

Subject : Operating Systems

Day : Friday
Date : 20/11/2015



Time : 02.00 PM TO 05.00 PM
Max Marks : 100 Total Pages : 1

N.B:

- 1) Answer **ANY FOUR** questions from Section-I and **ANY TWO** questions from Section-II.
- 2) Both the sections should be written in the **SAME** answer book.
- 3) Figures to the **RIGHT** indicate full marks.

SECTION-I

- Q.1** Differentiate between: (15)
- a) Online operating system Vs Real time operating system.
 - b) Memory management with bitmap Vs Memory management with linked list.
 - c) Implicit tasking and Explicit tasking.
- Q.2** Explain the following terms: (15)
- a) Process control block
 - b) File access methods
 - c) Process relationships.
- Q.3** What is segmentation? Explain the concept of pure segmentation in detail. (15)
- Q.4** What is semaphore? Why it is necessary? Discuss the implementation of semaphore. (15)
- Q.5** What is deadlock? Explain conditions for deadlock occurrence. How to detect and recover the system from deadlock. (15)
- Q.6** Explain the concepts of file. Discuss various file protection mechanisms in detail. (15)
- Q.7** Write short notes on: (15)
- a) Disk scheduling
 - b) Reusable and consumable resources
 - c) System programs

SECTION-II

- Q.8** Consider the memory with six page frames (0-5). R bit values are given below for each page. (20)
- R bit value at clock tick 0 : 010010
 R bit value at clock tick 1 : 011011
 R bit value at clock tick 2 : 110110
 R bit value at clock tick 3 : 010101
 R bit value at clock tick 4 : 111110
 R bit value at clock tick 5 : 110011
 R bit value at clock tick 6 : 110001
 R bit value at clock tick 7 : 101010
- By using LRU with aging (simulation of LRU in software) Find out page to be replaced at end. Also explain the algorithm in detail.
- Q.9** Consider the following case: (20)

Process	Arrival time	Execution time (in ms)
P1	10.00	6
P2	10.03	2
P3	10.04	1
P4	10.07	5

- Calculate average waiting and turnaround time in case of
- a) First come first served
 - b) Shortest job first
 - c) Round Robin
- Q.10**
- a) What are the operations performed by the operating system on a process right from its creation to termination. Explain each of them. (10)
 - b) Explain the concept and need of multiprocessing operating system. (10)

Subject : Software Engineering

Day : Monday
Date : 23/11/2015



Time : 02.00 PM TO 05.00 PM
Max Marks : 100 Total Pages : 1

N.B.

- 1) Answer any **FOUR** questions from Section – I and any **TWO** questions from Section - II.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in **SAME** answer book.

SECTION – I

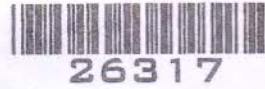
- Q.1** What are Principles of Software Engineering? Explain in brief Program and Software. (15)
- Q.2** Explain Waterfall Model with stages in Waterfall Model of Software Process. Explain each stage in brief. (15)
- Q.3** Why Feasibility Study is required? Explain types of Feasibility Study in Software Development Process. (15)
- Q.4** Explain concept of PERT and GANTT charts for Software Project Management. Explain Planning and Execution phase in Software Project Management. (15)
- Q.5** Write detail note on Function Oriented and Object Oriented Modeling with respect to Constructing Solution to a Problem. (Assume any Business Problem) (15)
- Q.6** What is Software Testing? Explain different Software Testing Techniques in brief. (15)
- Q.7** Write short notes on the following: (15)
- a) Quality Control and Quality Assurance
 - b) Categories of Software Maintenance
 - c) Software Development Life Cycle

SECTION – II

- Q.8** Draw the Entity Relationship Diagram and Context Level Data flow Diagram for Hospital Management System. (Assume appropriate processes in Hospital Management System) (20)
- Q.9** Explain Requirement Engineering in detail with respect to types of Requirements. (20)
- Q.10** a) What are Characteristics of SRS (Software Requirement Specification) ? Explain need of SRS document. (10)
- b) Explain Cost Benefit Analysis in Brief. (10)

Subject : Data Structures

Day : Thursday
Date : 26/11/2015



Time : 02.00 PM TO 05.00 PM
Max Marks : 100 Total Pages : 1

N.B.:

- 1) Attempt any **FOUR** questions from Section -I.
- 2) Attempt any **TWO** questions from Section – II.
- 3) Figures to the right indicate **FULL** marks.
- 4) Answers to both the sections should be written in **SAME** answer book.

SECTION-I

- Q.1 Explain the applications of stack with example. (15)
- Q.2 Explain in detail any three sorting techniques. (15)
- Q.3 Explain Advantages and disadvantages of Linked list. (15)
- Q.4 What is Data structure? Explain types of data structures. (15)
- Q.5 What is Queues? Explain types of queues. (15)
- Q.6 Write a program to allocate memory dynamically for string and store their addresses in array of pointers to string. (15)
- Q.7 Explain the terms: (15)
- i) Inorder Traversal
 - ii) Preorder Traversal
 - iii) Postorder Traversal

SECTION-II

- Q.8 Write a program to implement depth first search algorithm. (20)
- Q.9 Write a program to sort 20, 35, 40, 100, 3, 10, 15 using insertion sort. (20)
- Q.10 Write program to find specific element from the array using binary search. (20)

Day : Saturday
Date : 28/11/2015



Time : 02.00 PM TO 05.00 PM
Max Marks : 100 Total Pages : 2

N.B.:

- 1) Attempt any **FOUR** questions from Section –I and any **TWO** questions from Section –II.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in **SAME** answer book.

SECTION-I

Q.1 a) Find $AXBXC = ?$ **(08)**

$$\text{If } A = \begin{bmatrix} -1 & 2 & 3 \\ 1 & -1 & 5 \\ 6 & 2 & 3 \end{bmatrix} \quad B = \begin{bmatrix} 5 & 2 & 3 \\ 0 & 1 & 0 \\ -1 & -2 & -3 \end{bmatrix}$$

$$\text{and } C = \begin{bmatrix} 6 & 5 & 4 \\ 5 & 4 & -2 \\ 4 & -3 & 1 \end{bmatrix}$$

b) $A^2 + BI - C.$ **(07)**

Q.2 What is proposition and truth table? Construct truth table for $\sim(p \wedge q) \vee (\sim q \vee r).$ **(15)**

Q.3 Let $V = \{1, 2, 3, 4\}$ and **(15)**

$$f = \{(1,3), (2,1), (3,4), (4,3)\} \text{ and}$$

$$g = \{(1,2), (2,3), (3,1), (4,1)\}.$$

Find: i) $f \circ g$ ii) $g \circ f$ iii) $f \circ f$

Q.4 For each pair of integers a and b, find integers q and r such that $a = bq + r$ and $0 \leq r < |b|$ **(15)**

- i) $a = 258$ and $b = 12$ ii) $a = 573$ and $b = -16$

Q.5 Prove that: **(15)**

i) $(A \cup B)' = A' \cap B'$ For any A and B for universal set U.

ii) prove above expression by venn diagram.

Q.6 Define 'Symmetric relation'. Give an example of a symmetric relation. Give an example of a relation that is not symmetric. **(15)**

P. T. O.

Q.7 Write short notes on the following:

(15)

- a) Counting principle
- b) Minimal Boolean expressions
- c) Closure properties

SECTION-II

Q.8 a) Draw logic circuit for output Y
Here $Y = A'BC + AB'C' + AB'$.

(10)

- b) Write note on (Any TWO)
 - i) NAND gate
 - ii) NOR gate
 - iii) Prime implicate

(10)

Q.9 In a class of 80 students, 50 students know English, 55 know French and 46 know German languages. 37 students know English and French, 28 students know French and German, 25 students know English and German. 7 students know non of these languages. Find out.

(20)

- i) How many students know all 3 languages?
- ii) How many know only one language?

Q.10 Find the g.c.d. of

- a) 45, 34
- c) 258, 60

- b) 77, 128
- d) 152, 80

using Euclidean algorithm.

* * * *

(20)

Subject : Operating Systems

Day : Tuesday



Date : 12/04/2016

Time : 02.00 PM TO 05.00 PM

Max Marks : 100 Total Pages : 1

N.B:

- 1) Answer **ANY FOUR** questions from Section-I and **ANY TWO** questions from Section-II.
- 2) Both the sections should be written in the **SAME** answer book.
- 3) Figures to the **RIGHT** indicate full marks.

SECTION-I

- Q.1 Explain various operating system structures with their merits and demerits. (15)
- Q.2 Explain the following: (15)
- a) Multilevel scheduling
 - b) Multilevel feedback scheduling
 - c) Process control block
- Q.3 What is page table? Give the structure of page table entry. Explain the process of converting virtual addresses into physical addresses with suitable example. (15)
- Q.4 Explain the file system structure in detail. (15)
- Q.5 What is semaphore? Discuss characteristics and queuing implementation of semaphore. (15)
- Q.6 What is deadlock? Describe deadlock detection methods with example. (15)
- Q.7 Write short notes on: (15)
- a) Fragmentation
 - b) Disk structure
 - c) Segmentation with paging

SECTION-II

- Q.8 Consider the following case: (20)

Process	Arrival time	Execution time (min)
P1	10.00	08
P2	10.01	03
P3	10.07	02
P4	10.10	04

Calculate average waiting and turnaround time in case of.

- a) First come first served
 - b) Shortest job first
 - c) Round robin
- Q.9 Consider the following page reference string. (20)
- 1,2,3,4,0,2,3,2,1,0,4,3,2,4,3,0,1
- Find out the page to be replaced at end using LRU with matrix. Also explain the algorithm.
- Q.10 Explain the following: (20)
- a) Distributed operating system.
 - b) Input Output interface.
 - c) Conditional critical region.
 - d) Operating system services.

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Subject : Software Engineering

Day : Saturday

Date : 16/04/2016



Time : 02.00 PM TO 05.00 PM

Max Marks : 100 Total Pages : 1

N. B. :

- 1) Attempt **ANY FOUR** questions from Section –I. Each question carries **15**marks.
 - 2) Attempt **ANY TWO** questions from Section –II. Each question carries **20** marks.
 - 3) Answers to both the sections should be written in the **SAME** answer book.
-

SECTION - I

- Q. 1** What are software engineering concepts? Explain principles and importance (15) of software engineering.
- Q. 2** What is software project management? Explain software configuration in (15) brief.
- Q. 3** Explain software development life cycle in brief. What are stages in SDLC? (15)
- Q. 4** What is need of feasibility study? Explain in brief types of feasibility. (15)
- Q. 5** What is requirement engineering? Explain in brief types of requirements. (15)
- Q. 6** What are characteristics of SRS? Explain function oriented modeling in brief. (15)
- Q. 7** Explain ERD concepts with example. What are benefits of flow charts? (15)

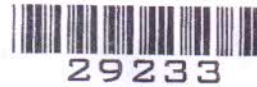
SECTION - II

- Q. 8** What are concepts of Testing? Explain different testing techniques with (20) example.
- Q. 9** What are quality concepts with respect to software? Explain in brief software (20) quality assurance and software reviews.
- Q.10** Write short notes on **ANY TWO** of the following: (20)
- a) Software maintenance
 - b) Object oriented design
 - c) Waterfall model

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Subject : Data Structures

Day : Wednesday
Date : 20/04/2016



Time : 02.00 PM TO 05.00 PM
Max Marks : 100 Total Pages : 1

N.B.:

- 1) Attempt **ANY FOUR** questions from Section – I and attempt **ANY TWO** questions from Section – II.
- 2) Answers to both the sections should be written in the **SAME** answer book.
- 3) Figures to the right indicate **FULL** marks.

SECTION – I

- | | | |
|-----|--|------|
| Q.1 | Explain array of structure and structure within structure with example. | [15] |
| Q.2 | What is dynamic memory allocation? Write and explain memory allocation for structure with example. | [15] |
| Q.3 | Discuss the advantage of linked list over array with example. | [15] |
| Q.4 | What is stack? Explain it with its example. | [15] |
| Q.5 | Explain with example linked list implementation of queue. | [15] |
| Q.6 | Explain Breadth First Traversal and Depth First tree Traversal. | [15] |
| Q.7 | Write short notes on ANY TWO of the following: | [15] |
| | a) Circular linked list | |
| | b) Array | |
| | c) Atomic Data | |

SECTION – II

- | | | |
|------|---|------|
| Q.8 | Write C program to perform Binary Search using Recursion. | [20] |
| Q.9 | Write a C program to implement a stack using Linked List. | [20] |
| Q.10 | Write a C program to read n unsorted numbers to an array of size n and sort the numbers in descending order using insertion sort technique. | [20] |

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Subject : Mathematics

Day : Friday

Date : 22/04/2016



Time : 02.00 PM TO 05.00 PM

Max Marks : 100 Total Pages : 2

N.B.:

- 1) Attempt **ANY FOUR** questions from Section- I and attempt **ANY TWO** questions from Section – II.
- 2) Figures to the right indicate **FULL** marks.
- 3) Both the sections should be written in the **SAME** answer book.

SECTION – I

Q.1 Let $U = \{x : x \in N, 1 \leq x \leq 12\}$ be the universal set and (15)
 $A = \{1, 9, 10\}$, $B = \{3, 4, 6, 11, 12\}$ and $C = \{2, 5, 6\}$ are subsets of U . Find the sets.

- a) $(A \cup B) \cap (A \cup C)$
- b) $A \cup (B \cap C)$
- c) $(A \cup B \cup C)'$

Q.2 a) Define composition of functions. Hence find the composition function: $g \circ f$. (07)

Given that $A = \{1, 2, 3, 4\}$, $B = \{a, b, c, d\}$, $C = \{x, y, z\}$
 Consider the function $f : A \rightarrow B$ and $g : B \rightarrow C$ defined by
 $f = \{(1, a), (2, c), (3, b), (4, a)\}$ and $g = \{(a, x), (b, x), (c, y), (d, y)\}$

b) Let R be a relation on the set $A = \{1, 2, 3, 4\}$ defined as (08)

$R = \{(1, 1), (1, 2), (1, 3), (1, 4), (2, 2), (2, 4), (3, 3), (3, 4), (4, 4)\}$
 Construct diagram for R .

Q.3 a) Construct a combinatorial circuit from the following input / output table. (07)

Input		Output
x_1	x_2	$f(x_1, x_2)$
1	1	1
1	0	0
0	1	0
0	0	1

b) Using mathematical induction prove that (08)

$$2 + 5 + 8 + \dots + (3n - 1) = \frac{n(3n + 1)}{2}$$

Q.4 Prove that $A^3 - 4A^2 - 3A + 11I = O$ (15)

Where $A = \begin{bmatrix} 1 & 3 & 2 \\ 2 & 0 & -1 \\ 1 & 2 & 3 \end{bmatrix}$ and I is the unit matrix of order 3.

P.T.O.

- Q.5 a) Express E in its complete sum - of - products of form (07)
- $E = (x' + y)' + x' y$
 - $E = y(x + yz)$
- b) Construct the truth tables for (08)
- $(p \wedge q) \vee (q \wedge r) \vee (r \wedge p)$
 - $(p \vee q) \vee r$

- Q.6 a) If A is the set of natural numbers which are less than 10 and B is the set of prime numbers which are less than 10. Then show that (07)
- $$A \times B \neq B \times A$$

- b) If $A = \begin{bmatrix} 2 & -1 & 0 \\ 0 & -2 & 1 \\ 1 & 0 & 1 \end{bmatrix}$, $B = \begin{bmatrix} -2 & 1 & -1 \\ 1 & 2 & -2 \\ 2 & -1 & -4 \end{bmatrix}$ $C = \begin{bmatrix} 1 & 1 & -1 \\ 2 & -3 & 4 \\ 3 & -2 & 3 \end{bmatrix}$ (08)

Evaluate:

- $2A + 3B - 4C$
 - $A(BC)$
- Q.7 Write short notes : (15)
- Types of functions.
 - Basic logical operations.
 - Difference between relations and functions.

SECTION - II

- Q.8 Explain the following concepts with suitable examples. (20)
- Closure properties.
 - Equivalence relations.
 - Partial ordering relations.
 - n - ary relations.
- Q.9 a) In a city, three daily news papers A, B and C are published. 42 percent of the people in that city read A, 56 percent read B, 60 percent read C, 24 percent read A and B, 34 percent read B and C, 32 percent read C and A, 8 percent do not read any of three news papers. Using the algebra of sets, find the percentage of persons who read all the three news papers. (10)
- b) Find the gcd of (10)
- 77, 128
 - 258, 60
- using Euclidean algorithm.
- Q.10 a) Draw circuit diagrams to represent the following equations. (10)
- $A = (p \cdot q) \cdot r$
 - $C = (p \cdot q) + (\bar{p} \cdot \bar{q})$
- b) Verify if the propositions: (10)
- $(p \wedge q) \wedge \sim (p \vee q)$ is a contradiction.
 - $(p \wedge \sim q) \vee \sim (p \wedge \sim q)$ is a tautology.

Subject : Operating Systems

Day : Tuesday
Date : 08/11/2016



Time : 02.00 PM TO 05.00 PM
Max Marks : 100 Total Pages : 1

N.B.:

- 1) Solve any **FOUR** questions from Section-I and any **TWO** questions from Section-II.
- 2) Both the sections should be written in the **SAME** answer book.
- 3) Figures to the **RIGHT** indicate full marks.

SECTION-I

- Q.1** Differentiate between: (15)
- a) Online operating system and Real time operating system.
 - b) Multilevel queue scheduling and Multilevel queue with feedback scheduling.
 - c) Shortest job first and Shortest remaining time next.
- Q.2** What is a file? Explain different file protection mechanisms. (15)
- Q.3** What is virtual memory? Explain the process of converting logical addresses into physical addresses with the help of page table. (15)
- Q.4** Discuss the process concept and explain the process state transition in detail. (15)
- Q.5** What do you mean by reusable and consumable resources? Discuss the process of resource management. (15)
- Q.6** Explain the following terms: (15)
- a) Command interpreter
 - b) System calls
 - c) Demand paging
 - d) Pre paging
 - e) Distributed system.
- Q.7** Write short notes on any **TWO** of the following: (15)
- a) Input-output systems
 - b) Disk space management
 - c) Semaphore

SECTION-II

- Q.8** a) What do you mean by deadlock? Give the conditions for occurrence of it. (10)
b) "Operating system acts as a resource manager." Justify with example. (10)
- Q.9** System refers the pages in the following sequence. (20)
0, 3, 2, 0, 2, 1, 3, 2, 1, 2, 0, 3
Explain the LRU algorithm in detail and find page to be replaced at the end using LRU with matrix.
- Q.10** Consider the disk with 50 tracks. The system refers the tracks in the following sequence. (20)
25, 37, 15, 9, 24, 37, 39, 47, 13, 25, 15
Currently head is on track number 20 and moving outside. Calculate total track movements and time required to move all these tracks.
(Consider seek time = 0.15 ms) in case of :
- a) First come first served.
 - b) Shortest seek time first.

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Subject : Software Engineering

Day : Thursday
Date : 10/11/2016



Time : 02.00 PM TO 05.00 PM
Max Marks : 100 Total Pages : 1

N.B.

- 1) Answer any **FOUR** questions from Section – I and any **TWO** questions from Section - II.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in **SAME** answer book.

SECTION – I

- Q.1** What is Software Engineering? Explain basic concepts of Software Engineering with importance of Software Engineering in Software Development. (15)
- Q.2** Explain Software Project Management in brief. What are applications of PERT and GANTT charts? (15)
- Q.3** What are the stages in Software Development Life Cycle? Explain in brief Feasibility study and its benefits. (15)
- Q.4** Explain Requirement Engineering concepts with types of Requirements in Software Development Process. (15)
- Q.5** What are characteristics of (SRS) Software Requirement Specification? Explain in brief why SRS is required? (15)
- Q.6** Write detail note on Function Oriented Modeling and Object Oriented Modeling with respect to software development. (15)
- Q.7** Write short notes on the following: (15)
- a) Testing Techniques
 - b) Quality Concepts
 - c) Software Maintenance

SECTION – II

- Q.8** Explain Formal Technical Reviews for Software Quality Assurance Plan for any business application Software. Assume appropriate real business documents in Review Meeting and Review guidelines for business Software development. (20)
- Q.9** Write detail note on Maintenance Process and Models. Explain in brief Reuse Oriented Model. (20)
- Q.10** Draw the Entity Relationship Diagram and Context Level Data Flow Diagram for your College Library Management System. (Assume appropriate processes in the Library Management System) (20)

Subject : Data Structures

Day : Saturday
Date : 12/11/2016



Time : 02.00 PM TO 05.00 PM
Max Marks : 100 Total Pages : 1

N.B.:

- 1) Attempt any **FOUR** questions from Section -I.
- 2) Attempt any **TWO** questions from Section – II.
- 3) Figures to the right indicate **FULL** marks.
- 4) Answers to both the sections should be written in **SAME** answer book.

SECTION-I

- Q.1 Write a program to add new node to the ascending order linked list. (15)
- Q.2 What is stack? Explain Array Implementation of stack. (15)
- Q.3 Explain ADT with example. (15)
- Q.4 What is queue? Explain types of queues? (15)
- Q.5 Explain the operations performed on Binary Search Tree. (15)
- Q.6 Write a program to allocate memory dynamically for string and store their addresses in array of pointers to string. (15)
- Q.7 Write short notes on: (15)
- a) Quick sort
 - b) Atomic data
 - c) Structures

SECTION-II

- Q.8 Write a program to sort 20, 35, 40, 100, 3, 10, 15 using bubble sort. (20)
- Q.9 Write a program to implement depth first search algorithm. (20)
- Q.10 Write a program for multiplication two matrices. (20)

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Subject : Mathematics

Day : Wednesday
Date : 16/11/2016



Time : 02.00 PM TO 05.00 PM
Max Marks : 100 Total Pages : 2

N.B.:

- 1) Attempt any **FOUR** questions from Section –I and any **TWO** questions from Section –II.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in **SAME** answer book.

SECTION-I

Q.1 a) Verify: $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$ (07)

using the sets

$$A = \{1, 2, 3, 5\}$$

$$B = \{2, 3, 4, 6\}$$

$$C = \{1, 2, 4, 5, 7\}$$

b) In a class of 25 students, 12 students have taken Economics, 8 students have taken Economics but not Politics. Find the number of students who have taken Economics and Politics. Also find the number of students who have taken Politics but not Economics. Draw Venn diagram also. (08)

Q.2 Given: $A = \{1, 4\}$, $B = \{2, 3\}$, $C = \{3, 5\}$ (15)

Prove that: $A \times B \neq B \times A$

Also find $(A \times B) \cap (A \times C)$

and $(A \times C) \cup (B \times C)$

Q.3 a) Let $R = \{(a, a), (a, b), (b, b), (c, c), (c, b)\}$ on (07)

$$A = \{a, b, c\}.$$

Find the symmetric closure of R.

b) Show that: $p \rightarrow (q \rightarrow r) \equiv p(\sim q \vee r) \equiv (p \wedge q) \rightarrow r.$ (08)

Q.4 Construct a combinatorial circuit from the following input/ output table: (15)

Input		Output
x_1	x_2	$f(x_1, x_2)$
1	1	1
1	0	0
0	1	0
0	0	1

Q.5 Prove that: $A^3 - 4A^2 - 3A + 11I = 0$ (15)

Where $A = \begin{bmatrix} 1 & 3 & 2 \\ 2 & 0 & -1 \\ 1 & 2 & 3 \end{bmatrix}$ and I is the unit matrix of order 3.

P. T. O.

Q.6 a) Define 'Transitive relation'. Give an example of a transitive relation. Give an example of a relation that is not transitive. (07)

b) Use the principle of mathematical induction to verify: (08)

$$P(n): 1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{n(n+1)(2n+1)}{6}.$$

Q.7 Write short notes on the following: (15)

- Euclidean algorithm
- Minimal Boolean Expressions
- n- ary relations

SECTION-II

Q.8 Find the g.c.d. of (20)

- | | |
|------------|------------|
| a) 45, 34 | b) 77, 128 |
| c) 258, 60 | d) 152, 80 |
- Using Euclidean algorithm.

Q.9 Construct the truth tables for: (20)

- $P \wedge (\sim q)$
- $(p \wedge q) \vee (q \wedge r) \vee (r \wedge p)$
- $(p \vee q) \vee (r \vee s)$
- $(\sim p) \vee (\sim q)$

Q.10 a) Define 'Singular Matrix' and find the value of 'x' if $|A| = 0$ (10)

$$\text{Where } A = \begin{bmatrix} 3 & -2 & -4 \\ 9 & 2 & x \\ 5 & 2 & 3 \end{bmatrix}$$

b) Explain the concept of Contradiction and verify given compound statement is Tautology (10)

$$p \vee [\sim (p \wedge q)]$$

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