



TIME ALLOWED: THREE HOURS	(PART-I MCQs)	MAXIMUM MARKS: 20
PART-I (MCQs) : MAXIMUM 30 MINUTES	(PART-II)	MAXIMUM MARKS: 80
NOTE: (i) First attempt PART-I (MCQs) on separate OMR Answer Sheet which shall be taken back after 30 minutes. (ii) Overwriting/cutting of the options/answers will not be given credit. (iii) There is no negative marking. All MCQs must be attempted.		

PART-I (MCQs)(COMPULSORY)

Q.1. (i) Select the best option/answer and fill in the appropriate Box ☐ on the OMR Answer Sheet.(20x1=20)
(ii) Answers given anywhere else, other than OMR Answer Sheet, will not be considered.

- Which of the following statement is true about overloading and overriding?
(A) Overloading and overriding is same
(B) Overloading and overriding are different but inheritance is not involved in to implement any concept
(C) Overloading is performed within same class but overriding is performed among different classes
(D) None of these.
- Which of the following statement is true about private data members?
(A) Can't accessible outside class but through public methods of that class.
(B) Can be accessible outside class using objects of that class
(C) Can be accessible outside class
(D) None of these
- In histogram equalization, applying the technique to each RGB channel independently often causes:
(A) Improved color constancy
(B) Better noise suppression
(C) Color distortions due to channel imbalance
(D) None of these
- In a pipelined processor, what is the primary purpose of the instruction pipeline?
(A) To increase the clock speed of the processor
(B) To execute multiple instructions simultaneously
(C) To reduce the number of instructions in a program
(D) None of these
- When applying a 2D Fourier Transform to an image, shifting the image spatially causes which corresponding effect in the frequency domain?
(A) Phase modulation
(B) Amplitude scaling
(C) Frequency doubling
(D) None of these
- In morphological image operations, the key property that distinguishes opening from closing is that opening tends to:
(A) Fill narrow gaps
(B) Remove thin protrusions
(C) Produce higher contrast
(D) None of these
- The main purpose of using a Laplacian of Gaussian (LoG) operator in image analysis is to:
(A) Detect extremely low-frequency patterns
(B) Identify regions of uniform color
(C) Localize edges by combining smoothing and second-order derivatives
(D) None of these
- The Data Definition Language (DDL) describes
(A) How data are structured in the data base
(B) The DBMS what is required; the techniques used to process data
(C) How data must be structured to produce the user's view
(D) None of these
- Data Encryption Standard (DES) generates _____ bit round keys.
(A) 16
(B) 32
(C) 48
(D) None of these
- In symmetric key cryptography, sender and the receiver uses _____ keys.
(A) Shared
(B) Two
(C) No
(D) None of these
- In modern micro-frontend architectures, the primary benefit of independently deployed UI fragments is:
(A) Tighter coupling across teams
(B) Improved runtime bundling only
(C) Enhanced isolation and autonomous deployment pipelines
(D) None of these
- HTTP/3 improves performance over HTTP/2 mainly because it:
(A) Uses TCP with modified congestion control
(B) Replaces TLS with a custom encryption protocol
(C) Operates over QUIC to avoid head-of-line blocking
(D) None of these
- A major advantage of using Web Assembly in computationally intensive web applications is that it:
(A) Eliminates the need for JavaScript entirely
(B) Enables near-native execution speed in browsers
(C) Works only on server-side rendering engines
(D) None of these
- The _____ is one of the fundamental components of a DBMS.
(A) System catalogue
(B) Metadata
(C) Information Resource Dictionary System
(D) None of these
- Which of the following is not a function of DBMS?
(A) Recovery services
(B) Support for data communication
(C) Funneling
(D) None of these
- Which of the following is not involved in DBMS?
(A) HTML
(B) Application Request
(C) End Users
(D) None of these
- In peer-to-peer networking:
(A) There is only one server and many clients
(B) Every computer is capable of playing the role of client, server or both at the same time
(C) There is no central server
(D) None of these

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18. You got a hardware resource conflict, it will more likely be an IRQ conflict rather than an i/o conflict because:
(A) The BIOS sometimes has more of a problem controlling IRQs (B) I/O addresses cannot conflict
(C) There are a lot more I/O addresses than IRQs. (D) None of these
19. The part of OS which decides what to do when main memory full is:
(A) Process Scheduler (B) Memory Manager (C) File System (D) None of these
20. Which of these is a method of file protection?
(A) Access Control (B) Deleting a file (C) Hiding a file (D) None of these

PART – II

- NOTE:** (i) Part-II is to be attempted on the separate Answer Book.
(ii) Attempt ONLY FOUR questions from PART-II by selecting TWO questions from EACH SECTION. ALL questions carry EQUAL marks.
(iii) All the parts (if any) of each Question must be attempted at one place instead of at different places.
(iv) Candidate must write Q. No. in the Answer Book in accordance with Q. No. in the Q.Paper.
(v) No Page/Space be left blank between the answers. All the blank pages of Answer Book must be crossed.
(vi) Extra attempt of any question or any part of the attempted question will not be considered.

SECTION – A

- Q. No. 2.** Machine instructions serve as a critical interface between hardware and software. (20)
Compare the representation and execution behavior of machine instructions in CISC and RISC based architectures. Evaluate how the instruction-cycle organization shapes the design of the control unit hardwired vs. microprogrammed.
- Q. No. 3.** Explain the synergistic relationship between instruction-level parallelism (ILP), (20)
superscalar execution, and multi-core architectures in modern CPU design. Analyze how their combined use affects the design of the instruction pipeline, the mitigation of control hazards, and the resultant overall processor throughput.
- Q. No. 4.** In large-scale distributed networks, congestion control and avoidance mechanisms are (20)
essential for maintaining service quality. Provide a detailed analysis of the congestion-handling strategies employed in TCP, and contrast them with the limitations of UDP in similar conditions. Explain why transport-layer design decisions influence overall network stability.
- Q. No. 5.** Modern operating systems balance efficiency and fairness while scheduling processes. (20)
Critically evaluate how multi-level feedback queues evolve process priorities over time. Discuss how this design influences CPU utilization and starvation compared to simpler scheduling algorithms.

SECTION – B

- Q. No. 6.** Normalization aims to improve schema quality. Discuss how violations of functional and (20)
multivalued dependencies lead to structural anomalies. Evaluate whether higher normal forms (3NF, BCNF, 4NF) always benefit large-scale Online Transaction Processing (OLTP) databases systems.
- Q. No. 7.** Morphological operations offer powerful tools to manipulate shape-based features. (20)
Discuss the mathematical foundation of dilation, erosion, opening, and closing, and evaluate their use in tasks such as document analysis or medical image preprocessing.
- Q. No. 8.** Feature extraction is central to computer vision. Describe how edge detection techniques (20)
differ in their response to noise, texture, and illumination variations. Compare boundary localization accuracy among classical detectors such as Sobel, Canny, and Laplacian-based methods.