

Total No. of printed pages = 8

4 BCA 1 (N/O)

2012

(June)

COMPUTER APPLICATION

Paper : 4·1

(Numerical Analysis and Scientific Computing)

Full Marks - 75

Time - Three hours

The figures in the margin indicate full marks
for the questions.

NEW COURSE

I. Answer the following : $1 \times 7 = 7$

- (a) Represent 44.85×10^6 in normalized floating point mode.
- (b) Define truncation error.
- (c) What is FORTRAN variable ?

[Turn over

(d) Write one advantage of Newton-Raphson's method.

(e) Define interpolation.

(f) Which symbol is used to denote third forward difference ?

(g) State the Trapezoidal Rule.

Answer the following :

(a) Express the following algebraic expression into its equivalent FORTRAN expression :

$$x = \frac{1}{K} \left[x + \frac{a}{x^{k-1}} \right]$$

2

(b) Subtract $.9432E - 4$ from $.5452E - 3$.

2

(c) Evaluate $\Delta^n(e^{ax+b})$ the interval of differencing being unity.

3

(d) Find the second divided difference with arguments p, q, r of the function $\frac{1}{x}$.

2

(c) Mention any three advantages of the use of the calculus of finite differences formulae.

3

(f) Express $\Delta^2 y_o$ and $\Delta^3 y_o$ in terms of the values of the function y.

2

3. Find the value of $(1+x)^2$ and $(x^2+2x)+1$ when $x = .5999E - 2$. Calculate the relative errors in the two methods of calculating the expression.

4

4. Use suitable floating point values of a, b, c to show that $a(b-c) \neq ab - ac$.

4

5. Write a FORTRAN program to find the area and circumference of a circle whose radius is r.

5

6. Write a FORTRAN program to find maximum among 3 numbers using arithmetic if.

5

7. Describe the bisection method. Find the positive root of $x - \cos x = 0$ by bisection method correct to three decimal places.

4+5=9

Or

Discuss the false position method. Find a positive root of $x^3 + 1 = 4x$ by false position method.

4+5=9

8. Discuss the Newton's Forward Interpolation formula for equal intervals. 9

Or

Discuss the Lagrange's Interpolation formula.

9

9. Deduce Trapezoidal rule and evaluate

$$\int_{4}^{5.2} \log_e x dx \text{ by taking } h = 0.2. \quad 4+5=9$$

Or

Discuss the procedure of obtaining Simpson's One Third rule. 9

10. Solve $\frac{dy}{dx} = x^2 + y^2$ given $y(0) = 1$ and find $y(2)$ at $x = 0.1$ and 0.2 by Taylor's series. 9

Or

Explain the Picard's method. Solve $4+5=9$

$$\frac{dy}{dx} = \frac{y-x}{y+x}, \quad y(0)=1 \text{ to find } y(1).$$

OLD COURSE

Answer the following : $1 \times 7=7$

- (a) Represent '004854' in normalized floating point mode.
(b) Define rounding errors.
(c) Mention any three symbols used in FORTRAN character set.
(d) What is shift operator ?
(e) $\Delta - \nabla \equiv ?$
(f) Write one of the advantages of Runge-Kutta method.
(g) Define a polynomial.

Answer the following :

- (a) What is the maximum length allowed in defining a variable in FORTRAN ? 2
(b) Add '6434E3' to '4845E3'. 2
(c) Prove that $\nabla = 1 - E^{-1}$ 2

ution Total No. of printed pages = 3

value

-5=9

4 BCA (O/S) 3

2012

(October)

COMPUTER APPLICATION

Paper : 4·3

solve

(Operating System)

, 0·4,

(Old Course)

Full Marks - 75

Time - Three hours

The figures in the margin indicate full marks
for the questions.

Answer question No.1 and any *four* from the rest.

- | | |
|---------------------------------------|---|
| 1. (a) Define scheduling. | 1 |
| (b) What is mutual exclusion ? | 1 |
| (c) Define process. | 1 |
| (d) What is meant by circular wait ? | 1 |
| (e) Write about context switching. | 1 |
| (f) Why is virtual memory necessary ? | 2 |

(g) How does thread differ from a process ?

(h) Compare between static and dynamic linking.

(i) How does absolute path differ from relative path ?

(j) How is logical address space differ from physical address space ?

2. (a) Differentiate between internal and external fragmentation.

(b) What is Belady's anomaly ? Explain with example.

(c) What is a process control block ? Why it is important ? Explain.

3. (a) Explain in brief the different CPU scheduling criterias.

(b) Explain different file operations. Write about different attributes of a file. $5+4=9$

4. (a) Explain in brief tree structured directory.

(b) Explain different techniques to prevent deadlock.

(a) What is a TLB ? How is TLB more effective than page table base register ? $1+6=7$

(b) Write about interprocess communication. What are the different models of interprocess communication ? $4+4=8$

(a) What are the drawbacks of linked allocation method ? How these drawbacks can be removed ? $4+4=8$

(b) Write in brief about the different techniques for free space management. 7

Write short notes on any three : $5 \times 3 = 15$

(a) Segmentation

(b) DMA

(c) Real time operating system

(d) File mounting

(e) Demand paging.

(d) Write any two properties of divided differences. 2

e) If $f(x) = 3x^2 - \sqrt{5x} + 7$ then find $\Delta^2 f(x)$. 2

f) What is the order of convergence of Newton-Raphson method ? 3

3. Write a program to find Fahrenheit temperature from the corresponding Centigrade temperature. 4

4. Write a program to find the volume and surface area of a sphere of radius r. 5

5. Write a program to compute the roots of the quadratic equation $x^2 - 1000x + 25 = 0$. 5

6. Write a program to test whether a given integer is divisible by 7. 5

7. Discuss the Newton-Raphson method for single variable. Find the real root of $x^3 - 6x + 4 = 0$ by Newton-Raphson's method correct to 5 decimal places. 4+5=9

Or

Solve the following systems by Gauss elimination method : 9

$$3x - y + 2z = 12$$

$$x + 2y + 3z = 11$$

$$2x - 2y - z = 2$$

Discuss the Newton's Backward Interpolation formula for equal intervals. 9

Or

Describe the Newton's Divided Difference formula. 9

Deduce Simpson's One Third formula and evaluate 2+7=9

$$\int_1^2 \frac{dx}{x} \text{ by taking } h = .25.$$

Or

Discuss the procedure of obtaining Trapezoidal rule. 9

10. Obtain the Euler's formula for numerical solution of differential equation. Consider the initial value problem.

4+5=9

$$\frac{dy}{dx} = y - x^2 + 1, \quad y(0) = 0.5 \text{ Find } y(0.2).$$

Or

Using Runge-Kutta method of fourth order, solve

$$\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2} \text{ given } y(0) = 1 \text{ at } x = 0.2, 0.4$$

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4 BCA 4 (N/O)

2012

(June)

COMPUTER APPLICATION

Paper : 4·4

Full Marks = 75

Time – Three hours

The figures in the margin indicate full marks
for the questions.

NEW COURSE

(System Software)

- (i) Define Lexical Analysis and Syntax Analysis with example. 2+2=4
- (ii) Write the various phases of a compiler. 2
- (iii) What is Parsing ? Draw parse tree for the following : 2
$$(x + y) / 3 - (\log a - 45) / 6$$

[Turn over

- (iv) Define Abstract and Concrete Syntax. 2
- (v) What are Lexical Errors ? 2
- (vi) What is ambiguity ? How it is handled by a compiler ? 3
- (vii) Define linker and loader. 2

2. Write a recursive descent parser for the following grammar :

$$E \rightarrow E + T \mid T$$

$$T \rightarrow T * F \mid F$$

$$F \rightarrow (E) \mid a \mid b \mid c$$

Or

3. Construct SLR parser for the following grammar :

$$E \rightarrow E + T, E \rightarrow T$$

$$T \rightarrow T * F, T \rightarrow F$$

$$F \rightarrow \underline{id}$$

Is the following grammar LL(1) grammar ? Justify your answer.

(i) Explain LEX and YACC tools. 5

(ii) What is ambiguity ? How it is handled by a compiler ? 5

(iii) Draw the transition diagram for the following grammar : 7

$$E \rightarrow TE'$$

$$E' \rightarrow + TE' \mid \in$$

$$T \rightarrow FT'$$

$$T' \rightarrow *FT' \mid \in$$

$$F \rightarrow (E) + id$$

Or

(iv) What are the different issues in lexical analysis ? Define token, pattern and lexeme. 7

(i) What is MACRO ? How MACRO is defined and called ? 7

Or

(ii) Write about nested MACRO calls. Explain advanced MACRO facilities. 7

6. (i) Draw Parse tree for the sentence $i * (i + i)$ using the following operator grammar :

$$E \rightarrow T / E + T / E - T$$

$$T \rightarrow F / T * F / T / F$$

$$F \rightarrow P / F \uparrow P$$

$$P \rightarrow i \ (E)$$

Or

- (ii) What is predictive parsing ? What are its design issues ?

7. (i) Consider the grammar

$$R \rightarrow R' / 'R | RR | R* | (R) | a | b$$

Show that the grammar is ambiguous.

Or

- (ii) Consider the grammar

$$bexpr \rightarrow bexpr \text{ or } bterm \mid bterm$$

$$bterm \rightarrow bterm \text{ and } bfactor \mid bfactor$$

$$bfactor \rightarrow \text{not } bfactor \mid (bexpr) \text{ true } \mid \text{ false}$$

Is this grammar ambiguous ? Why ?

Write short notes on any two of the following :
 $5 \times 2 = 10$

- (i) Overlays
- (ii) Microprocessor
- (iii) Two pass Assembler.

OLD COURSE

(Programming Paradigm)

Answer question Nos. 1 and 2 and any six from the rest.

- (a) What is the full form of UML ? $1 \times 7 = 7$
- (b) What is a function ?
- (c) What is recursion ?
- (d) What is parameter ?
- (e) What is a stack ?
- (f) What is block structure ?
- (g) What is parsing ?

2. (a) Define principle of qualification. $2 \times 7 = 14$
- (b) How is data abstraction achieved ?
- (c) What is call by value ?
- (d) What are simple control constructs ?
- (e) Write the uses of activation record.
- (f) What is a heap ?
- (g) What is polymorphism ?
3. Describe logic programming using a language such as USP.
4. Describe various programming language models with their syntax.
5. Describe higher order functions and parametric polymorphism.
6. Describe recursive function and the implementation using a language.
7. Describe about list and user defined data type using examples.
- Describe operator overloading and templates with suitable examples. 9
- Describe dynamic dispatch and friend classes using examples. 9
8. Write short notes on any three : $3 \times 3 = 9$
- (a) Inheritance
 - (b) Display records
 - (c) PROLOG
 - (d) Lambda Calculus
 - (e) Declarative style programming versus imperative style programming.

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4 BCA NA & SC 1

2013

(June)

COMPUTER APPLICATION

Paper : 4.1

(Numerical Analysis and Scientific Computing)

Full Marks – 75

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer the following : $1 \times 7 = 7$

- (a) Give an example of a real constant in FORTRAN.
- (b) Mention any one library function in FORTRAN.
- (c) What is interpolation ?
- (d) State true or false :

“The nth divided difference of a polynomial of nth degree is constant”.

[Turn over

- (e) If $B = -2354.817$, write the output of the following :

WRITE (*, 6) B
6 FORMAT (IX, 'VALUE IS', F7.2)

- (f) What is Numerical Integration ?
(g) Write the first backward difference operator.

2. Answer the following :

- (a) Using floating point arithmetic, add '4547E4 and '5344E7.

- (b) Prove that $(1+\Delta)(1-\nabla) \equiv 1$

- (c) State the Simpson's one-third rule.

- (d) Show that the second difference is constant for the curve. $y = 5x^2 - 3$.

- (e) Write a program to find the surface area of a sphere.

- (f) Define rounding off error.

3. Calculate the value of $(a^2 - b^2) / (a + b)$ with $a = .4845$ and $b = .4800$ using normalised floating point arithmetic. Compare with the value of $(a-b)$.

A second degree polynomial passes through (0,1), (1,3), (2,7) and (3, 13). Find the polynomial.

Find the missing value from the following data:

x : 2	4	6	8	10
y : 5.6	8.6	13.9	—	35.6

Form the divided difference table for the following data :

x : 1	3	7	10	15
f(x) : -71	31	15	45	95

Find the positive root of $e^{-x} - x = 0$ by Newton-Raphson method correct to five decimal places.

Or

Solve :

$$3x - y + 2z = 12$$

$$x + 2y + 3z = 11$$

$$2x - 2y - z = 2$$

Describe the procedure for obtaining Trapezoidal rule.

Or

Calculate (upto 4 places of decimal) $\int_{1}^{10} \frac{dx}{1+x}$ by
dividing the range into eight equal parts.

9. Use Runge-Kutta method to approximate y , when
 $x = 0.1$ and $x = 0.2$, given that $x = 0$ when

$$y=1 \text{ and } \frac{dy}{dx} = x+y$$

Or

Explain Picard's method and solve

$$\frac{dy}{dx} = 3x + y^2, y(0) = 1 \text{ to get } y \text{ at } x = 0.1$$

10. Explain the Lagrange's Interpolation formula for
unequal interval.

Or

Using Taylor series method, solve $\frac{dy}{dx} = 3x + \frac{y}{2}$.

given that $y(0) = 1$, find y at $x = 0.1$ and 0.2 .

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4 BCA DMS 2

2013

(June)

COMPUTER APPLICATION

Paper : 4·2

(Database Management System)

Full Marks – 75

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Choose the correct option : $1 \times 7 = 7$

- (a) _____ is a file that defines the basic organization of a database.
- (i) Data dictionary
 - (ii) Metadata
 - (iii) Tab
 - (iv) RDBMS.

[Turn over

- (b) Which database level is the one closest to the users ?
- (i) Internal
 - (ii) External
 - (iii) Conceptual
 - (iv) Physical
- (c) _____ expresses the specific number of entity occurrences associated with one occurrence of the related entity.
- (i) Connectivity
 - (ii) Degree
 - (iii) Cardinality
 - (iv) Relationship
- (d) When all the columns in a table describe and depend upon the primary key, the table is said to satisfy the _____ normal form.
- (i) First
 - (ii) Second
 - (iii) Third
 - (iv) Fourth
- (e) Which rule guarantees that every primary key attribute is non-null ?
- (i) Domain constraint
 - (ii) Entity integrity constraints
 - (iii) Referential integrity constraint
 - (iv) Primary key constraint
- (f) Each non-leaf node in a B^+ tree has between _____ children.
- (i) $n/2$ and $n-1$
 - (ii) $n-1$ and $n+1$
 - (iii) $n/2$ and n
 - (iv) $n/4$ and n
- (g) _____ means that execution of a transaction in isolation preserves the integrity of the database.
- (i) Atomicity
 - (ii) Consistency
 - (iii) Isolation
 - (iv) Durability.

2. Answer the following : $2 \times 7 = 14$

- (a) Define database languages.
- (b) What is a composite attribute ? Give examples.
- (c) State two advantages of the buffer manager in a DBMS.
- (d) Define equijoin, natural join and self join.
- (e) State two differences between the network model and the hierarchical model.
- (f) Explain insertion anomaly and deletion anomaly.
- (g) Write the difference between 3NF and BCNF with an example.

3. Answer any four from the following : $6 \times 4 = 24$

- (a) Explain the various functions of a DBMS.

(b) Draw an E-R model for a Book Club where people have to register as members to borrow books. The Club has a database of books that contains the name of the author and the title. Members are allowed to borrow two books at a time for a period of 1 month. A fine of ₹ 10 is to be paid by the member per month if the member is not able to return the books within the stipulated time.

(c) What is functional dependency ? Explain.

(d) What are the relational algebraic operations ? Explain with examples.

(e) What are the different types of optical disks ? State the advantages of an auxiliary storage device.

(f) Define heap files and sorted files. Write about sequential file processing and direct file processing.

(g) Discuss the various dimensions of database security.

(h) Explain the transition of a transaction from one state to another with the help of a diagram.

(a) Why is concurrency control required ? Discuss the various concurrency control schemes. $2+8=10$

(b) Consider the two relations given below :

BOOK (Book_id, Name, Author, Price)

AUTHOR (Author_id, Name, Address)

Write SQL statements/Relational algebra statements for the following : $5 \times 2 =$

- (i) Find the names of the books that have same price.
 - (ii) Find the names of all authors whose books are priced above Rs. 1000.
 - (iii) Find the names of both the authors and the books published by them who are from India.
 - (iv) Change the address of all authors to 'India' whose address is 'Delhi' and 'Mumbai'.
 - (v) Create an index on the book_id for the relation 'Book'.
- (c) Write short notes on any two : $2 \times 5 = 10$
- (i) Hashing techniques
 - (ii) Error recovery
 - (iii) Relational Model.

Printed pages = 4

4 BCA OS 3

2013

(June)

COMPUTER APPLICATION

Paper : 4·3

(Operating System)

Full Marks - 75

Time - Three hours

Figures in the margin indicate full marks
for the questions.

Answer question Nos. 1 and 2 and any
three from the rest.

Write the functions of operating system. 2

What is multiprogramming ? 2

What is deadlock ? 2

What is page fault ? 2

What is internal fragmentation ? 2

What is a file ? 2

[Turn over

(g) What is a process ? What is the difference between process and thread ? 1+2

2. (a) Explain Belady's anomaly with the help of an example.

(b) Explain Process Control Block.

(c) Explain preemptive and non-preemptive scheduling.

(d) Differentiate between long term scheduler and short term scheduler.

(e) What is Semaphore ? What is its use ?

3. (a) Discuss segmentation in detail. Compare with paging. 5+3=

(b) Explain how DMA relinquishes CPU.

4. (a) Explain various file allocation methods briefly.

(b) Explain the necessary and sufficient conditions for deadlock.

(ii) What are the different directory structures? Explain in brief. 8

(b) Explain how virtual memory can be implemented with Demand paging. 7

Q. (a) Consider the following set of processes with the length of the CPU burst time given in milliseconds : 10

Process	Burst Time
P ₁	7
P ₂	28
P ₃	14
P ₄	4
P ₅	15
P ₆	6

All the six processes arrive at time 0 in the order given.

Draw Gantt chart, illustrate the execution of the processes using FCFS, RR and SJF algorithms. For RR time quantum is 2. Also find the turnaround time and waiting time for each of the algorithm.

- (b) Explain and compare the C-Look and
C-Scan disk scheduling algorithm. 5
7. Write short notes on any *three*. $5 \times 3 = 15$
- Mutual Exclusion
 - Paging
 - TLB
 - Block I/O
 - Mounting.

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4 BCA SS 4

2013

(June)

COMPUTER APPLICATION

Paper : 4·4

(System Software)

Full Marks – 75

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer question Nos. 1 and 7 and any *four*
from the rest.

Answer the following questions : $2 \times 10 = 20$

- (i) What is execution gap in a language processing system ?
- (ii) What are the properties of LL(1) grammar ?
- (iii) What is input buffering ?
- (iv) Why LR parsers are attractive ?
- (v) Differentiate between syntax tree and parse tree.

[Turn over

- (vi) What is DAG ? Explain with an example. 6
- (vii) What is context free and context sensitive grammar ?
- (viii) Differentiate between procedure and function.
- (ix) What do you mean by dynamic memory allocation ?
- (x) What is handle and handle pruning ?
2. (i) Explain the rules of a lexical analyser and a parser. What are the design issues of a lexical analyser ? 10
- (ii) What are the different types of assembly language statements ? Explain with examples. 5
3. (i) Why elimination of left recursion is necessary in case of top down parsing ? Eliminate recursion from the following grammar if it exists : 5
- $$B \rightarrow b t \quad C \ (C) / \ B b$$
- $$C \rightarrow e \ C / \ d$$
- (ii) Check the following grammar whether it is LL(1) or not : 6
- $$S \rightarrow i e t \ S / \ i e t \ B e / \ b$$
- $$B \rightarrow B e / \ d$$
4. Prepare a CLR parsing table for the following grammar : 10
- $$E \rightarrow E + T / \ T$$
- $$T \rightarrow T * F / \ F$$
- $$F \rightarrow id$$
- Show the moves made by the CLR parser for the string $id + id * id$ by using the above grammar. 5
5. (i) What is macro ? Explain how macros are used in high level languages with an example. 5
- (ii) What is macro expansion ? How a nested macro can be defined ? Explain with an example. 5
6. (i) What are the data structures used in two pass assemblers ? Prepare one symbol table for the following code segment : 5
- $$\begin{aligned} &\text{int } a, b ; \\ &\text{real } i ; \\ &a = b * i ; \end{aligned}$$
- also show the intermediate representation for the same.

- (ii) What are the functions of Pass-1 and Pass-2 of a two pass assembler ?
7. Write short notes on any *three*: $3 \times 5 = 15$
- (i) YACC
 - (ii) Absolute loader
 - (iii) Code optimization
 - (iv) Dependency graph.

S-2
5

Total number of printed pages - 4

15

4 BCA NA & SC.1

S 3

2014

(June)

COMPUTER APPLICATION

Paper : 4.1

(Numerical Analysis and Scientific Computing)

Full Marks : 75

Time : Three hours

The figures in the margin indicate full marks
for the questions.

Answer the following :

$1 \times 7 = 7$

- (a) What is the maximum length allowed in defining a variable in FORTRAN ?
- (b) Determine whether the following is a valid integer constant - 15.0
- (c) Write the following value in standard exponential form 21×10^{21} .
- (d) Write the second order Runge-Kutta method.

Contd.

(e) What is a variable?

(f) Write the FORTRAN expression for the following mathematical expression $\frac{x+y}{x-y}$.

(g) If $A = -1275.819$, write the output of the following

 WRITE (*, 5) A

 5 FORMAT (IX, 'VALUE IS', F 7.2)

2. Answer the following :

(a) Write a FORTRAN program to calculate the slope and midpoint of a line.

(b) Write a FORTRAN program to read two integers I and J and print the quotient and remainder when I is divided by J .

(c) Using floating point arithmetic add $.4546E5$ and $.5433E7$.

(d) Prove that $\Delta^3 y_0 = y_3 - 3y_2 + 3y_1 - y_0$

(e) Find $\Delta \log x$

(f) State the Simson's one-third rule.

3. Calculate the value of $(a^2 - b^2)/(a+b)$ with $a = .4845$ and $b = .4800$ using normalised floating point arithmetic. Compare with the value of $(a-b)$.

4. Find the missing value from the following data:

x :	2	5	8	11	14
y :	94.8	87.9	81.3	—	68.7

5. Given the following data, express θ as a function of t .

t :	0	1	2	3	4
θ :	3	6	11	18	27

6. Discuss the Gauss method of elimination.

7. (a) Find a real root of the equation $x^3 - 2x - 5 = 0$ by the method of False Position correct to three decimal places.

Or

(b) Solve $x + 2y + z = 3$

$$2x + 3y + 3z = 10$$

$$3x - y + 2z = 13$$

8. (a) Describe the procedure for obtaining Simpson's one third rule. 9

Or

(b) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ using 9

(i) Trapezoidal rule (ii) Simpson's 1/3 rule.

9. (a) Solve $\frac{dy}{dx} = xy + y^2$, $y(0) = 1$ to get y for $x = 1$ and $x = 2$ using R-K method of fourth order. 9

Or

(b) Using Picard's method solve $\frac{dy}{dx} = x + y$,
 $y(0) = 1$ to get x at $x = 1$ and 2 . 9

10. (a) Explain the Euler's Method. 9

Or

(b) Explain the Taylor series method. 9

Total number of printed pages - 4

4 BCA DBMS 2

2014

(June)

COMPUTER APPLICATION

Paper : 4·2

(Database Management System)

Full Marks : 75

Time : Three hours

The figures in the margin indicate full marks
for the questions.

- I. Answer the following : $1 \times 7 = 7$
- (a) What is data inconsistency ?
 - (b) What is a domain ?
 - (c) Define hierarchical model database.
 - (d) What is normalization ?
 - (e) What is hashing ?
 - (f) Define a database instance.
 - (g) Why is concurrency control required ?

Contd.

2. Answer the following : 2×7

- (a) State two advantages of the network model.
- (b) Write two functions of a DBA.
- (c) Define degree of a relationship with respect to different types.
- (d) What are the different operations that can be performed on files ?
- (e) State the distinguishing characteristics of the relational model.
- (f) Define 1NF and 2NF.
- (g) How can the security of data in a database be compromised ?

3. Answer *any six* from the following : 4×6=24

- (a) Draw and explain the three layer architecture of a DBMS.
- (b) Draw an E-R diagram for a college which offers many courses. Students can register in only one course at a time. Hostel facilities are available for registered students only. Make your own assumptions.

- (c) What is relational algebra ? Explain the unary operations of relational algebra.
- (d) What are the advantages of using secondary storage devices ? Distinguish between direct access storage and secondary access storage.
- (e) What is an index ? Define Primary index and Secondary index.
- (f) What is functional dependency ? State the desirable properties of decomposition.
- (g) What is a transaction ? State the properties of a transaction.
- (h) Define DDL and DML. What are the advantages of using views ?

4. Answer *any three* from the following :

- (a) Write the advantages of using a database over traditional files. Write *any four* functions of a DBMS. 6+4=10
- (b) Distinguish between a B-tree and a B+ tree. What are the functions of the buffer manager ? 6+4=10

(c) Consider the two relations :—

Employee (E_id, Name, Address, Salary, D_id)
Department (D_id, D_Name) $5 \times 2 = 10$

Write SQL statements for the following :

- (i) Find the names of all the employees who get salary between 10000 and 20000.
- (ii) Find the total salary of each department.
- (iii) Find the names of the employees who get the highest and second highest salary.
- (iv) Add another field named Dep_location to the Department table.
- (v) Delete all the employees who resides in ‘Guwahati’.

(d) Write short notes on : (Any two) $5 \times 2 = 10$.

(i) Locking

(ii) Recoverability

(iii) Components of DBMS.

4 BCA OS 3

2014

(June)

COMPUTER APPLICATION

Paper : 4·3

(Operating System)

Full Marks : 75

Time : Three hours

The figures in the margin indicate full marks
for the questions.

Answer Q. nos. 1 and 2 and any three from the rest.

- | | |
|--|---|
| 1. (a) What is Process Control Block ? | 2 |
| (b) What is Critical Section ? | 2 |
| (c) Define CPU Scheduling. | 2 |
| (d) Define thread. | 2 |
| (e) What is demand paging ? | 2 |
| (f) What is Block I/O ? | 2 |

Contd:

(g) Define the following :—

$$1+1+1=3$$

- (i) Binary Semaphore
- (ii) Context Switching
- (iii) Mutual Exclusion

2. (a) What is the difference between logical address space and physical address space ?

$$3$$

(b) What is starvation ? Write one solution to the problem of starvation ?

$$2+2=4$$

(c) Mention the necessary conditions for Deadlock.

$$2$$

(d) What are the different attributes of a file ?

$$3$$

(e) Write the advantages of linked allocation method.

$$3$$

(a) Explain different types of Schedulers.

$$7$$

(b) Describe the SJF and Round Robin Scheduling algorithm with an example.

$$4+4=8$$

(a) Explain in brief the different scheduling criteria.

$$7$$

(b) What are the different directory structures ? Explain acyclic-graph directories in brief.

$$2+6=8$$

(a) Consider the following reference string :
7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1. Use the given reference string to illustrate the following page replacement algorithm :

$$3+3+3=9$$

(i) FIFO

(ii) LRU

(iii) Optimal

(b) Explain the basic concept of paging.

$$6$$

(a) Explain the concept of virtual memory.

$$6$$

(b) Explain the different methods of handling Deadlock.

$$6$$

(c) Define wait and signal operations of semaphore.

$$3$$

7. Write short notes on : (any three) $5 \times 3 = 15$

- (i) Segmentation
- (ii) Device Drivers
- (iii) Fragmentation
- (iv) Disk Scheduling
- (v) Tree structure directory.

Total number of printed pages-7

4 BCA SS 4

2014

(June)

COMPUTER APPLICATION

Paper : 4·4

(System Software)

Full Marks : 75

Time : Three hours

*The figures in the margin indicate full marks
for the questions.*

Answer Q. Nos. 1 and 7 and any four from the rest.

1. Answer the following questions :

(i) Define system software and differentiate between system software and application software. 2

(ii) A quadruple has....
[Choose the correct answer]

(a) four addresses

(b) two addresses

Contd.

- (c) three addresses
(d) one address.

(iii) Write down the 3-address code for the following code segment — 3

if $a > b$
 $X = a + b$
else
 $X = a - b$

(iv) Consider the context free grammar given below : 2

$$S \rightarrow SS+ / SS* / a$$

and draw the parse tree for the string :

$aa + a^*$

(v) Consider the following segment of C – Code : 2

`float i, j;`

`i = i * 70 + j + .2 ;`

and write the output for lexical analyzer. 2

(vi) Eliminate the left recursion from the following grammar :

$$\text{exp} \rightarrow \text{exp} + \text{exp} / \text{exp} * \text{exp} / \text{id}$$

(vii) Explain the role of parser in the syntax analysis phase of a compiler. 2

(viii) Why are imperative statements used in assembly language ? 2

(ix) What are overlays ? What are their uses ? 2

(x) Draw a DAG for the following expression :
 $a = a + a * b$ 2

2. Construct a predictive parsing table for the following grammar —

$$G : S \rightarrow Aa / bAc / Bc / bBa$$

$$A \rightarrow d$$

$$B \rightarrow d$$

Is the grammar "G" an LL (1) grammar ? 10

3. (i) Check whether the following grammar is ambiguous or not —

$$\text{exp} \rightarrow \text{exp} + \text{exp} / \text{exp} * \text{exp} / \text{id}$$

(ii) Eliminate the left factors from the following :

$$A \rightarrow \alpha\beta_1 / \alpha\beta_2 / \alpha\beta_3 / \dots / \alpha\beta_n / \gamma \quad 3$$

(iii) Explain the "conflicts" in shift-reduce parser. 3

4. Construct a CLR parsing table and verify whether the string $abaab\$$ is valid or not using the grammar :

$$G : S \rightarrow CC$$

$$C \rightarrow aC / b \quad 10$$

5. (i) Define forward reference with a suitable example. 3

(ii) What is macro ? Explain Nested macro and how parameter is passed in macros using an example. 7

6. (i) Prepare a symbol table for the following code segment : 4

```
int a, b;  
a++;  
b = a * (++b);
```

(ii) Write the equivalent machine language program for the following Assembly codes using the given OP codes : 6

Instruction OP Code	Assembly Mnemonics
00	STOP
01	ADD
02	SUB
03	MULT
04	MOVER
05	MOVEM
06	COMP
07	BC
08	DIV
09	READ
10	PRINT

Assembly program :

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
	MOVEM	BREG, RESULT
	PRINT	RESULT
	STOP	
N	DS	1
RESULT	DS	1
ONE	DC	'1'
TERM	DS	1
	END	

7. Write short notes on *any three* from the following
 $3 \times 5 = 15$
- (a) Three address code
 - (b) Dynamic Linking
 - (c) Symbol Table
 - (d) Compile and go loader.
-

Total number of printed pages - 4

4 SEM BCA NASC 1

2015

(June)

COMPUTER APPLICATION

Paper : 4.1

(Numerical Analysis and Scientific Computing)

Full Marks : 75

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Answer the following : $1 \times 7 = 7$

- (a) Write the full form of FORTRAN.
- (b) Mention any two library functions in FORTRAN.
- (c) Determine whether the following is a valid integer constant -15.0 .
- (d) Write the following number in standard floating point form 437.65 .
- (e) Write the following expression in FORTRAN equivalent

$$a\cos x + b\cos^2 x + c\cos^3 x$$

Contd.

(a) What is logical operator ?

(b) Evaluate the following arithmetic expression, if $A = 2.7$, $B = 3.5$, $J = 3$ and $K = -2$

$$A + J * K ** 2 + B$$

2. Answer the following :

(a) Write a FORTRAN program to compute the area and circumference of a circle. 3

(b) Write a FORTRAN program to list whether an integer is even or odd. 3

(c) Using floating point arithmetic add $-4546E5$ and $5433E5$. 2

(d) Write Newton's formula to find the square root of N . 2

(e) Explain the use of Lagrange's interpolation formula. 2

(f) Define Roundoff error. 2

If $a = 5665E1$, $b = 5556E-1$ and $c = 5644E1$, show that

$$(a+b)-c \neq (a-c)+b. \quad 5$$

4. If $f(x) = \frac{1}{x^2}$, find $f(a,b)$ and $f(a,b,c)$ by using divided differences. 4

5. Find the polynomial for the following data by Newton's Backward Difference formula. 5

x	: 0	1	2	3	5
$f(x)$: -3	2	9	18	

6. Solve the following system of equations by Gauss-Elimination method 4

$$5x + 4y = 15, \quad 3x + 7y = 12$$

7. (a) Find the positive root of $x^3 = 2x + 5$ by the method of False Position. 9
Or

(b) Find the positive root of $e^{-x} - x = 0$ by Newton-Raphson method, correct to five decimal places. 9

8. (a) By dividing the range into equal parts,

evaluate $\int_0^\pi \sin x dx$ by using

Trapezoidal rule. 9

Or

(b) Use Simpson's $\frac{1}{3}$ rule to estimate the

value of $\int_1^5 f(x)dx$ given 9

$x : 1 \quad 2 \quad 3 \quad 4 \quad 5$

$f(x) : 13 \quad 50 \quad 70 \quad 80 \quad 100$

9. (a) Given $\frac{dy}{dx} = x^3 + y, y(0) = 2$. Compute

$y(0.2)$ and $y(0.4)$ by R-K method of
fourth order. 9

Or

(b) Using R-K method of fourth order solve

$\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}, \quad y(0) = 1 \text{ at } x = 0.2.$ 9

10. (a) Using Taylor series method find y at

$x = 0.1$ if $\frac{dy}{dx} = x^2 y - 1, \quad y(0) = 1.$ 9

Or

(b) Using Euler's method find $y(0.2)$ and

$y(0.4)$ from $y' = x + y, y(0) = 1$ with

$h = 0.2.$ _____ 9

Total number of printed pages - 4

4 SEM BCA DBMS 2

2015

(June)

COMPUTER APPLICATION

Paper : 4.2

(Database Management System)

Full Marks : 75

Time : Three hours

The figure in the margin indicate full marks for the questions.

Answer Question nos. 1 & 2 and any four from the rest.

1. Answer the following : $1 \times 5 = 5$

- (a) Define Database.
- (b) What is database schema ?
- (c) What do you mean by Entity ?
- (d) Define Primary key.
- (e) What do you mean by tuple of a relation ?

Contd.

- Ques.
2. (a) What are the participation constraints? 1
- (b) Define full and partial functional dependency. 1
- (c) Write about two DBMS languages. 1
- (d) Explain the difference between strong and weak entity with example. 1
- (e) Define cardinality ratio of a relation and its different types. 1
3. (a) Explain three schema architecture with diagram. 4
- (b) What do you mean by attribute? Explain its various types. 5
- (c) Define Specialization and Generalization. Give an example for each. 6
4. (a) What is transaction? Explain ACID property of transaction. 1+4=5
- (b) What is two phase locking protocol? Explain with an example. 5
- (c) Define one problem that occurs during concurrent execution. 5
5. (a) What are the functions of buffer manager? Explain the operation of tree. 3+4=7
- (b) Distinguish between primary index and secondary index. 1
- (c) Explain the technique of external hashing. 1
6. (a) Write SQL commands for following : 1x6=6
- Consider the two relations :—
- Student (Roll_no, name, address, D_id)
- Department (D_id, D_name)
- (i) Display Roll-no and name of students who live in Guwahati.
 - (ii) Find out total number of students.
 - (iii) Add a new Column Age to the student table.
 - (iv) Find out student's name, Age and department name of all students.
 - (v) Modify the address from Guwahati to Jorhat for the student whose Roll no is 2.
 - (vi) Delete student records from student table where roll no from 3 to 5.

- (b) Write commands for following using relational algebra operator. 1
- Consider following relation
- Employee (Eid, name, Address, Salary)
- (i) Find employee details whose eid is 4
 - (ii) Find employee details whose salary is greater than 10000 and address is Tezpur.
 - (iii) Find name, address and salary of all employee.
 - (iv) Display minimum salary.
 - (v) Display Eid, name and salary whose Address is Guwahati.
- (c) Draw the ER diagram for library management system. 4

7. Write short notes on : **(any three)**

$3 \times 5 = 15$

- (a) End users
 - (b) Transaction states
 - (c) Anomalies
 - (d) Recovery
 - (e) Network model
 - (f) 2NF and 3NF
-

Total number of printed pages-4

4 SEM BCA OS 3

2015

(June)

COMPUTER APPLICATION

Paper : 4.3

(Operating System)

Full Marks : 75

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer question Nos. 1 and 2 and any three from the rest.

1. (a) Write the functions of an operating system. 2
- (b) What is Process Control Block? 2
- (c) What is spooling? How is it implemented? 2
- (d) What is Belady's anomaly? 2

Contd.

- (e) What is a two level directory structure? 2
- (f) How does thread differ from a process? 2
- (g) What is external fragmentation? 2
2. (a) Explain best fit, first fit and worst fit methods of memory allocation. 3
- (b) What is context switching? Explain. 3
- (c) What is a safe state? Explain with the help of example. 1+2=3
- (d) What is mutual exclusion? Why is it needed? 1+2=3
- (e) Differentiate between internal and external fragmentation. 4
3. (a) Define DMA. How DMA relinquish CPU for doing other works? 2+6=8
- (b) What is a dispatcher? Explain in brief different scheduling criteria. 1+6=7

4. (a) Consider the following reference string:
 $4+4=8$
 (1, 2, 3, 4, 5, 3, 4, 1, 6, 7, 8, 7, 8, 9, 7, 8, 9, 5, 4, 5, 4, 2)
 Show how many page faults will occur with four page frames for the following algorithms :
 (i) Optimal page replacement
 (ii) LRU page replacement.
- (b) Explain the methods of deadlock handling. 7
5. (a) Explain how TCB is more effective over page table base register. 6
- (b) What are the drawbacks of linked allocation method? Explain how the drawbacks can be removed. 4+5=9
6. (a) Explain the different file operations. 6
- (b) What are the different directory structures? Explain Tree-structured directory in brief. 2+7=9

7. Write short notes on : (any three)

$$5 \times 3 = 15$$

- (i) Critical Section Problem
- (ii) Disk scheduling
- (iii) Linking and loading
- (iv) Semaphores
- (v) Priority scheduling.

Total number of printed pages-7

4 SEM BCA SS 4

2015

(June)

COMPUTER APPLICATION

Paper : 4·4

(*System Software*)

Full Marks : 75

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer Q. Nos 1 & 2 and **any five** from the rest :

1. Choose correct or the best alternative from the following : $1 \times 10 = 10$.

- (i) Analysis which determines the meaning of a statement once its grammatical structure becomes known, is termed as
- (A) Semantic analysis
 - (B) Syntax analysis
 - (C) Regular analysis
 - (D) General analysis

Contd.

- (ii) Which of the following loaders is executed when a system is first turned on or restored ?
- (A) Boot-loader
 - (B) Compile and Go loader
 - (C) Bootstrap loader
 - (D) Relating loader.
- (iii) A parser which is a variant of top down parsing without Backtracking is
- (A) Recursive Descend
 - (B) Operator Precedence
 - (C) LL(I) Parser
 - (D) LALR Parser
- (iv) In a two pass assembler, the task of the PASS II is to
- (A) Separate the symbol, mnemonic opcode, operand fields.
 - (B) Build the Symbol Table
 - (C) Construct Intermediate Code
 - (D) Synthesize the target program.

- (v) The syntax of the assembler Directive EQU is
- (A) EQU <address space>
 - (B) <Symbol> EQU <address space>
 - (C) <Symbol> EQU
 - (D) None of these.
- (vi) An analysis which determines the syntactic structure of the source statement, is called
- (A) Semantic analysis
 - (B) Process analysis
 - (C) Syntax analysis
 - (D) Function analysis
- (vii) A Dipole has
- (A) four addresses
 - (B) two addresses
 - (C) one address
 - (D) none of these

(viii) Find out the valid three address codes from the following.

- (A) return exp
- (B) $a = oP b$
- (C) $a \leq b$ goto L
- (D) $a = \& b$

(ix) Parser generator YACC can be used to generate automatically

- (A) LR(0) Parser
- (B) LALR Parser
- (C) SLR Parser
- (D) CLR Parser

(x) Nested macro calls are expanded using the

- (A) FIFO rule
- (B) LIFO rule
- (C) FILO rule
- (D) None of the above

2. Write short notes on **any three** from the following : $3 \times 5 = 15$

- (i) Recursive Descent Parsing
- (ii) Closure and Goto operation
- (iii) Assembler
- (iv) Bootstrap Loader
- (v) Error recovery in LR Parsing.

3. (a) What is parsing ? What are the different types of parsing available ? Write down the drawback of top-down parsing of Backtracking. $2+2+3=7$

(b) Why top down parsers cannot handle self recursion ? Explain. Eliminate the left recursion from the following production : 3

$$S \rightarrow SS^* / a$$

4. Construct a LALR parsing table and verify whether the string id + id * id\$ is valid or not using the grammar. 10

$$E \rightarrow E + T / T$$

$$T \rightarrow T * F / F$$

$$F \rightarrow (E) / id$$

5. (a) Write down the steps of a Language processing system with a block diagram. 5

(b) Explain the task of the Lexical analysis phase of compiler. Write the output for lexical analyzer for the following code : 2+3=5

```
If ( $a > b$ )
 $a = a + b$  ;
else
 $b = a + b$  ;
```

6. (a) Discuss the importance of symbol table in compiler design. How is the symbol table manipulated at various phases of compilation ? 5

(b) What do you mean by run time storage allocation ? Explain the difference between static and dynamic allocation. 5

7. (a) Consider the following piece of code in the source language :

$\text{if } x > 0 \text{ then } x = 3 * (y + 1) \text{ else } y = y + 1$

- (i) draw the syntax tree
- (ii) draw the Directed acyclic graph.

3+3=6

(b) Write the three address code statements for the following piece of code : begin

```
location = -1
i=0
while ( $i < 100$ ) do
begin
    if  $A[i] = X$  then location =
        i = i+1
    end
end
```

8. (a) Define Macro and explain nested macro with a suitable example.

(b) What are the design issues of a two pass assembler ?

Total number of printed pages-5

4 SEM BCA DBMS 2

2016

(June)

COMPUTER APPLICATION

Paper : 4·2

(Database Management System)

Full Marks : 75

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer Question nos. 1 & 2 and any four from the rest.

1. (a) Define database state.
- (b) Define entity with an example.
- (c) What is domain of an attribute ?

Contd.

- (d) Write two uses of normalization.

(e) Define atomic attribute.

$$1 \times 5 = 5$$

2. (a) Compare primary key and foreign key.
(b) Write down the functions of DBMS.
(c) Explain the difference between 3NF and BCNF.
(d) Define specialization with an example.
(e) What are the responsibilities of a database designer?

$$2 \times 5 = 10$$

- (a) Briefly describe the advantages of DBMS. 4

- (b) Define the term data model. Explain different types of data models. 1+5=6

- (c) What is an End user ? Explain the categories of End users. 5

- (a) Draw the Hierarchy of storage devices & explain. 5

- (b) Distinguish between primary storage and secondary storage.

- (c) Explain Hash file organization.

5. (a) Explain various states of a transaction.

- (b) Write one solution for concurrency control with an example.

- (c) Write a short note on shadow paging.

6. (a) Write commands for following using relational algebra operator. 5

Consider following relation :-

Student (Roll no, name, address, age,
phone no)

- i) Retrieve name and address for all the student.

- ii) Display all the information for the student whose name is XYZ.

- iii) Display average age.
- iv) Find Roll no and address for the student whose age is greater than 20.
- v) Retrieve name, age and phone no for the student whose address is either Guwahati or Digboi.

(b) Write SQL commands for following :

$$1 \times 6 = 6$$

Consider the two relations :-

BOOK (ISBN, Book-title, Category, Price, PID)

PUBLISHER (PID, Pname, Address)

- i) Display ISBN, Book-title and price for the books which is published by PHI.
- ii) Find out the number of books.
- iii) Remove the book details whose name is DBMS.

- iv) Change the address for the publisher from Guwahati to Nalbari whose id is P1012.
- v) Find out the difference between maximum price and minimum price of the book.
- vi) Add a new column phone no to the PUBLISHER relation.

(c) Draw the ER diagram for Banking System. Make your own assumptions for entity, attributes and relationship.

4

7. Write short notes on : *(any three)*

$3 \times 5 = 15$

- (a) ACID property
- (b) Specialization & Generalization
- (c) DBMS languages
- (d) Three schema architecture
- (e) Relational model.

- (c) What is Page replacement ? Explain basic page replacement scheme. 3
(d) Explain how DMA relinquishes CPU. 4

Total number of printed pages-4

4 SEM BCA OS 3

Write short notes on : (any three) $5 \times 3 = 15$

- (a) Device Drivers
(b) Thread life cycle
(c) Linking and loading
(d) Segmentation
(e) Mounting.

2016

(June)

COMPUTER APPLICATION

Paper : 4·3

(Operating System)

Full Marks : 75

Time : Three hours

The figures in the margin indicate full marks for the questions.

(Answer question nos. 1 and 2 and any four from the rest)

1. Answer the following questions : $1 \times 5 = 5$
- (a) What is Mutual Exclusion ?
(b) Define file.
(c) What is deadlock ?
(d) What is page fault ?
(e) What is DMA ?

2. Answer the following questions : **(any five)**
 $2 \times 5 = 10$
- (a) Differentiate between thread and process.
 - (b) What is non-contiguous memory allocation ?
 - (c) How spooling is implemented ?
 - (d) What are the different directory structures ?
 - (e) What is the difference between FIFO and SJF scheduling ?
 - (f) What is Process Control Block ?
3. (a) Explain the necessary and sufficient conditions for deadlock. 4
- (b) Describe the SJF scheduling algorithm with an example. 4
- (c) What are the different attributes of a file ? 3
- (d) Explain DMA's principle of working. 4
4. (a) Explain the various states of a process. 4
- (b) Describe the FCFS scheduling algorithm with an example. 4
5. (a) Define wait and signal operations of semaphore. 4
- (b) Describe the Round Robin scheduling algorithm. 4
- (c) Explain Index Allocation method. 3
- (d) Explain Block I/O. 4
6. (a) Explain the major benefits of multithreaded programming. 4
- (b) Explain best fit, first fit and worst fit methods of memory allocation. 4
- (c) Explain how the drawbacks of linked allocation method can be removed. 3
- (d) Write a short note on transforming I/O requests to hardware operations. 4
7. (a) What is Semaphore ? What is its use ? 4
- (b) Explain virtual memory. 4

- Q. Write short notes on following : **(any three)**
 $3 \times 5 = 15$
- (i) Three address code
 - (ii) YACC
 - (iii) PASS of a compiler
 - (iv) MACRO Expansion.

Total number of printed pages-8

4 SEM BCA SS 4

2016
(June)

COMPUTER APPLICATION

Paper : 4.4

(System Software)

Full Marks : 75

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Choose the correct options from the following : $1 \times 10 = 10$
- (i) A group of logically related characters in the source program is known as _____.
- (a) Token
 - (b) Lexeme
 - (c) Parse Tree
 - (d) Buffer

(ii) A _____ acts as an interface between the source program and the rest of the phases of compiler.

- (a) Semantic analyzer
- (b) Parser
- (c) Lexical analyzer
- (d) Syntax analyzer

(iii) Which of these tasks are performed by the lexical analyzer?

- (a) Stripping out comments and whitespaces
- (b) Correlating error messages with the source program
- (c) Performing the expansion of macros
- (d) All of these

(iv) Consider a grammar : $A \rightarrow \alpha S_1 \mid \alpha S_2$.
left factored productions for this grammar are :

- (a) $A' \rightarrow \alpha A$
 $A \rightarrow S_1 / S_2$
 - (b) $A \rightarrow \alpha A'$
 $A' \rightarrow \alpha S_1 \mid \alpha S_2$
 - (c) $A \rightarrow \alpha A'$
 $A' \rightarrow S_1 \mid S_2$
 - (d) None of these
- (v) Which of these parsing techniques is a kind of bottom up parsing?
- (a) Shift reduce parsing
 - (b) Reduce reduce parsing
 - (c) Predictive parsing
 - (d) Recursive descent parsing

(vi) Top down parsing is a technique to find _____.

- (a) Leftmost derivation
- (b) Rightmost derivation
- (c) Leftmost derivation in Reverse
- (d) Rightmost derivation in Reverse

(vii) Shift reduce and reduce-reduce conflicts occur in

- (a) SLR Parser
- (b) LALR Parser
- (c) CLR Parser
- (d) None of these

(viii) The simplest LR Parsing technique is

- (a) CLR Parser
- (b) SLR Parser
- (c) LALR Parser
- (d) LL Parser

(ix) An SDD is S-attributed if every attribute is _____.

- (a) Inherited
- (b) Synthesized
- (c) Dependent
- (d) None of these

(x) Which of the following is true for intermediate code generation?

- (a) It is machine dependent
- (b) It is nearer to the target machine
- (c) Both (a) and (b)
- (d) None of these

Answer any five questions from 2 to 8 :

10×5=50

2. (a) What is meant by the term cousins of compiler? 2
- (b) Explain different phases of a compiler with suitable block diagram. 6
- (c) Differentiate between compiler and interpreter. 2

3. (a) Discuss the action taken by every phase of a compiler on the following instruction of source program while compilation 5

$$PC = (\text{total_marks})/500 * 100$$

- (b) Define the following terms, with example. 5
tokens, patterns and lexemes.

4. (a) Construct a symbol table and find the tokens for the given code 5
if ($i=20$) then GOTO 100.

- (b) Discuss dangling-Else ambiguity. 5

5. (a) What is Left-Recursive grammar? Write an algorithm to eliminate Left recursion. Eliminate left recursion from :

$$E \rightarrow E + T \mid T \quad 2+2+1=5$$

- (b) Define parsing. What is the role of a parser? 2+3=5

6. (a) Explain FIRST and FOLLOW Procedure. 5

- (b) Show that the following grammar is not LL(1) 5

$$\begin{aligned} G : E &\rightarrow iAeE \mid iAcEeE \mid a \\ A &\rightarrow b \end{aligned}$$

7. (a) Why LR parsing is good and attractive? Also explain its de-merits if any. 3

- (b) Construct an LR(0) parsing table for the following grammar 7

$$\begin{aligned} G : P &\rightarrow Q \\ P &\rightarrow Q, R \mid (R, R \\ R &\rightarrow \{\text{num}, \text{num}\} \end{aligned}$$

8. (a) Compare syntax directed translation and syntax directed definition. 3

- (b) What is dependency graph? Construct a dependency graph for the input string 7 + 8 by considering the following grammar 2+5=7

$$\begin{aligned} G' : A &\rightarrow BA' \\ A' &\rightarrow +BA'_1 \mid \epsilon \\ B &\rightarrow \text{digit} \end{aligned}$$

Total number of printed pages-7

4 SEM BCA (NCBCS) SS 4

2017

(June)

COMPUTER APPLICATION

Paper : 4·4

(System Software)

Full Marks : 75

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Choose the correct option from the following:

$1 \times 10 = 10$

- (i) A compiler for a high level language that runs on one machine and produce code for different machine is called
- A. Optimizing compiler
 - B. One-pass compiler
 - C. Cross compiler
 - D. Multipass compiler.

Contd.

- (ii) Synthesized attribute can be easily simulated by a
- A. LL grammar
 - B. Ambiguous grammar
 - C. LR grammar
 - D. None of the above.

(iii) Task of the lexical analysis

- A. To parse the source program into the Basic elements or tokens of the language
- B. To build a literal table and an identifier table
- C. To build a symbol table
- D. All of these.

(iv) Shift reduce parsers are

- A. Top Down parser
- B. Bottom up parser
- C. May be Top Down or bottom up
- D. None of the above

- (v) Intermediate code generation phase gets input from
- A. Lexical analyzer
 - B. Syntax analyzer
 - C. Semantic analyzer
 - D. Error Landing.

- (vi) 'Macro' in an assembly level program is
- A. sub program
 - B. a complete program
 - C. a hardware portion
 - D. relative coding.

- (vii) In an absolute loading scheme, which loader function is accomplished by programmer ?
- A. Allocation
 - B. Linking
 - C. Both A and B
 - D. None of the above.

(viii) A system program that set up an executable program in main memory ready for execution is :

- A. Assembler
- B. Linker
- C. Loader
- D. Text editor.

(ix) In which of the parsing shift-reduce conflict occurs —

- A. SLR Parser
- B. LALR Parser
- C. CLR Parser
- D. None of these.

(x) The most common no-backtracking shift reduce parsing technique is —

- A. LL Parsing
- B. LR Parsing
- C. Top-Down Parsing
- D. Bottom up Parsing

Answer any five questions from Q. No. 2 to Q.No. 8 :

2. (a) Why LALR parser is considered over SLR ? 4
(b) Discuss how YACC can be used to generate a parser. 6

3. (a) Compute Follow () for the following grammar — 5

$$G1 : S \rightarrow ACB/CbB/Ba$$

$$A \rightarrow da/BC$$

$$B \rightarrow g/\epsilon$$

$$C \rightarrow h/\epsilon$$

- (b) Construct the predictive parsing table for the grammar G1 in (Q.No. 3.a). 5

4. Consider a grammar

$$G2 : E \rightarrow iAbE / iAbEeE / a$$

$$A \rightarrow b$$

do the followings :

- (a) Eliminate the left factors from G2. 5
(b) Prove that the grammar G2 is not a $LL(1)$ grammar. 5

5. Construct the set of $LR(0)$ items for the following grammar :

$G_3 : E \rightarrow E + E / E * E / (E) / id$ 10

and also construct the parsing table.

6. Consider the following grammar G_4 :

$$S \rightarrow CC$$

$$C \rightarrow aC/a$$

do the following:

(a) Construct CLR parsing table for the grammar G_4 . 6

(b) Show the moves of the parser for the input string: $aaadd$. 4

7. (a) Consider the following code segment and generate the three address code for it. 5

for ($k=1$; $k \leq 12$; $k++$)

if ($x < y$) then $a = b + c$;

- (b) Draw a DAG for the following: 5

$$a + a * (b - c) + (b - c)$$

8. What is macro? Explain the concept of macro expansion with a suitable example of nested macro. 10

9. Write short notes on the following: (any three) 3x5=15

- (a) Absolute loader
- (b) Assembler directive
- (c) Symbol table
- (d) Overlays
- (e) Three address code.

Or

Total number of printed pages-4

(b) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ using

- (i) Trapezoidal rule
- (ii) Simpson's 1/3 rule.

9

9. (a) Solve $\frac{dy}{dx} = x+y$, $y(0)=1$ to get y for $x=1$ and $x=2$ using Runge-Kutta method of fourth order. 9

Or

(b) Using Picard's method solve

$$\frac{dy}{dx} = 1+xy, \text{ with } x=2, y=0. \quad 9$$

10. (a) Explain the Lagrange's Interpolation formula for unequal interval. 9

Or

(b) Using Taylor series method find y at $x=0.1$, if $\frac{dy}{dx} = x^2y-1$, $y(0)=1$. 9

4 SEM BCA (NCBCS) NA&SC 1

2018

(June)

COMPUTER APPLICATION

Paper : 4.1

(Numerical Analysis and Scientific Computing)

Full Marks : 75

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Answer the following : 1×7=7

- (a) Write the full form of FORTRAN.
- (b) Mention any three symbols used in FORTRAN character set.
- (c) Give any two built-in functions in FORTRAN.
- (d) What is a shift operator ?

Contd.

(e) What is Numerical Integration ?

(f) Write the FORTRAN expression for the following mathematical expression :

$$\frac{x+y}{x-y}$$

(g) State the Newton-Raphson formula.

2. Answer the following :

(a) Using floating point arithmetic, add $0.4692E_5$ and $0.8953E_2$. 3

(b) Evaluate $\Delta \tan^{-1} x$. 2

(c) What is a FORTRAN variable ? 2

(d) State Newton's forward interpolation formula. 2

(e) Prove that

$$\Delta \log f(x) = \log \left[1 + \frac{\Delta f(x)}{f(x)} \right] \quad 3$$

(f) State the Trapezoidal rule. 2

3. Calculate the value of $(a^2 - b^2)/(a+b)$ with $a = .4845$ and $b = .4800$ using normalised floating point arithmetic. Compare with the value of $(a-b)$. 5

4. Form the divided difference table for the following data : 4

x	2	4	9	10
$f(x)$	4	56	711	980

5. From the following table, evaluate $f(5)$ using Newton backward interpolation formula : 5

x	0	1	2	3	4
$f(x)$	5	1	9	25	55

6. Solve the following system of equations by Gauss-Elimination method. 4

$$5x + 4y = 15, \quad 3x + 7y = 12$$

7. (a) Find a root of the equation $x^3 - x - 11 = 0$, correct to three decimals using bisection method. 9

Or

(b) Find the positive root of $x^3 + x^2 - 3x - 3 = 0$ by the method of False Position. 9

8. (a) Describe the procedure for obtaining Simpson's one third rule. 9

- (b) Explain Two-phase locking protocol with example. 7
- (a) Explain in brief different hashing techniques. 8
- (b) Explain generalization, specialization and aggregation with examples. 7

Total number of printed pages - 4

4 SEM BCA (NCBCS) DBMS 2

2018

(June)

COMPUTER APPLICATION

Paper : 4.2

(Data Base Management System)

Full Marks : 75

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer any five questions.

1. (a) What is data independence ? Explain two types of data independence with examples. 7
- (b) Discuss the 3-level architecture of DBMS. Explain how it leads to data independence. 5+3=8

Contd.



2. (a) Draw an ER diagram for the situation given below : 8

Library consists of many books in different subject areas where books are written by different authors and are published by different publishers. There are inside-members and outside-members who gets book issued for their uses. The issuing and return operation of the books are managed by the librarian.

- (b) What is the need of indexing in DBMS? Explain multilevel indexes and dynamic multilevel indexes with examples. 7

3. (a) Compare between network model and hierarchical model. 7

- (b) What is functional dependency? Explain full and partial functional dependency. 8

4. Consider the following relations for database :

Students (RollNo, Name, DOB)

Subjects (SCode, SName)

Result (RollNo, SCode, Marks)

Write the SQL query for the following :

- (i) Display total number of students who have scored above 75 marks in 'DBMS'. 3

- (ii) Add a new column 'Class' in table student. 3

- (iii) Display name of the students who scored less than 40 marks in subject 'Java'. 3

- (iv) Display roll number of all the students who appeared in exam for the subject 'operating system'. 3

- (v) Display name of all the students whose names have 'a' as third character. 3

5. (a) Explain the different possible states of a transaction with the help of a diagram. 7

- (b) Explain 3NF. Justify the statement "BCNF is stronger than 3NF" with the help of an example. 2+6=8

6. (a) What is Recovery and Atomicity of transaction? Explain log based recovery. 3+5=8

(b) Define wait and signal operations of semaphore.

2

Total number of printed pages—4

7. Explain the following : **(any four)**

$$4 \times 2\frac{1}{2} = 10$$

- (a) Segmentation
- (b) Swapping
- (c) Mounting
- (d) Characters I/O
- (e) Thread life cycle.

4 SEM BCA (NCBCS) OS 3

2018

(June)

COMPUTER APPLICATION

Paper : 4·3

(Operating System)

Full Marks : 75

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Answer the following questions : **(any five)**
 $2 \times 5 = 10$

- (a) Define page fault.
- (b) What is Process Control Block ?
- (c) How spooling is implemented ?
- (d) What is the importance of page replacement algorithm ?
- (e) Differentiate between a Job and a Process.

Contd.

1. (a) What are the advantages of multiprocessor system ?
2. (a) What is process scheduler? State the characteristics of a good process scheduler ? 5
- (b) What is Scheduling? Define the criteria that affects the scheduler's performance. 5
- Or**
- Describe the necessary condition for characterizing deadlock.
3. (a) Explain in brief the concept of transforming I/O requests to hardware operations. 5
- (b) What are the drawbacks of linked allocation methods ? 5
- (c) What is the maximum file size supported by a file with 16 direct blocks, single, double and triple indirection? The block size is 512 bytes. Disk block numbers can be started in 4 bytes. 5

4. (a) Explain in brief the three state process model. State the transitions that are valid between the three states. Describe an event that might cause such transition. $2+2+2=6$
- (b) What is a race condition? Give an example. 4
- Or**
- Explain how DMA relinquishes CPU.
5. (a) Describe the indexed memory allocation methods. 5
- Or**
- What is an inverted page table? How does it compare to a two-level page table?
- (b) Compare and contrast between preemptive scheduling and non-preemptive scheduling. 5
6. (a) Given page reference string —
1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6
Calculate the number of page faults for LRU and FIFO. $4+4=8$

otal number of printed pages-7

4 SEM BCA (NCBCS) SS 4

2018

(June)

COMPUTER APPLICATION

Paper : 4.4

(System Software)

Full Marks : 75

Time : Three hours

The figures in the margin indicate
full marks for the questions.

1. Choose the correct option from the following :

$$1 \times 10 = 10$$

- (i) In SLR parser, R stands for
- A. Right to left scanning
 - B. Right most derivation
 - C. Right input end-marker
 - D. Right input.

Contd.

- (ii) In compiler design, three address code representation belongs to
- Syntax analysis phase
 - Intermediate code generation phase
 - Code optimization phase
 - All of the above.
- (iii) A grammar is said to be left recursive, if it contains production of the form
- $A \rightarrow aA/A$
 - $A \rightarrow Aa/B$
 - $A \rightarrow Ba/\epsilon$
 - $B \rightarrow A\gamma/\epsilon$.
- (iv) In $LL(1)$ grammar, which of the following is correct ?
- The first L stands for left to right scanning
 - The second L stands for left most derivation
 - '1' is the look-ahead symbol.
 - All of the above.
- (v) The most common no-backtracking shift-reduce parsing technique is
- LL parsing
 - LR parsing
 - Top-down parsing
 - Bottom-up parsing.
- (vi) 'MACRO' in an assembly level program is
- Subprogram
 - A complete program
 - A hardware portion
 - Relative coding.
- (vii) If a predictive parsing table have an entry with more than one production, then the grammar is known as —
- $LL(1)$ grammar
 - Ambiguous grammar
 - Both A and B is correct
 - None of the above.

- (viii) Compiler and Interpreter is a / an
- Application software
 - System software
 - Malware
 - All of the above.

- (ix) A macro is a/an
- open subroutine
 - close subroutine
 - function
 - None of the above.

- (x) Which of the following is not a step for constructing a LALR parser ?
- Closure Computation
 - Canonical item set
 - Follow () set
 - All of the above.

2. Answer **any five** from the following : 5×4=20
- Differentiate between compiler and interpreter. 4
 - What is a language processor ? Explain with a suitable diagram. 4

- Define lexeme and pattern. 4
- Define macro call and macro expansion. 4
- Compute Follow () for the following grammar : 4

$G1 : E \rightarrow TE'$
 $E' \rightarrow +TE'/\epsilon$
 $T \rightarrow FT'$
 $F \rightarrow *FT'/\epsilon$
 $F \rightarrow (E)/id$

(vi) Write the three address representation for the following code : 4

```
switch ( i + j )
{
    case 1 : x=y+z
    default : p=q+r
    case 2 : u=v+w
}
```

3. (a) Explain the different phases of a compiler. 10

Or

- (b) Explain about Quadrouple, Triple and Indirect triple with a suitable examples. 10

4. (a) Construct SLR parsing table and also show the parsing of the string id + id * id \$ using the following grammar G2 :

10

$$\begin{aligned}G2 : E &\rightarrow E + T/T \\T &\rightarrow T * F/F \\F &\rightarrow (E)/id\end{aligned}$$

Or

- (b) Construct a CLR parsing table and also show the parsing for the string – 10
a b a a b \$

using the grammar G3 :

$$\begin{aligned}G3 : S &\rightarrow CC \\C &\rightarrow aC/b\end{aligned}$$

5. (a) Write an assembly program to add two consecutive odd numbers. 5
(b) Define left recursion. Eliminate left recursion from the grammar G2. 5

6. Write short notes on **any three** from the following : 3x5=15

- (a) DAG
- (b) Symbol Table
- (c) Dynamic Linking
- (d) Absolute and bootstrap loader
- (e) YACC.

8. (a) Deduce Trapezoidal rule of numerical integration.

9

OR

- (b) Compute the value of $\int_1^2 \frac{dx}{x}$ using Simpson's one-third rule and Trapezoidal rule.

9

9. (a) Using Taylor series method, find y at $x = 0.1$ if $\frac{dy}{dx} = 2y + 3e^x$, $y(0) = 0$.

9

OR

- (b) Use R-K method to find y for $x = 0.2$ if $\frac{dy}{dx} = x + y^2$, $y(0) = 1$.

9

10. (a) Discuss the Newton's Forward Interpolation formula.

9

OR

- (b) Explain the Euler method.

9

Total number of printed pages - 4

4 SEM BCA (NCBCS) NA&SC 1

2019

(June)

COMPUTER APPLICATION

Paper : 4.1

(Numerical Analysis and Scientific Computing)

Full Marks : 75

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Answer the following : 1×7=7
- (a) What is truncation error?
 - (b) Give an example of an input statement in FORTRAN.
 - (c) What is the use of Format Statement in FORTRAN?
 - (d) Write the relation between the two operators Δ and E .
 - (e) What is interpolation?

Contd.

- (f) Write the FORTRAN expression for the following mathematical expression :

$$x^2 + y^2$$

- (g) State true **or** false :

"If the n^{th} differences are constant then $(n+1)^{\text{th}}$ order differences are zeros."

2. Answer the following :

- (a) If h is the interval of differencing, prove that

$$\Delta \left[\frac{f(x)}{g(x)} \right] = \frac{g(x)\Delta f(x) - f(x)\Delta g(x)}{f(x)+g(x+h)}$$

3

- (b) What is floating point representation of numbers ?

3

- (c) State Simpson's one-third rule.

2

- (d) What is Round-off error ?

2

- (e) Write the differences between Newton's Forward Interpolation formula and Newton's Backward Interpolation formula.

2

- (f) What is the use of STOP statement in FORTRAN ?

2

3. Write a FORTRAN program to calculate the area of a circle. 5

4. Form the divided difference table for the following data. 4

x	3	7	9	10
$f(x)$	168	120	72	63

5. Use Lagrange's Interpolation formula to find the value of $f(x)$ corresponding to $x=27$ from the following data : 5

x	14	17	31	35
$f(x)$	68.7	64.0	44.0	39.1

6. Solve the following system using Gauss elimination method. 5

$$\begin{aligned} x + 2y + z &= 3 \\ 2x + 3y + 3z &= 10 \\ 3x - y + 2z &= 13 \end{aligned}$$

7. (a) Find a root of the equation $x^3 - 9x + 1 = 0$ using Bisection method. 8

OR

- (b) Find a root of the equation $x^3 - 2x - 5 = 0$ using False position method. 8

- (ii) Add a new attribute named 'DOB' to the employee table.
- (iii) Find the names of all employees who work in department 'Computer' and also live in 'Delhi'.
- (iv) Find the total number of employees working in each department.
- (v) Create a view from the employee table comprising the attributes 'Name', 'Address', and 'DOB'.
- (b) Draw an E-R diagram for a student database which keeps track of the results of the student in each examination. Make your own assumptions. 5
- (c) Explain the ACID properties of transaction. 5
- (d) Define index. Distinguish between primary index and secondary index. 5

Total number of printed pages - 4

4 SEM BCA (NCBCS) DBMS 2

2019

(June)

COMPUTER APPLICATION

Paper : 4.2

(DBMS)

Full Marks : 75

Pass Marks : 30

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Answer the following:

- (a) Define candidate key.
- (b) What is the use of metadata?
- (c) Give example of a derived attribute.
- (d) What is lossy join decomposition?
- (e) Define checkpoint.

1×5=5

Contd.

2. Answer **any five** from the following : $2 \times 5 = 10$

- (a) Differentiate between a serial and non-serial schedule.
- (b) Write one advantage and one disadvantage of transaction log.
- (c) How is collision handled during hashing?
- (d) What is participation constraint? Give example.
- (e) How program-data independence is achieved in a Database System?
- (f) State two functions of DBMS.

3. Answer **any five** from the following : $3 \times 5 = 15$

- (a) Give the different data types available in Oracle.
- (b) State three different roles of database administrator.
- (c) Define project and select operation of relational algebra with example.
- (d) What are the different logical operators available in Oracle?

(e) State the use of 'GROUP BY' and 'HAVING' clause with an example.

(f) State the advantages of using database over traditional file system.

4. Answer **any four** from the following : $4 \times 5 = 20$

- (a) Explain the two-phase locking protocol.
- (b) Explain the various advantages and disadvantages of the network model.
- (c) Define Normalization. Why is normalization required? State the various types of normalization.
- (d) Explain the B-tree index organization.
- (e) Explain the various factors that affect the access time of a hard disk.

5. Answer the following :

- (a) Write SQL statements for the following : $2 \times 5 = 10$
 - (i) Create a relation named employee with the attributes 'empid', 'name', 'address', 'dept_id'.

OR

Distinguish between a tree and an acyclic graph directory structure.

6. (a) Explain different file allocation methods. 5
(b) What is free-space list? How is it implemented? 5

OR

Explain how DMA operations are performed.

7. Explain the following : *(any five)*

$$5 \times 2 = 10$$

- (a) Process
- (b) Demand Paging
- (c) Mounting
- (d) Block I/O
- (e) Caching and Buffering
- (f) Device controller.

Total number of printed pages - 4

4 SEM BCA (NCBCS) OS 3

2019

(June)

COMPUTER APPLICATION

Paper : 4-3

(Operating System)

Full Marks : 75

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Answer the following questions : *(any five)* $2 \times 5 = 10$
- (a) Program in execution is called _____. (Fill in the blank)
 - (b) Whenever a new job is entered into the system, it is stored in the _____. (Choose the correct option)
 - (i) Ready queue
 - (ii) Job queue
 - (iii) Suspended queue
 - (iv) Response queue

Contd.

(c) Pages and frames are _____ in size.
(Fill in the blank)

(d) Define Boot block.

(e) Device independence is achieved through the _____.
(Choose the correct option)

- (i) Device driver
- (ii) Kernel I/O sub-system
- (iii) Device controller
- (iv) RAM.

(f) DOS stands for _____.
(Fill in the blank)

2. (a) Explain different types of scheduler. 5

(b) Explain the benefits and drawbacks of Round Robin Scheduling. 5

OR

Explain the shared memory concept for process communication.

3. (a) What are the necessary conditions for occurrence of a deadlock? Explain. 5

(b) What is scheduling? Define the criteria that affects the scheduler's performance. 5

(c) Distinguish between Swapping and Paging. 5

4. (a) How does paging eliminate external fragmentation? Explain. 5

(b) What is a race condition? Explain with an example. 5

OR

Calculate the number of page faults for the following reference string using LRU page replacement algorithm with frame size as 3.

5 0 2 1 0 3 0 2 4 3 0 3 2 1 3 0 1 5

5. (a) Explain different types of file access methods. 5

(b) Distinguish between absolute and relative path in tree directory structure. 5

7. (a) Find the FIRST and FOLLOW sets for the following grammar: 6

$S \rightarrow ABCDE$

$A \rightarrow a | \epsilon$

$B \rightarrow b | \epsilon$

$C \rightarrow c$

$D \rightarrow d | \epsilon$

$E \rightarrow e | \epsilon$

- (b) Write in short about symbol table or overlays. 5

Total number of printed pages - 4

4 SEM BCA (NCBCS) SS 4

2019

(June)

COMPUTER APPLICATION

Paper : 4.4

(System Software)

Full Marks : 75

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Answer the following in short: $1 \times 5 = 5$
-
- (a) What is the significance of intermediate code ?
- (b) Give example of a system software.
- (c) What is YACC ?
- (d) Define Lexeme.
- (e) Define LL(1) grammar.

2. Answer the following : (any six) $3 \times 6 = 18$
- Define operator precedence parser.
 - Differentiate between static linking and dynamic linking.
 - Write an assembly language program to add two numbers.
 - How does assembler handle forward reference problem? Explain.
 - Define Translator. Mention its types.
 - Differentiate between System Software and Application Software.
 - Explain the applications of DAG.

3. What is Compiler? Explain the different phases of Compiler in detail. $1+9=10$

OR

What are the elements of Assembly Language? Explain. 10

4. (a) Eliminate left recursion from the following grammar for the order S, A. 4

$$\begin{aligned}S &\rightarrow Aa \mid b \\A &\rightarrow Ac \mid Sd \mid f\end{aligned}$$

- (b) What is Macro? Explain Macro call and Macro expansion. $2+2+2=6$

- OR**
What is Leader? Explain any one type of leader. $2+4=6$

5. Describe the concept of Predictive Parsing and Shift Reduce Parsing. $5+5=10$

OR

Construct SLR parsing table and also show the parsing of the string $id + id * id$ using the following grammar — 10

$$\begin{aligned}E &\rightarrow E + T \mid T \\T &\rightarrow T * F \mid F \\F &\rightarrow (E) \mid id\end{aligned}$$

6. (a) Explain top down parsing and bottom up parsing with example. 6
(b) What is ambiguous grammar? Show that the following grammar is ambiguous. $2+3=5$

$$S \rightarrow aSbS \mid bSaS \mid \epsilon$$

OR

Consider the following grammar — 5

$$\begin{aligned}S &\rightarrow (L) \mid a \\L &\rightarrow L, S \mid S\end{aligned}$$

Give the right most derivation for $(a, (a, a))$.