instruction takes **16 bytes** and the activation records for these procedures are statically allocated starting at locations **400** and **494,** respectively. Consider that **action3** has a condition which is responsible for returning back to the caller procedure. You also have to explain the reasons behind each line of the generated machine code. **15**

b. Explain the following optimization mechanism with appropriate examples : **15**

(i) Basic Block Optimization
(ii) Peephole Optimization