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**BCACAC 208**

**Credit Based Third Semester B.C.A. Degree  
Examination, September/October 2020  
(Common to All Batches) (Repeaters)  
BASIC MATHEMATICS**

Time : 3 Hours

Max. Marks : 80

**Note : Answer any ten questions from Part-A and one full question from each Unit from Part – B.**

**PART – A**

**(10×2=20)**

1. a) Change into exponential form

i)  $\log_4 64 = 3$

ii)  $\log_{\sqrt{2}} 16 = 8$ .

b) Find the number of permutations of the word ASSASSINATION.

c) Find the distance between  $(-4, -2)$  and  $(3, -5)$ .

d) Express in radian

i)  $60^\circ$

ii)  $135^\circ$ .

e) Differentiate  $7x^4 + 3x^3 - 9_{x+5}$  with respect to  $x$ .

f) Integrate  $3 - 2x - x^4$ .

g) Define proper subset. Give example.

h) Given  $A = \{2, 3, 4\}$   $B = \{4, 5, 6\}$ . Find  $A \times B$  and  $B \times A$ .

i) Represent the following using Venn diagram

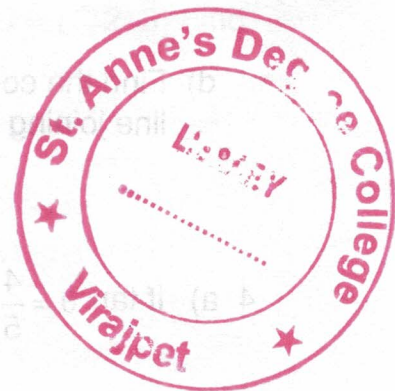
i)  $A \cup B$

ii)  $B - A$ .

j) Define isolated vertex. Give example.

k) Define mixed graph with example.

l) Define isomorphic graphs with example.



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## PART – B

## Unit – I

2. a) Without using log table show that  $\log \frac{81}{8} - 2 \log \frac{3}{2} + 3 \log \frac{2}{3} + 3 \log \frac{3}{4} = 0$ .
- b) Expand  $\left(\frac{3x}{4} - \frac{4}{3x}\right)^5$  using Binomial theorem.
- c) Show that the points (4, -5) (8, 1) (14, -3) and (10, -9) are the vertices of a square.
- d) Find the equation of the circle whose centre is (4, 5) and passing through the centre of the circle  $x^2 + y^2 + 4x + 6y - 12 = 0$ . **(4+4+4+3)**
3. a) If  $a^2 + b^2 = 7ab$  prove that  $\log\left(\frac{1}{2}(a+b)\right) = \frac{1}{2}(\log a + \log b)$ .
- b) In a mercantile firm, 4 posts fall vacant and 35 candidates apply for posts. In how many ways can a selection be made
- If one person is always included
  - If one person is always excluded.
- c) Find the middle term in the expansion of  $\left(\frac{4x}{5} - \frac{5}{2x}\right)^8$ .
- d) Find the co-ordinates of the point which divides internally and externally the line joining (5, 2) and (7, 9) in the ratio 2 : 7. **(3+4+4+4)**

## Unit – II

4. a) If  $\tan \theta = \frac{4}{5}$ , find the value of  $\frac{2 \sin \theta + 3 \cos \theta}{4 \cos \theta + 3 \sin \theta}$

b) Evaluate  $\lim_{x \rightarrow 0} \left( \frac{4x^4 + 5x^3 + 7x^2 + 6x}{5x^5 + 7x^2 + x} \right)$ .

c) Prove that the function  $x^2 + 4x - 2$  is continuous at  $x = 1$ .

d) Find the value of  $\int_2^4 (3x - 2)^2 dx$ . **(4+3+4+4)**



5. a) If  $\cos \theta = \frac{24}{25}$  and  $\theta$  is an acute angle find the values of other trigonometric functions

b) Evaluate  $\lim_{x \rightarrow 2} \frac{x^2 - x - 2}{x^2 - 5x + 6}$

c) Differentiate  $\frac{3x^2 + 5x}{7x^4 + 4}$  with respect to  $x$ .

d) Prove that  $4(\sin^4 30^\circ + \cos^4 60^\circ) - 3(\cos^2 45^\circ - \sin^2 90^\circ) - 2 = 0$ . (4+4+4+3)

**Unit – III**

6. a) If  $X = \{1, 2, 3, 4\}$  and  $R = \{(1, 1), (1, 4), (4, 1), (4, 4), (2, 2), (2, 3), (3, 2), (3, 3)\}$ , write the matrix of  $R$  and sketch its graph.

b)  $A = \{1, 2, 3, 4\}$   $B = \{a, b, c\}$   $C = \{x, y\}$ . Write  $A \times B$ ,  $A \times B \times C$ ,  $B^2 \times A$ ,  $C \times A^2$ ,  $B \times C^2$ .

c)  $R = \{<1, 2> <3, 4> <2, 2> \}$   $S = \{<4, 2> <2, 5> <3, 1> <1, 3> \}$  Write  $R \circ S$ ,  $R \circ R$ ,  $S \circ S$ ,  $S \circ R$  and  $R \circ (S \circ R)$ . (5+5+5)

7. a)  $A = \{x/x \text{ is an integer and } 0 \leq x \leq 5\}$ ,  $B = \{3, 4, 5, 17\}$  and  $C = \{1, 2, 3\}$  Find

- i)  $A \cup B$  ii)  $A \cap B$
- iii)  $A - B$  iv)  $A - C$
- v)  $A \cap C$

b) Given the relation matrices

$$M_R = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$$

$$M_S = \begin{bmatrix} 1 & 0 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 0 \end{bmatrix}$$

Find  $M_{R \circ S}$ ,  $M_{\bar{R}}$ ,  $M_{\bar{S}}$ ,  $M_{\overline{R \circ S}}$  and show that  $M_{\overline{R \circ S}} = M_{\bar{S}} \circ M_{\bar{R}}$ .

c) Let  $X = \{1, 2, 3, 4, \dots, 7\}$ . A relation  $R$  is defined as  $R = \{(x, y) | x - y \text{ is divisible by } 3\}$ . Show that  $R$  is an equivalence relation and draw a graph of  $R$ .

(5+5+5)



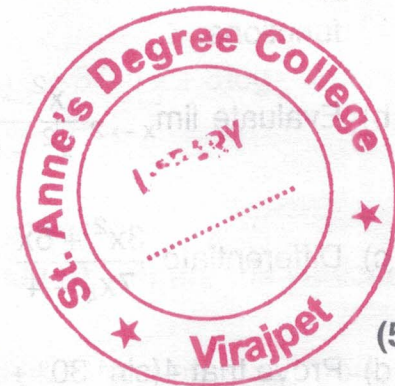
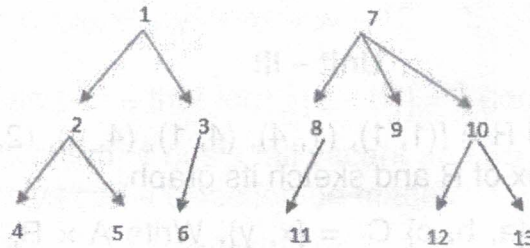
Unit – IV

8. a) Define in degree, out degree and total degree of a node. Give example.

b) Define the following terms with an example.

- i) Loop
- ii) Simple path
- iii) Weighted graph
- iv) Multi graph
- v) Directed tree.

c) Convert the following trees into a binary tree.



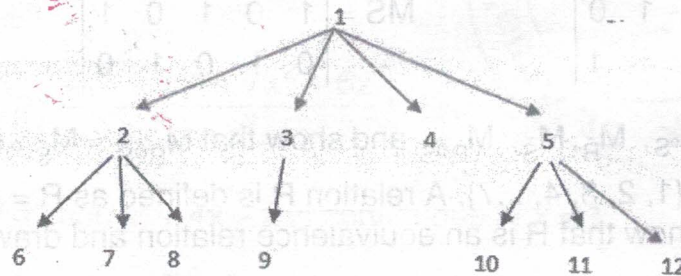
(5+5+5)

9. a) What are strongly connected weakly connected and unilaterally connected graphs ? Explain with suitable examples.

b) Define the following terms with an example

- i) Undirected graph
- ii) Null graph
- iii) Root node
- iv) Cycle
- v) Elementary path.

c) Convert the following tree into a binary tree.



(5+5+5)

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**BCACAC 209**

**Credit Based Third Semester B.C.A. Degree Examination, Sept/Oct. 2020  
(Common to all Batches) (Repeaters)  
MICROPROCESSORS**

Time : 3 Hours

Max. Marks : 80

**Note :** Answer **any ten** questions from Part – A and **one full** question from **each** Unit in Part – B.

**PART – A**

**(10×2=20)**

1. a) Expand CISC and RISC.
- b) If CS = 3456H and IP = ABCDH; find the physical address of the next instruction to be executed.
- c) In the real mode, show the starting and ending addresses of segment with segment register value is AB00H.
- d) Identify the addressing mode of the following :
  - i) MOV CX, [SI]
  - ii) MOV [BX+SI], AX.
- e) Which registers move on to stack with PUSHA instruction ?
- f) Differentiate Intersegment and Intra-segment jump instructions.
- g) What is the value of AX and Carry flag after the execution of following instructions ?  
MOV AX,0ABCDH  
MOV CL,06H  
STC  
RCL AX,CL.
- h) Differentiate LAHF and SAHF instructions.



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- i) Differentiate NOT and NEG instructions.
- j) List the instructions used to control direction flag.
- k) Write the start and end address of an interrupt vector in real mode.
- l) Write the length of NEAR and FAR call instructions.

## PART – B

### Unit – I

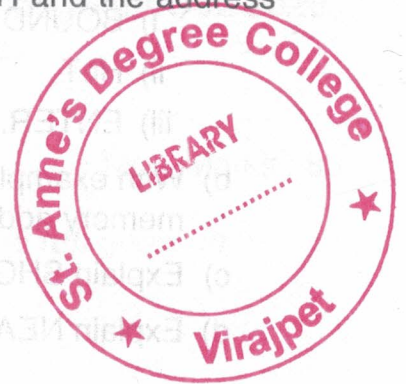
2. a) What are the salient features of 8086 processor ? **(3+5+4+3)**
  - b) Explain the flag register of 8086 with a neat diagram and also write the status of conditional flag after adding 5678H to ABCDH.
  - c) Explain the multipurpose registers of 8086.
  - d) If the physical branch address is 5A230H when (CS) = 5200H, what will it be if (CS) is changed to 7800H ?
3. a) Explain the following assembler directives : **(4+4+4+3)**
  - i) ASSUME
  - ii) PUBLIC.
  - b) Define bus. With a suitable diagram, explain bus structure of a microprocessor based computer system.
  - c) Explain real mode memory addressing with neat diagram.
  - d) Write a note on Byte and Word sized data.

### Unit – II

4. a) Assume DS=5000H, SS=7000H, BX=F000H, SI=4000H, BP=7000H.  
Calculate address accessed by each of the following instructions : **(4+6+3+2)**
  - i) MOV AX, [BX+SI]
  - ii) MOV CX, [BP-20H]
  - iii) MOV AX, [BX]
  - iv) MOV AX, [BP+SI+100H].



- b) Explain any THREE string instructions with example.
  - c) Show which JMP instruction assembles (short, near or far) if the JMP THERE instruction is stored at memory address 10000H and the address of THERE is :
    - i) 10020H
    - ii) 11000H
    - iii) 0FFFEH
    - iv) 30000H.
  - d) Explain following instructions with example :
    - i) XLAT
    - ii) PUSHF.
5. a) Explain following data addressing mode with example : **(4+4+4+3)**
  - i) Register indirect.
  - ii) Based relative plus index.
- b) Explain LDS and LEA instructions with example.
  - c) Explain three program memory addressing mode.
  - d) Write a note on memory organization.



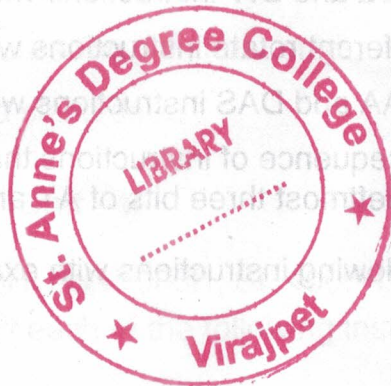
**Unit – III**

6. a) Explain MUL and DIV instructions with example. **(4+4+4+3)**
- b) Explain different rotate instructions with examples.
  - c) Explain DAA and DAS instructions with example.
  - d) Write the sequence of instructions that set the rightmost four bit of AX, clears the leftmost three bits of AX and inverts bit 7, 8 and 9 of AX.
7. a) Explain following instructions with example : **(4+5+4+2)**
  - i) AND
  - ii) XOR.
- b) Explain with example REP, REPE and REPNE prefix.
  - c) Suppose BX and DX contain 4 digit BCD numbers 3099H and 1234H respectively. Write the sequence of instructions to add BX and DX and store the result in CX.
  - d) Compare JA and JG instruction.

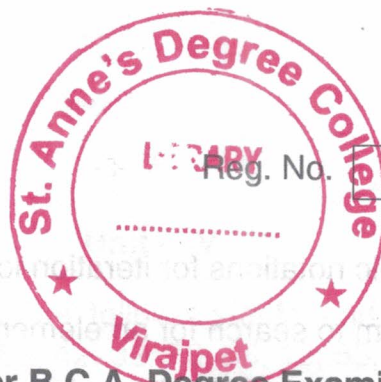


## Unit – IV

8. a) Explain following instructions : (4+4+4+3)
- BOUND
  - HLT
  - ENTER.
- b) With example, explain call with register as operand and a call with indirect memory addressing.
- c) Explain SHORT and FAR JUMP with example.
- d) Explain NEAR RET and FAR RET instruction.
9. a) What is an Interrupt Vector ? Explain following interrupt. (4+4+4+3)
- INT type
  - INT 3
  - INTO
- b) Explain LOOPE and LOOPNE instructions with examples.
- c) Explain parameter passing using stack with the program to add two 16 bit number using stack.
- d) Draw the block diagram of Microcontroller.







**BCACAC 210**

**Credit Based Third Semester B.C.A. Degree Examination, Sept./Oct. 2020  
(Common to All Batches) (Repeaters)  
DATA STRUCTURES**

Time : 3 Hours

Max. Marks : 80

**Note : Answer any ten questions from Part – A and answer one full question from each Unit in Part – B.**

**PART – A**

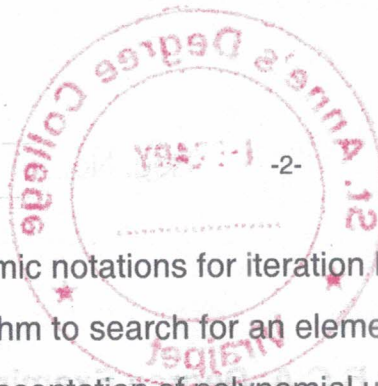
1. a) Define linear data structure. Give example. **(10×2=20)**
- b) List any four data structure operations.
- c) What is sparse matrix ? Give example.
- d) What is a circular linked list ? Give its diagrammatic representation.
- e) What is null pointer ? Write its significance.
- f) Mention any two recursive and non-recursive sorting techniques.
- g) Define overflow and underflow conditions with respect to stacks.
- h) Write recursive function to find the factorial of n.
- i) Write any two applications of queues.
- j) Define complete binary tree. Give example.
- k) Define labeled graph and directed graph.
- l) Represent  $(a - b) / ((c * d) + e)$  using binary tree.

**PART – B**

**Unit – I**

2. a) Explain algorithmic notations for selection structure with suitable example.
- b) Trace binary search for the following data: 11, 22, 30, 33, 40, 44, 55, 60, 66, 77, 80, 88, 99 and Item = 40.
- c) Explain linked storage of strings with suitable examples. **(6+5+4)**

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3. a) Explain algorithmic notations for iteration logic with suitable example.  
 b) Write the algorithm to search for an element using linear search.  
 c) Explain the representation of polynomial using arrays with an example. List its disadvantages. (5+5+5)

### Unit – II

4. a) Explain Radix sort with suitable example.  
 b) Write an algorithm to insert a node to the beginning of a singly linked list.  
 c) Trace selection sort for the following data :  
 66, 33, 40, 22, 55, 88, 60, 11, 80, 20, 50 (5+5+5)
5. a) Write the algorithm to traverse a singly linked list.  
 b) Write an algorithm to delete a node from the given position of a singly linked list.  
 c) Trace insertion sort for the following data :  
 11, 62, 14, 27, 8, 52, 18, 16, 40, 89, 65. (5+5+5)

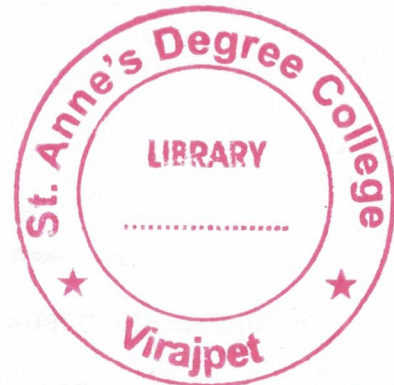
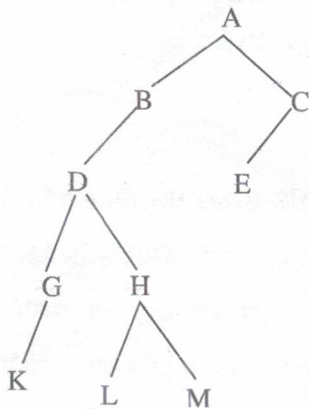
### Unit – III

6. a) Write algorithms for PUSH and POP operations on stacks using arrays.  
 b) Evaluate the following postfix expressions:  
 i) 3, 5, +, 6, 4, -, \*, 4, 1, -, 2, ↑, +  
 ii) 3, 1, +, 2, ↑, 7, 4, -, 2, \*, +, 5, -  
 c) Write a note on :  
 i) Priority queue  
 ii) Dequeue. (5+5+5)
7. a) Write algorithm for Insert and Delete operations on queues using arrays.  
 b) Write algorithm to convert given infix expression to postfix.  
 c) Explain the operations of circular queue using arrays with example. (5+5+5)



Unit – IV

- 8. a) Construct binary tree for the following data and traverse it in inorder, preorder and postorder : 60, 42, 39, 72, 88, 12, 55, 100, 77.
  - b) Explain linked representation of a binary tree with example.
  - c) Explain Breadth first algorithm for a graph with example. (5+5+5)
9. a) Consider the following binary tree T and trace the inorder traversal algorithm showing the contents of stack.



- b) Define the following with respect to binary tree with an example.
  - i) Leaf node
  - ii) Path
  - iii) Depth
  - iv) Predecessor node.
- c) Explain adjacency matrix and path matrix with example. (5+5+5)

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**BCACAC 211**

**Credit Based Third Semester B.C.A. Degree Examination, Sept/Oct. 2020  
(Common to all Batches) (Repeaters)**

**OPERATING SYSTEM**

Time : 3 Hours

Max. Marks : 80

**Note : Answer any ten questions from Part – A and one full question from each Unit of Part – B.**

**PART – A**

1. a) What are the components of the operating system ? (10×2=20)
- b) Distinguish between a process and a program.
- c) Define the terms *waiting time* and *throughput*.
- d) What is a deadlock ?
- e) What are semaphores ?
- f) List the various methods to recover from deadlock.
- g) What is fragmentation ?
- h) Define virtual memory.
- i) Mention any four types of file extensions.
- j) What is the purpose of mv command in Linux ? Give example.
- k) List any two process oriented commands of Linux with syntax.
- l) Define kernel.

**PART – B**

**Unit – I**

2. a) What is an operating system ? Explain any two types of operating systems.
- b) Explain the concept of process scheduling using queuing diagram.
- c) Discuss FCFS and SJF scheduling policies with example. (5+5+5)

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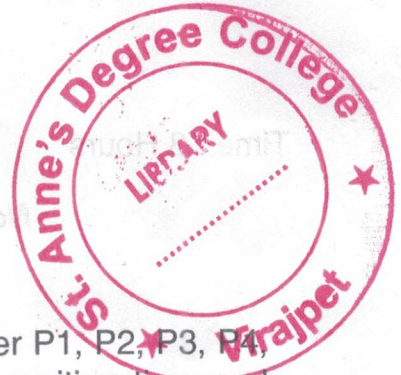


3. a) Explain process state transaction with a neat diagram.
- b) Explain any five services of an operating system.
- c) Consider the following set of processes, with the length of the CPU burst given in milliseconds :

Process	Burst Time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

The processes are assumed to have arrived in the order P1, P2, P3, P4, P5 all at time 0. Draw Gantt charts and find average waiting time and turnaround time using *nonpreemptive priority* (a smaller priority number implies a higher priority), and *Round Robin* (quantum = 1) scheduling algorithms.

(5+5+5)



**Unit – II**

4. a) What is readers-writers problem ? Explain.
- b) Explain resource allocation graph with an example.
- c) How do you detect deadlock for multiple instances of resource types ? (5+5+5)
5. a) Explain the necessary conditions for deadlock to occur in a system.
- b) Explain the two process solution to a critical section problem.
- c) Consider the following snapshot of a system :

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

Answer the following questions using the Banker's algorithm :

- i) Is the system in a safe state ?
- ii) If a request from process P1 arrives for (0, 4, 2, 0), can the request be granted immediately ?

(5+5+5)

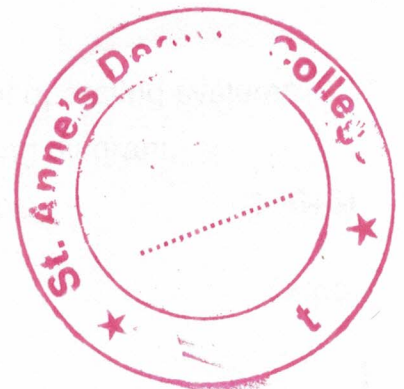


**Unit – III**

6. a) Explain the concept of paging with an example.  
b) Consider the following page-reference string :  
1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6.  
With three frames of memory write the steps for LRU and optimal page replacement algorithms which shows the occurrence of page faults and find the number of page faults.  
c) Explain the file attributes. (5+6+4)
7. a) Explain the concept of segmentation with a neat diagram.  
b) Explain the FIFO page replacement algorithm with an example.  
c) Write a short note on indexed allocation method. (5+5+5)

**Unit – IV**

8. a) Explain the Unix file system.  
b) Explain any five directory oriented commands in Linux.  
c) Explain the different file permissions in Linux. What does `-rw-r-r- - file1` mean for the file `file1`? (5+5+5)
9. a) Explain the following commands :  
i) `grep`  
ii) `chmod`.  
b) Explain the various types of shell available in Unix.  
c) Explain any five file oriented commands in Linux. (5+5+5)



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**BCACAC 212**

**Credit Based Third Semester B.C.A. Degree  
Examination, September/October 2020  
(Common to All Batches) (Repeaters)  
DATA MINING**

Time : 3 Hours

Max. Marks : 80

**Note :** Answer **any ten** questions from Part – A and **one full** question from **each** Unit in Part – B.

**PART – A**

1. a) Define Data warehouse. (10×2=20)
- b) List any two types of aggregate functions used in summary measures.
- c) Define base cuboid and apex cuboid.
- d) Define FP Tree.
- e) Define the terms support and confidence.
- f) List the structures used in Dynamic Itemset Counting algorithm.
- g) What is splitting criterion ?
- h) What is stemming ?
- i) What is multimedia data mining ?
- j) What is decision tree ?
- k) Define index and reference node.
- l) What is temporal data mining ?

**PART – B**

**UNIT – I**

2. a) Explain the various stages of KDD.
- b) Explain data warehouse architecture with a neat diagram.
- c) Compare data mining with DBMS. (5+6+4)

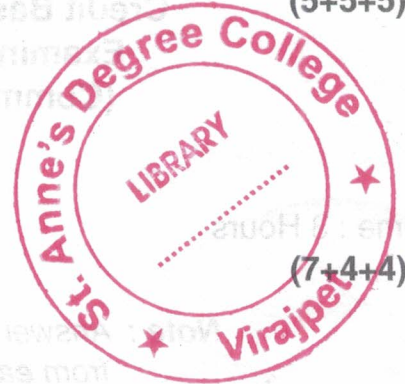
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3. a) Explain the Roll up and Roll down operations with a sketch.  
 b) Explain star schema and snowflake schema with a neat diagram.  
 c) Explain meta data with their types. (5+5+5)

## UNIT – II

4. a) Explain Apriori algorithm with an example.  
 b) Write a note on CLARA.  
 c) Differentiate hierarchical and partition clustering. (7+4+4)
5. a) Explain partition algorithm with an example.  
 b) Write a note on STIRR.  
 c) Differentiate agglomerative and divisive clustering. (7+4+4)



## UNIT – III

6. a) Explain the typical artificial neurons with activation function.  
 b) What is RBFN ? Explain with a neat diagram.  
 c) Explain support vector machine. (5+5+5)
7. a) Describe the learning technique in Multi layer perceptron.  
 b) Write a note on CART and ID 3 decision tree algorithms.  
 c) Explain mutation and crossover operation in genetic algorithm. (5+5+5)

## UNIT – IV

8. a) Write a note on web structure mining.  
 b) What is page rank ? How is it computed ?  
 c) State the important features that can be extracted from an unstructured document. (5+4+6)
9. a) Write a note on web usage mining.  
 b) Explain GSP algorithm.  
 c) What are the types of temporal data mining ? Explain. (5+4+6)