

## UGC NET 22nd June 2026 Shift 2 Computer Science Memory Based Paper

**Q1.** Consider the following statements:

Statement I: LALR parser is more powerful than canonical LR Parser.

Statement II: SLR parser is more powerful than LALR.

Which of the following is correct?

- (a) Statement I true and Statement II false
- (b) Statement I false and Statement II true
- (c) Both Statement I and Statement II false
- (d) Both Statement I and Statement II true

**Ans.(c)**

**Q2.** Which of the following parser types is not suited for left-recursive grammars?

- (a) LL(1) Parser
- (b) LR(1) Parser
- (c) Recursive Descent Parser
- (d) LALR(1) Parser

**Ans.(a)**

**Q3.** Arrange the following parsers in increasing order of their power of handling grammars i.e. from the least powerful parser to the most powerful parser.

- A. LR(0)
- B. LR(1)
- C. LALR(1)
- D. LL(0)
- E. SLR

Choose the correct answer from the options given below:

- (a) LL(0) → LR(0) → SLR → LR(1) → LALR(1)
- (b) SLR → LR(0) → LL(0) → LR(1) → LALR(1)
- (c) LL(0) → LR(0) → SLR → LALR(1) → LR(1)
- (d) LR(0) → LL(0) → SLR → LR(1) → LALR(1)

**Ans.(c)**

**Q4.** Consider the following statements regarding LR parsing techniques:

1. Every SLR(1) grammar is inherently unambiguous, but not every unambiguous grammar is SLR(1).
2. Constructing an LALR(1) parser by merging CLR(1) states can introduce new Shift-Reduce conflicts that did not exist in the CLR(1) parser.
3. A CLR(1) parsing table will always contain strictly more states than an LALR(1) parsing table for any given CFG.
4. If an LR(0) item set contains  $A \rightarrow \alpha$  and  $B \rightarrow \beta$ , it results in a Reduce-Reduce conflict in an SLR(1) parser only if  $FOLLOW(A) \cap FOLLOW(B) \neq \emptyset$

Which of the given statements are correct?

- (a) Only 1 and 2
- (b) Only 1 and 4
- (c) Only 1, 3 and 4
- (d) Only 2 and 3

**Ans.(b)**

**Q5.** Choose the correct sequence to build the table of SLR(1):

1. Build LR(0) item automaton.
  2. Compute FIRST/FOLLOW sets.
  3. In ACTION, place reductions for items A\to \alpha. under tokens in FOLLOW(A).
  4. Fill shifts/gotos from GOTO transitions.
- (a) 2 → 1 → 4 → 3  
 (b) 1 → 2 → 4 → 3  
 (c) 1 → 2 → 3 → 4  
 (d) 2 → 1 → 3 → 4

**Ans.(c)**

**Q6.** Which of the following programming languages directly evolved from FORTRAN?

- (a) ALGOL  
 (b) C  
 (c) COBOL  
 (d) C++

**Ans.(a)**

**Q7.** Following is the segment of a 8085 assembly language program:

```
LXI SP, EFFH
CALL 3000H
3000 H : LXI H, 3CF4H
PUSH PSW
SPHL
POP PSW
RET
```

On completion of RET execution, the contents of SP is:

- (a) 3CF0 H  
 (b) 3CF8 H  
 (c) EFFD H  
 (d) EFFH

**Ans.(b)**

**Q8.** Match List - I with List - II.

	List - I		List - II
A.	Handshaking	I.	I/O interface informs the CPU that device is ready transfer.
B.	Programmed I/O	II.	Requires two control signals working in opposite direction.
C.	Interrupt initiated I/O	III.	Has local memory & control large set of I/O devices.
D.	I/O processor	IV.	Required CPU to check the I/O flag & perform transfer.

Choose the correct option from those given below:

Match the columns.

- (a) A-I, B-II, C-III, D-IV  
 (b) A-II, B-IV, C-III, D-I  
 (c) A-II, B-IV, C-I, D-III  
 (d) A-IV, B-III, C-II, D-I

**Ans.(c)**

**Q9.** What will be the output of the following C programming code?

```
int i, j;  
for(i = 1; i < 5; i += 2)  
for(j = 1; j < i; j += 2)  
printf("%d ", j);
```

- (a) 1
- (b) 1 2
- (c) 1 3
- (d) 1 1 3

**Ans.(a)**

**Q10.** Which of the following are TRUE about constructors in C++?

- A. A constructor can be overloaded.
- B. A constructor does not have a return type.
- C. A constructor must be declared as a friend function.
- D. A constructor is called when an object is destroyed.

Choose the correct answer from the options given below:

- (a) B, C, D only
- (b) B, C only
- (c) A, B, C only
- (d) A, B only

**Ans.(d)**

**Q11.** Which of the following C++ operators CANNOT be overloaded by a programmer?

- (a) Addition + and Subscript []
- (b) Function Call () and Arrow ->
- (c) Scope Resolution :: and Member Access .
- (d) Assignment = and Bitwise Left Shift <<

**Ans.(c)**

**Q12.** Consider the following statements with respect to duality in LPP:

- A. The final simplex table giving optimal solution of the primal also contains optimal solution of its dual in itself.
- B. If either the primal or the dual problem has a finite optimal solution, then the other problem also has a finite optimal solution.
- C. If either problem has an unbounded optimum solution, then the other problem has no feasible solution at all.

Which of the statements is (are) correct?

- (a) only (A) and (B)
- (b) only (A) and (C)
- (c) only (B) and (C)
- (d) (A), (B) and (C)

**Ans.(d)**

**Q13.** Consider the following statements about page replacement policies:

P: Optimal page replacement is theoretical because it requires future knowledge.

Q: LRU approximates Optimal by replacing the page least recently used.

R: FIFO may suffer from Belady's Anomaly.

Which statements are correct?

- (a) Only P and Q
- (b) Only Q and R
- (c) Only P and R
- (d) P, Q, and R

**Ans.(d)**

**Q14.** Which of the following mathematical notations is used as a quantifier to express that at least one tuple in the relation satisfies a specific condition?

- (a)  $\forall$
- (b)  $\exists$
- (c)  $\sigma$
- (d)  $\pi$

**Ans.(b)**

**Q15.** If memory access takes 20 ns with cache and 110 ns without cache, and the cache uses a 10 ns memory, then what is the cache hit ratio?

- (a) 93%
- (b) 90%
- (c) 88%
- (d) None of the above

**Ans.(b)**

**Q16.** Match List I with List II:

List I: Processor Type	List II: Functional Characteristic
A. Compiler	I. Translates assembly language into machine code
B. Interpreter	II. Translates the entire source code into object code at once
C. Assembler	III. Translates source code line-by-line during execution
D. Linker	IV. Combines multiple object files into a single executable

Choose the correct answer from the options given below:

- (a) A-II, B-III, C-IV, D-I
- (b) A-I, B-II, C-IV, D-III
- (c) A-III, B-IV, C-II, D-I
- (d) A-II, B-III, C-I, D-IV

**Ans.(d)**

**Q17.** Match List - I with List - II:

	<b>List - I</b>		<b>List - II</b>
A.	Data Link Layer	I.	True end-to-end layer
B.	Network Layer	II.	Token Management
C.	Transport Layer	III.	Produce billing information
D.	Session Layer	IV.	Piggybacking

Choose the correct answer from the options given below:

Match the columns.

- (a) A - IV, B - III, C - I, D - II
- (b) A - IV, B - II, C - I, D - III
- (c) A - II, B - III, C - I, D - IV
- (d) A - IV, B - I, C - III, D - II

**Ans.(a)**

**Q18.** Match List - I with List - II.

	<b>List - I</b>		<b>List - II</b>
A.	Physical layer	I.	Routing of the signals divide the outgoing message into packets, to act as network controller for routing data.
B.	Data link layer	II.	Make and break connections, define voltages and data rates, convert data bits into electrical signal.
C.	Network layer	III.	Synchronization, error detection and correction. To assemble outgoing message into frames.
D.	Presentation layer	IV.	It works as a translating layer.

Choose the correct answer from the options given below:

Match the columns.

- (a) A-IV, B-III, C-II, D-I
- (b) A-II, B-III, C-IV, D-I
- (c) A-IV, B-III, C-I, D-II
- (d) A-II, B-III, C-I, D-IV

**Ans.(d)**

**Q19.** Match List-I with List-II:

	<b>List - I</b>		<b>List - II</b>
A.	TCP	I.	Connectionless transport
B.	UDP	II.	Three-way handshake
C.	SCTP	III.	Multistreaming support
D.	Sliding Window	IV.	Flow control mechanism

Choose the correct answer:

- (a) A-I, B-II, C-IV, D-III
- (b) A-IV, B-II, C-I, D-III
- (c) A-II, B-III, C-IV, D-I
- (d) A-II, B-I, C-III, D-IV

**Ans.(d)**

**Q20.** Arrange the following protocol data units (PDUs) in the correct descending order as they are encapsulated traversing down the OSI model from the Application Layer to the Physical Layer:

- A. Packet
- B. Frame
- C. Data (Message)
- D. Bit
- E. Segment
- (a) C → A → E → B → D
- (b) C → E → A → B → D
- (c) E → C → A → B → D
- (d) C → E → B → A → D

**Ans.(b)**

**Q21.** Arrange the correct order of operations when sending a data frame with CRC at the sender:

- 1. Append r zero bits to data.
- 2. Divide by generator polynomial.
- 3. Replace the appended zeros with remainder (FCS).
- 4. Transmit resulting codeword.
- (a) 1 → 2 → 3 → 4
- (b) 2 → 1 → 3 → 4
- (c) 1 → 3 → 2 → 4
- (d) 2 → 3 → 1 → 4

**Ans.(a)**

**Q22.** Which of the following statements is/are true about transmission errors in data communication?

- (i) Noise and interference in the communication channel can cause transmission errors.
- (ii) Parity checking can only detect an odd number of bit errors.
- (iii) Cyclic Redundancy Check (CRC) is more robust than parity check for detecting errors.
- (iv) In a perfect communication channel with no interference, transmission errors can still occur due to faulty hardware.
- (a) Only (i) and (iii)
- (b) Only (ii) and (iv)
- (c) Only (i), (iii) and (iv)
- (d) Only (ii), (iii) and (iv)

**Ans.(c)**

**Q23.** Match the fundamental data structure listed in List-I with its primary application or structural characteristic defined in List-II:

	List - I		List - II
A.	Stack	I.	Recursion
B.	Queue	II.	Buffering
C.	Graph	III.	Cycle
D.	Tree	IV.	Hierarchical

- (a) A-I, B-II, C-IV, D-III
- (b) A-I, B-II, C-III, D-IV

- (c) A-III, B-II, C-I, D-IV  
 (d) A-II, B-I, C-III, D-IV

**Ans.(b)**

**Q24.** Match the LIST - I with LIST - II.

	List - I (Algorithm)		List - II (Complexity)
A.	Insertion Sort	I.	$O(\log n)$
B.	Binary Search	II.	$O(n^2)$
C.	Quick Sort	III.	$O(n - 1)$
D.	Selection Sort	IV.	$O(n \log n)$

Choose the correct answer from the options given below:

Match the columns.

- (a) A-III, B-I, C-IV, D-II  
 (b) A-II, B-III, C-I, D-IV  
 (c) A-I, B-II, C-IV, D-III  
 (d) A-II, B-III, C-IV, D-I

**Ans.(a)**

**Q25.** A Boolean function of 4 variables is given as  $F(A, B, C, D) = \sum m(1,3,7,11,15)$ . Using K-map simplification, which is the minimal SOP expression?

- (a)  $AD + BC$   
 (b)  $BC + AD$   
 (c)  $BD + ABC$   
 (d)  $CD + A'B'D$

**Ans.(d)**

**Q26.** Which of the following are properties of a subgroup H of a group G?

- I. H contains the identity element of G.  
 II. The inverse of any element in H is also in H.  
 III. The product of any two elements in H is in H.  
 IV. H is a cyclic group.

Select all that apply.

- (a) I, II and III  
 (b) I and IV  
 (c) II and IV  
 (d) All of the above

**Ans.(a)**

**Q27.** Given the following scenario for a single-layer perceptron with a threshold activation function:

- Inputs:  
 $x_1 = 0.5, x_2 = 0.2$
- Weights:  
 $w_1 = 0.4, w_2 = 0.7$
- Bias:  $b = -0.3$

The perceptron uses a threshold activation function  $f(x) = 1$  if  $x \geq 0$  and  $f(x) = 0$  otherwise. What is the output of the perceptron?

- (a) 0.04
- (b) 1
- (c) 0.9
- (d) 1.2

**Ans.(a)**

**Q28.** Every subgroup of an Abelian group is not -

- (a) cyclic
- (b) Abelian
- (c) normal
- (d) None of the above

**Ans.(a)**

**Q29.** An abelian group of order 24 has:

- (a) exactly one subgroup of order 3
- (b) exactly two subgroups of order 3
- (c) no subgroup of order 3
- (d) more than two subgroups of order 3

**Ans.(d)**

**Q30.** The hamming distance between 10101 and 11110 is:

- (a) 2
- (b) 3
- (c) 4
- (d) 5

**Ans.(b)**

**Q31.** In a medical expert system using Bayesian reasoning, a disease  $D$  has prior probability  $P(D) = 0.1$ . A lab test  $T$  returns positive, and the system uses:

- $P(T | D) = 0.9$
- $P(T | \neg D) = 0.2$

Using Bayes' theorem, what is the posterior probability  $P(D | T)$  (rounded to two decimal places)?

- (a) 0.33
- (b) 0.36
- (c) 0.45
- (d) 0.69

**Ans.(a)**

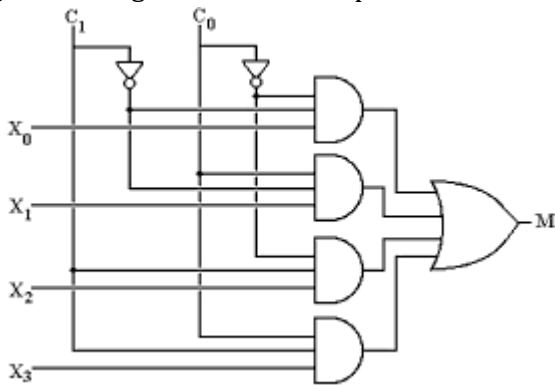
**Q32.** Arrange the disk scheduling algorithms in the correct order of their efficiency for accessing a specific disk request in a large disk queue:

1. SSTF
2. FCFS
3. SCAN
4. LOOK

- (a) 1 → 2 → 3 → 4
- (b) 2 → 1 → 4 → 3
- (c) 1 → 4 → 3 → 2
- (d) 4 → 3 → 1 → 2

**Ans.(c)**

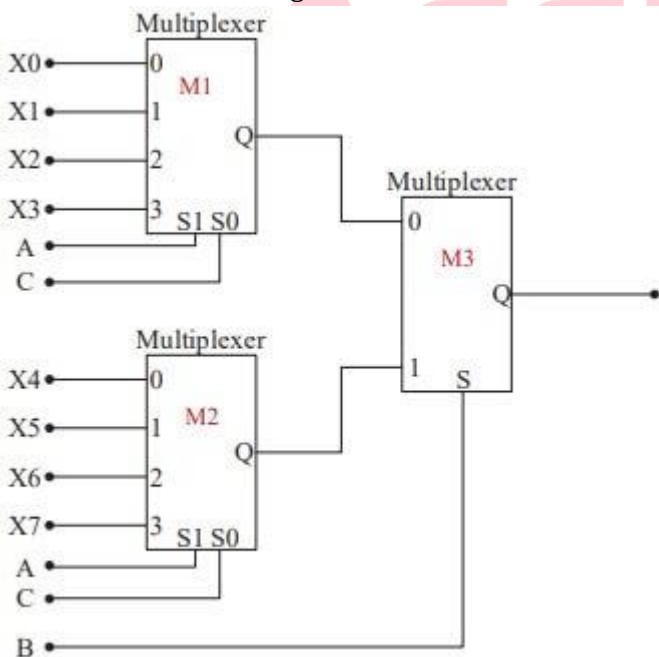
**Q33.** In the given 4-to-1 multiplexer, if  $c_1 = 0$  and  $c_0 = 1$  then the output M is \_\_\_\_\_



- (a) X0
- (b) X1
- (c) X2
- (d) X3

**Ans.(b)**

**Q34.** A Boolean digital circuit is composed using two 4-input multiplexers (M1 and M2) and one 2-input multiplexer (M3) as shown in the figure. X0-X7 are the inputs of the multiplexers M1 and M2 and could be connected to either 0 or 1. The select lines of the multiplexers are connected to Boolean variables A, B and C as shown below in the diagram.



Which one of the following set of values of (X0, X1, X2, X3, X4, X5, X6, X7) will realise the Boolean function  $A^- + A^- \cdot C^- + A \cdot B^- \cdot CA^- + A^- \cdot C^- + A \cdot B^- \cdot C$ ?

- (a) (1, 1, 0, 0, 1, 1, 1, 0)
- (b) (1, 1, 0, 0, 1, 1, 0, 1)
- (c) (1, 1, 0, 1, 1, 1, 0, 0)
- (d) (0, 0, 1, 1, 0, 1, 1, 1)

**Ans.(a)**

**Q35.** Which of the following is NOT a phase in the Software Development Life Cycle (SDLC)?

- (a) Requirement Analysis
- (b) System Design
- (c) Coding
- (d) Marketing

**Ans.(d)**

**Q36.** Arrange the following types of testing in the order they are usually performed in the software development life cycle:

- A. Integration testing
- B. Unit testing
- C. System Testing
- D. Acceptance Testing

Choose the correct answer from the options given below:

- (a) B, C, A, D
- (b) B, A, C, D
- (c) C, B, A, D
- (d) C, B, D, A

**Ans.(b)**

**Q37.** Which of the following tuple relational calculus (TRC) expressions correctly retrieves all tuples t from relation R such that the value of attribute A in t is greater than 10?

- (a)  $\{t \mid R(t) \wedge t.A > 10\}$
- (b)  $\{t \mid t \in R \wedge A > 10\}$
- (c)  $\{t \mid A(t) > 10\}$
- (d)  $\{t \mid \forall A > 10\}$

**Ans.(a)**

**Q38.** Consider R (A, B, C, D, E) be relation with following dependencies:

- $C \rightarrow F$ ,
- $E \rightarrow A$ ,
- $EC \rightarrow D$ ,
- $A \rightarrow B$

Which of the following is a key for R?

- (a) CD
- (b) EC
- (c) AE
- (d) AC

**Ans.(b)**

**Q39.** Match the following:

	List - I (Concept)		List - II (Characteristics)
A.	Conflict Serializability	I.	Based on precedence graph with no cycles.
B.	View Serializability	II.	Same final state as some serial schedule.
C.	Recoverable Schedule	III.	A transaction commits only after others it depends on commit.
D.	Cascadeless Schedule	IV.	Prevents aborts from propagating.

A. A-II, B-I, C-III, D-IV

(b) A-I, B-II, C-III, D-IV

(c) A-II, B-IV, C-I, D-III

(d) A-IV, B-III, C-II, D-I

**Ans.(b)**

**Q40.** Using 'RSA' algorithm, if  $p = 13$ ,  $q = 5$  and  $e = 7$ , the value of  $d$  and cipher value of '6' with  $(e, n)$  keys are:

(a) 7, 4

(b) 7, 1

(c) 7, 46

(d) 55, 1

**Ans.(c)**

**Q41.** A system utilizes Amdahl's Law to evaluate the benefit of adding more CPU cores. If a specific application is 60% parallelizable and 40% inherently serial, what is the maximum theoretical speedup that can be achieved if the number of processing cores is increased to 4?

(a) 1.55

(b) 1.82

(c) 2.50

(d) 1.40

**Ans.(b)**

**Q42.** Let  $R$  be a reflexive and transitive relation defined on a set  $D$ . A new relation  $E$  is defined on set  $D$  such that:

$$E = \{(a, b) \mid (a, b) \in R \text{ and } (b, a) \in R\}$$

The relation  $E$  is:

(a) a partial order

(b) a total order

(c) an equivalence relation

(d) none of the above

**Ans.(c)**

**Q43.** Match List - I with List - II.

	<b>List - I (Software Process Model)</b>		<b>List - II (Description)</b>
A.	Waterfall Model	I.	Software can be developed incrementally
B.	Evolutionary Model	II.	Requirement compromises are inevitable
C.	Component-based Software Engineering	III.	Explicit recognition of risk
D.	Spiral Development	IV.	Inflexible partitioning of the project into stages

Choose the correct answer from the options given below:

Match the columns.

- (a) A – IV, B – I, C – III, D – II  
 (b) A – I, B – IV, C – II, D – III  
 (c) A – II, B – III, C – I, D – IV  
 (d) A – IV, B – I, C – II, D – III

**Ans.(d)**

**Q44.** Match the following:

	List - I (Software Process Models)		List - II (Characteristics)
A.	Waterfall Model	I.	A model where each phase must be completed before the next starts.
B.	Spiral Model	II.	Focuses on iterative risk analysis and refinements during development.
C.	V-Model	III.	Emphasizes testing at each stage in parallel with the development phase.
D.	Agile Model	IV.	Encourages flexibility and iterative progress with customer feedback.

A. A → I, B → II, C → III, D → IV

(b) A → II, B → I, C → III, D → IV

(c) A → III, B → II, C → I, D → IV

(d) A → IV, B → III, C → I, D → II

**Ans.(a)**

**Q45.** If we want to resize a 1024 × 768 pixels image to one that is 640 pixels wide with the same aspect ratio, what would be the height of the resized image?

- (a) 420 Pixels  
 (b) 460 Pixels  
 (c) 480 Pixels  
 (d) 540 Pixels

**Ans.(c)**

**Directions (46-50):** Read the given passage and answer the following questions.

Software Engineering is a systematic approach to the development, maintenance and testing of software applications. This field emphasizes principles of engineering to create reliable and efficient software that meets user needs within specified timelines. The software development life cycle (SDLC) is a fundamental concept in software engineering, encompassing stages such as requirements gathering, system design, coding, testing, deployment, and maintenance. Various models, like the Waterfall, Agile, and Spiral models, offer different frameworks for managing these stages. Agile, for example, focuses on iterative development and continuous

feedback, enabling teams to adapt to changing requirements quickly. Quality assurance through testing is critical in software engineering, ensuring that software functions as expected and remains secure. Furthermore, software engineering practices emphasize the importance of documentation, version control, and project management to facilitate smooth development and maintenance processes. This discipline is integral in today's technology-driven world, supporting innovation and ensuring that software systems are reliable and effective.

**Q46.** What is the purpose of Software Engineering?

- (a) To develop hardware
- (b) To create reliable software systematically
- (c) To manage databases
- (d) To build network systems

**Ans.(b)**

**Q47.** Which model in Software Engineering focuses on iterative development and adaptability?

- (a) Waterfall
- (b) Agile
- (c) Spiral
- (d) Prototype

**Ans.(b)**

**Q48.** What does SDLC stand for?

- (a) Software Design Language Code
- (b) Secure Development Lifecycle Control
- (c) System Design Lifecycle Concept
- (d) Software Development Life Cycle

**Ans.(d)**

**Q49.** Why is testing an essential part of Software Engineering?

- (a) It accelerates coding speed.
- (b) It helps verify software functionality and security.
- (c) It reduces documentation needs.
- (d) It avoids the use of version control.

**Ans.(b)**

**Q50.** What practice is crucial for managing software versions and facilitating team collaboration?

- (a) Testing
- (b) Documentation
- (c) Version control
- (d) Debugging

**Ans.(c)**