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Note: Attempt any *Five* questions. All questions carry equal marks.

- Q.1 (a) Write algorithms to insert and delete elements from an array. Comment on efficiency of these algorithms.
(b) Write algorithms for insertion and deletion in a queue.
- Q.2 (a) Explain how you can implement two stacks into a single array? Are there any advantages doing this?
(b) Write applications of stack and show example of each application.
- Q.3 (a) Perform the following operations on doubly linked list and write the code in C:
(i) Insert a node before a given node. (ii) Make a doubly linked list circular (iii) Search a value
(b) Write a function to create a linked list by adding nodes at the end of existing nodes.
- Q.4 What is a Binary Search Tree? Write algorithms to insert and delete values from a binary search tree.
- Q.5 (a) Write algorithms to insert and delete values from a heap. Work out your algorithms on an example.
(b) Write a function to count the leaf nodes in a binary tree.
- Q.6 (a) How is a graph represented using Linked Representation?
(b) Write algorithms to find indegree and outdegree of a graph using linked representation.
(c) Define path matrix and adjacency matrix.
- Q.7 (a) Write algorithms for one internal sort and one external sort.
(b) Prove that the complexity of binary search is $\log_2 n$.



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Note: Attempt any *Five* questions. All questions carry equal marks.

- Q.1 (a) Explain Data Structure. Discuss primitive and non-primitive data types.
(b) Why linked list is a better data structure than an array?
- Q.2 (a) What is a stack? Discuss the operations on a stack.
(b) Write down the various applications of stack.
- Q.3 (a) Write an algorithm to insert an element in a sorted linked list.
(b) Define Deque, Circular linked list and Doubly-linked list.
- Q.4 (a) Define binary tree. Explain array and linked representation of binary tree in memory with illustrations.
(b) Explain tree traversals.
- Q.5 (a) Draw binary tree T corresponding to the following algebraic expression E:
$$E = a + (b - c) * (d - e) / (f + g - h)$$

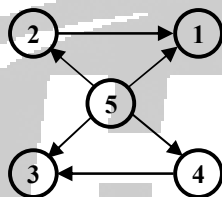
Write preorder and post order traversals of the resultant tree T.
(b) What is threaded binary tree?
- Q.6 (a) What is path matrix in graphs? Write algorithm to find path matrix.
(b) Suppose a weighted graph G is maintained in memory by a node array DATA and a weight matrix W as follows:
DATA : X, Y, S, T
$$W = \begin{pmatrix} 0 & 0 & 3 & 0 \\ 5 & 0 & 1 & 7 \\ 2 & 0 & 0 & 4 \\ 0 & 6 & 8 & 0 \end{pmatrix}$$

Draw a picture of graph G.
- Q.7 What is Heapsort? Write algorithm of Heapsort along with illustrations. Also discuss complexity analysis.
- Q.8 Write short notes on the following:
(a) Hashing techniques (b) Internal and external sorting (c) Static and dynamic storage



Note: Attempt any *Five* questions. All questions carry equal marks.

- Q.1 (a) Explain the term Data Structure. What are the main objectives of data structure?
 (b) Differentiate between array and linked allocated list.
 (c) Write an algorithm to insert an item into Sorted Linked List.
- Q.2 (a) How is a slack useful for handling recursion? Explain with the help of an example.
 (b) What are the limitations to implement slack using array?
 (c) Convert the following infix notations to postfix, using slack:
 (i) $A+B - (C+D) - (E-F)+F/H \uparrow I$ (ii) $A * (B+D)/E+F * (G+H/K)$.
- Q.3 (a) What are queues and priority queues? Discuss the array representation of priority queue.
 (b) Explain the boundary condition for an empty and full circular queue (assume that queue is implemented as an array). What is a dequeue? Give algorithm to insert an item at the front end of the dequeue and delete an element from the rear of the dequeue.
- Q.4 (a) Explain the use and importance of head node in a circular linked list.
 (b) Discuss a doubly linked list. Write algorithm for inserting an item and deleting an item from a circular list linked list.
 (c) Convert the following infix notching to postfix and prefix using tree traversal algorithms:
 (i) $A + (-B) * C/D ^ E$ (ii) $A^B + C/E - F$
- Q.5 Write an algorithm which will accomplish the following:
 (a) Create binary search tree (b) Insert an item in the binary search tree 5
 (c) Search for a specific item in the binary search tree and if found then delete it.
- Q.6 (a) Draw the binary tree for which preorder and in-order traversals are given below:
 Pre-order: A B D G C E F H I
 In-order: G D B A E C H F I
 (b) Prove that binary tree with N levels has at most $2^N - 1$ nodes.
- Q.7 (a) Write an algorithm to delete a node from a graph when a graph is representing using linked representation.
 (b) Given a following directed graph G:



Write adjacency matrix A of the graph G.

- (c) What are the different ways to represent graphs in computer? Give any two applications of graphs.
- Q.8 (a) Explain bubble sort technique with the help of an example.
 (b) Briefly describe: (i) The complexity of an algorithm (ii) The space time trade-off algorithm



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PGDCA 2nd Semester, MS – 06 (Data Structure and Algorithms)

(Old Question Paper)

Note: Attempt any *Five* questions. All questions carry equal marks.

Q.1 (a) Compare the efficiency of data structures implemented with linear list and linked list structure.

(b) Explain array structure of 1-D, 2-D, 3-D arrays and data access method for them.

Q.2 Differentiate between queue and dequeue. Explain all operation on both structure with program modules.

Q.3 (a) Explain circular linked list with example.

(b) Differentiate between doubly linked-list and multi-linked list.

Q.4 (a) What do you mean by tree traversal? Explain different methods for traversing trees.

(b) Describe about binary tree, B tree and B+ tree.

Q.5 (a) Describe about thread binary tree. What are the applications of threaded binary trees.

(b) Compare DFS and BFS. Give suitable examples for them.

Q.6 (a) What do you mean by spanning tree? Explain Prim's algorithm for it.

(b) Explain techniques for representing Graphs with suitable examples.

Q.7 (a) What do you mean by Big 'O' notation? Compare efficiency of quick, merge and heap sorting.

(b) Explain internal and external sorting techniques.

Q.8 Write short notes on the following: (a) Dynamic storage (b) Hashing techniques



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PGDCA 2nd Semester, MS – 07 (Computer Organization and Architecture)

(Old Question Paper)

Note: Attempt any *Five* questions. All questions carry equal marks.

Q.1 Explain different types of register used in a basic computer. Explain how these registers are connected to common bus.

Q.2 Explain instruction cycle with the help of flowchart.

Q.3 Write a program to evaluate the arithmetic statement:

$$X = (A + B) * (C + D)$$

Using a general register computer with three address instructions, two address instructions, one address instructions and zero address instructions

Q.4 Explain RISC characteristic describing overlapped register window. Explain RISC pipelining.

Q.5 Explain the Input-Output Processor. How Input-Output Processor Communicate with CPU.

Q.6 What is Virtual Memory? Explain its mapping procedure with the help of suitable example.

Q.7 (a) Explain the asynchronous data transfer technique.

(b) Explain the difference between micro-programmed control and hardwired control.

Q.8 Write short notes on the following: (a) Transaction Processing Benchmarks

(b) Cache Memory

(c) Addressing Modes

(d) DMA Data Transfer



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PGDCA 2nd Semester, MS – 07 (Computer Organization and Architecture)
(Old Question Paper)**H.K. Hi-Tech**

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 (b) Cache Memory (d) Addressing Modes (d) DMA Data Transfer



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PGDCA 2nd Semester, MS – 07 (Computer Organization and Architecture)
(Old Question Paper)**H.K. Hi-Tech**

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Note: Attempt any *Five* questions. All questions carry equal marks.

- Q.1 Explain the following: (a) The difference between Computer organization and Computer Architecture.
 (b) The difference amongst instruction cycle, machine cycle and clock cycle.
 (c) The difference between High level and Assembly level languages.
 (d) What do you mean by I/O Channels and its role?
- Q.2 What is the importance of addressing modes? Mention the various addressing modes and discuss each of these along with their applications.
- Q.3 (a) Explain the difference between hardwired and micro-programmed control units. Explain their relative advantages and disadvantages. (b) Discuss the importance of instruction format. Draw a typical format and explain its components.
- Q.4 (a) What do you mean by RISC and CISC? Explain their relative merits and demerits. Give examples in each case.
 (b) Explain the principle of operation of pipelining. What advantages does it derive?
- Q.5 (a) List the various memory devices used in computer systems. Discuss the features of each of these devices.
 (b) What is the need to use variety of memory devices in a system? What are the necessity of using cache and virtual memories?
- Q.6 Discuss the various I/O data transfer techniques. Explain their relative advantages and disadvantages.
- Q.7 (a) Discuss the role of the various interrupts available in the computer systems. Use examples.
 (b) Write what you know about superscale processors.
- Q.8 Write notes on any two of the following: - (a) Virtual Memory (b) Cache Memory (c) SPEC-MARKS



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PGDCA 2nd Semester, MS – 07 (Computer Organization and Architecture)
(Old Question Paper)

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Note: Attempt any *Five* questions. All questions carry equal marks.

- Q.1 Explain the various addressing modes usually used with general purpose computer organization.
- Q.2 Discuss the instruction cycle for an instruction and explain each subcycle followed in the instruction cycle.
- Q.3 (a) Convert the following arithmetic expression from infix to reverse polish notation:
(i) $A+B * [C * D + E * (F+G)]$ (ii) $A * (B+C * (D+E)) / F * (G+H)$
(b) Differentiate between RISC and CISC architecture.
- Q.4 Explain the following: (a) Control Memory (b) Control address Register (c) Sequencer
(d) Pipeline Register (e) Microprogram
- Q.5 (a) Draw a space time diagram for a six-segment pipeline showing the time it takes to process eight tasks.
(b) A non-pipeline system takes 50ns to process a task. The same task can be processed in a six-segment pipeline with a clock cycle of 10ns. Determine the speedup ratio of the pipeline for 100 tasks.
- Q.6 (a) Explain the superscalar processors and also discuss the concept of Memory Interleaving.
(b) Discuss the Asynchronous Data Transfer using strobe and hand shaking.
- Q.7 (a) What do you mean by Auxiliary Memory? Discuss the working of Associative Memory.
(b) How many mapping techniques are available with cache memory? Explain each.
- Q.8 Write short notes on the following: (a) Central Processing Unit (b) Virtual Memory



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PGDCA 2nd Semester, MS – 07 (Computer Organization and Architecture)
(Old Question Paper)

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Note: Attempt any *Five* questions. All questions carry equal marks.

- Q.1 (a) Draw a diagram of a bus system using: (i) Multiplexers (ii) Three State Buffers and Decoder and explain them.
(b) Draw a 4 bit arithmetic circuit and show all the related micro-operations.
- Q.2 (a) Draw the diagram of a common bus system and explain the purpose of each register of basic computer.
(b) Explain with the help of flow-chart how instruction is fetched, decoded and executed.
- Q.3 (a) Draw the block diagram depicting control unit organization and explain the function of each block.
(b) Write a short note on Microprogram Sequencer.
- Q.4 Discuss different addressing modes in detail with suitable examples.
- Q.5 Explain the following in detail: (a) RISC and CISC characteristics (b) Pipeline Processing
- Q.6 (a) Differentiate between Memory mapped I/O and I/O mapped I/O.
(b) Explain DMA controller in detail.
- Q.7 (a) What is Cache memory? Explain different mapping techniques used in organization of Cache memory.
(b) Explain Associative Memory in detail.
- Q.8 Write short notes on any two of the following: (a) Multiprocessor System (b) SPEC Marks
(c) Virtual Memory (d) Stack Organization (e) I/O Processor



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PGDCA 2nd Semester, MS – 08 (Operating System)

(Old Question Paper)

Note: Attempt any *Five* questions. All questions carry equal marks.

- Q.1 What are the main objectives of an operating system? What type of services an operating system would provide?
- Q.2 (a) What is memory management? Write and explain virtual memory concept in detail.
(b) Write and describe various allocation algorithms in detail.
- Q.3 What is CPU scheduling? Explain all CPU scheduling algorithms in detail.
- Q.4 (a) Why do we need file system? Discuss the various methods for accessing files.
(b) What do you know about file directories? Discuss their importance. How are the files protected from unauthorized users?
- Q.5 What is disk scheduling? List and explain disk scheduling algorithms briefly.
- Q.6 (a) What is deadlock problem? Explain with the help of suitable examples the deadlock prevention and avoidance.
(b) Explain the concept of recovery from deadlock briefly.
- Q.7 What is concurrent processing? List and explain various techniques of concurrent processing in detail.
- Q.8 Write short notes on the following: (a) Page fault (b) Thrashing (c) Segmentation
(d) LINUX/UNIX operation System (e) Synchronization



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PGDCA 2nd Semester, MS – 08 (Operating System)

(Old Question Paper)

Note: Attempt any *Five* questions. All questions carry equal marks.

- Q.1 Find out hit ratio for a 2-Level memory system having 4 pages frame in main memory with the following page traces for different page replacement policies: 1, 0, 2, 2, 1, 7, 6, 7, 0, 1, 2, 0, 3
- Q.2 (a) Describe difference between short, long and medium term schedules.
(b) Explain Banker's algorithm in deadlock.
- Q.3 (a) Explain the concept of: (i) Synchronization (ii) Interprocess Communication (iii) Mutual Exclusion
(b) Write a mutual exclusion algorithm for two processes. What is its drawback?
- Q.4 (a) Discuss similarities and differences between paging and segmentation.
(b) Explain with the help of diagram h/w support for paging.
- Q.5 (a) Explain different file protection methods. (b) What is a Page Fault? Discuss steps to handle page fault.
- Q.6 (a) With the help of diagram explain state of processes. (b) Explain different CPU scheduling algorithm
- Q.7 (a) Explain different methods of disk scheduling. (b) How can deadlock be recovered? Explain.
- Q.8 Write short notes on the following: (a) Disc Scheduling in LINUX OS (b) Multitasking OS (c) MS-DOS



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PGDCA 2nd Semester, MS – 08 (Operating System)

(Old Question Paper)

Note: Attempt any *Five* questions. All questions carry equal marks.

- Q.1 Explain essential properties of the following types of OS: (a) Batch (b) Interactive (c) Parallel
(d) Distributed (e) Clustered (f) Real time (g) Network (h) Time sharing (i) Handhold
- Q.2 Explain different classic problems of synchronization and their solution along with algorithms.
- Q.3 (a) Explain different types of scheduling algorithms along with example.
(b) Explain multilevel queue and multilevel feedback queue scheduling in operating system.
- Q.4 (a) Describe first fit, best fit and worst fit memory allocation algorithms.
(b) Consider a logical address space of eight pages of 1024 words each, mapped onto a physical memory of 32 frames:
(i) How many bits are in logical address? (ii) How many bits are in physical address?
- Q.5 Explain along with example optimal, FIFO, LRU, Counting Based and page buffering page replacement algorithms.
- Q.6 (a) Why is rotational latency usually not considered in desk scheduling? How would you modify SSTF, SCAN, C-Scan to include latency optimization.
(b) Explain different disk scheduling algorithms along with example.
- Q.7 Explain in detail deadlock problem, characterization, prevention, avoidance and detection of deadlock along with algorithm.
- Q.8 Write short notes on the following: (a) LINUX OS (b) MS-DOS OS



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PGDCA 2nd Semester, MS – 09 (Business Data Processing)

(Old Question Paper)

Note: Attempt any *Five* questions. All questions carry equal marks.

- Q.1 What do you understand by data and electronic data processing? Distinguish between data unification and data validation. Explain different techniques of validation.
- Q.2 What do you understand by different file organization in COBOL? Explain the various I/O commands along with their syntax for indexed Files.
- Q.3 (a) "COBOL is a business oriented language." Justify this statement.
(b) Differentiate between Master File and Transaction File.
- Q.4 (a) Explain the use of REDEFINES clause giving a suitable example.
(b) Why do "S" and "V" not require any storage space in a data item?
(c) What is meant by an Edited Picture?
(d) Why is COMP or COMP-3 more efficient for fields in computations? Can these be used for alphanumeric fields.
- Q.5 (a) What is meant by an Overflow?
(b) When is it safe to execute a group MOVE?
(c) Explain each of the OPEN modes: INPUT, OUTPUT, I-O, EXTEND
(d) Where can numeric edited data items be used in arithmetic statements?
- Q.6 (a) Explain the use of NEXT SENTENCE in a nested IF.
(b) Explain the THRU option of PERFORM. Why should it be avoided?
(c) Distinguish between "66" and "77" level. (d) Explain Table in COBOL
- Q.7 (a) Explain the Subscript. How should it be defined? (b) What is an Index? When should indexes be used?
(c) How is a two-dimensional initialized? (d) Explain SEARCH verb with syntax
- Q.8 Explain the following: (a) SORT Verb (b) Master File (c) File Recovery (d) Structured Programming



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PGDCA 2nd Semester, MS – 09 (Business Data Processing)

(Old Question Paper)

Note: Attempt any *Five* questions. All questions carry equal marks.

- Q.1 (a) Explain the importance of Master File and Transaction File in business environment with the help of suitable example.
(b) The backup of files is most crucial and most important activity in data processing system. Discuss.
- Q.2 (a) Explain the various files organization techniques. Also discuss the advantages and disadvantages on one over the other.
(b) What is meant by on Overflow of data?
- Q.3 Explain the following with the help of the COBOL program statements: (i) RENAMES clause
(ii) REDEFINES clause (iii) COMP Clause (iv) SYNC clause (v) VALUE clause
- Q.4 (a) Is COBOL a structured language? Justify your answer.
(b) Explain the purpose of the following levels: 01, 03, 66, 77, 88
- Q.5 (a) What are the various conditional statements available in COBOL and compare them?
(b) Write short notes on the following: (i) Data Security (ii) SEARCH verb (iii) Blank when ZERO
- Q.6 (a) Explain the purpose of PERFORM verb in COBOL. Explain its various types with the help of an example:
(b) Differentiate the following: (i) Literals and Figurative constants (ii) Data editing and Data checking
(iii) INSPECT and EXAMINE
- Q.7 (a) Explain the working of SORT verb in COBOL with the help of suitable example.
(b) List and discuss any one data verification and validation technique.
- Q.8 (a) What is file Merging? Write an algorithm to merge two business files.
(b) What is an Index? When should indexes be used?



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PGDCA 2nd Semester, MS – 09 (Business Data Processing)

(Old Question Paper)

Note: Attempt any *Five* questions. All questions carry equal marks.

- Q.1 Explain the following: (a) File Organization (b) File Generation (c) File Operations
(d) Data Recover Procedures
- Q.2 (a) Differentiate the following: (i) Manual and Electronic Data Processing
(ii) Data Verification and Data Validation
(b) Explain various methods of data collection in detail.
- Q.3 Develop an algorithm to merge two business files.
- Q.4 What do you mean by Editing? Discuss all editing characters with examples.
- Q.5 What are Tables? Why are they needed in COBOL? Explain the procedure using COBOL instruction to sort a given table in descending order.
- Q.6 Explain and discuss the following: (a) VALUE Clause (b) PICTURE Clause (c) SYNC Clause
(d) COMP Clause
- Q.7 (a) What is Portability? What should you do to increase the portability of your program?
(b) What are logical errors? How can these be detected and removed?
- Q.8 Write short notes on the following: (a) REDEFINES Clause (b) RENAMES Clause (c) ON SIZE ERROR
(d) SEARCH VERB



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PGDCA 2nd Semester, MS – 09 (Business Data Processing)

(Old Question Paper)

Note: Attempt any *Five* questions. All questions carry equal marks.

- Q.1 (a) List the methods used for file recover in a typical data processing system. Discuss one of these methods which is most commonly used. (b) Differentiate between Structured Programming and Modular Programming.
- Q.2 Explain the following: (a) Data Security (b) Data Preparation (c) Data Collection
- Q.3 (a) What do you understand by the terms Data Verification and Data Validation? Explain.
(b) List and discuss any one of popular data verification and data validation technique you are aware of.
- Q.4 (a) "COBOL is a business oriented language." Justify your answer with the help of suitable examples
(b) Explain the following with the help of examples:
(i) Can a group item have a VALUE clause? (ii) What are arithmetic verbs? What is their function?
(iii) What is the purpose of ADVANCING phrase in the WRITE statement.
- Q.5 (a) How does RENAMES compare with REDEFINES? Discuss.
(b) Explain the THRU option of PERFORM. Why should it be avoided?
(c) What is the purpose of SEARCH ALL statement?
- Q.6 Explain the following in COBOL: (a) BLANK WHEN ZERO (b) OCCURS clause
(c) 77 and 88 levels (d) INSPECT Vs. Examine
- Q.7 (a) List the series of events which occurs when a SORT statement is executed in a COBOL program.
(b) Explain the following with the help of the suitable examples: (i) Elementary MOVE and Group MOVE
(ii) Primary Key and Unique Key (iii) Why, When and How is a SEARCH statement used?
- Q.8 Write short notes on the following: (a) Table Handling in COBOL (b) File Generations
(c) Editing Characters.



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PGDCA 2nd Semester, MS – 09 (Business Data Processing)

(Old Question Paper)

Note: Attempt any *Five* questions. All questions carry equal marks.

- Q.1 (a) List and explain the various data collection techniques in detail.
 (b) Differentiate between data editing and data checking.
- Q.2 (a) What is Merging Files? What are the various constraints to merge two files. Write an algorithm to merge Master file and Transaction file.
 (b) How Business Data Processing is different from Scientific Data Processing?
- Q.3 (a) Explain each of the OPEN modes: INPUT, OUTPUT, I-O, EXTEND
 (b) Explain the use of the following levels in COBOL: 01, 02, 03, 66, 77, 88
- Q.4 (a) Discuss the various types of file organization. Also discuss the use of each type of file organization with examples.
 (b) Explain the working of filling pictures CR, DB, & V, Z, I, X, A, 9 with suitable examples.
- Q.5 Write short notes on the following:
 (a) Backup and File Recover Procedures (b) Modular Programming and its advantages
 (c) IF Statement in COBOL with examples (d) Figurative Constants in COBOL.
- Q.6 (a) Explain the series of events which occurs when SORT statements is executed in COBOL program.
 (b) Explain the working of: (i) Perform Verb (ii) Comp Clause
- Q.7 (a) What are Tables? How are these useful and used in COBOL? Explain the procedure using COBOL instructions to sort a given table in ascending/descending order. (b) What is an Index? When should indexes be used?
 (c) Explain the use of NEXT SENTENCE in a nested IF.
- Q.8 (a) Differentiate between 'Structured Programming' and 'Modular Programming'.
 (b) Differentiate between Merging and Matching.



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PGDCA 2nd Semester, MS – 09 (Business Data Processing)

(Old Question Paper)

Note: Attempt any *Five* questions. All questions carry equal marks.

- Q.1 (a) What is the difference between data and information? What is data Processing? What is data processing cycle? Explain with the help of an example. Discuss.
 (b) Explain the various methods of data collection, data preparation, data verification, data edition and data checking?
- Q.2 (a) Explain the term structured programming. Why is program structured important? Are short program well structured? Describe the facilities available in COBOL language to assist the structuring of programs.
 (b) What do you understand by master file and transaction file? Explain with an example.
- Q.3 (a) Explain the working of the following COBOL verbs:
 (i) PERFORM (ii) PERFORM with Times (iii) PERFORM with VARYING
 (b) The backup of files is a crucial and most important activity in a data processing system. Discuss.
- Q.4 (a) What is meant by file-processing? Discuss the various types of file organization. Also discuss the use of each type of file organization with examples. (b) Explain Figurative constants in COBOL with examples.
- Q.5 (a) Explain the use 01, 02-49, 66, 77, 88 level entries in COBOL with suitable examples.
 (b) Write a COBOL program to search a table of 100 names.
- Q.6 (a) Explain the working of the following clauses:
 (i) Comp (ii) Comp-1 (iii) Comp-2 (iv) Comp-3 (v) Comp-4
 (b) Compare: (i) ACCEPT and READ (ii) DISPLAY and WRITE
 (c) Explain the term 'Data Security'.
- Q.7 (a) How are PIC, &, V, Z, I, X, A, 9, CR, DB used in COBOL to justify the data its output? Give suitable example.
 (b) Explain each of the OPEN modes: INPUT, OUTPUT, I-O, EXTEND
 (c) What is an Index? When should indexes be used?
- Q.8 (a) Differentiate between COBOL verb and clause.
 (b) Explain various conditional statements available in COBOL.