--Question Starting--

67. Consider the following two statements related to parsing techniques:

Statement I: LL(1) parsers cannot handle left-recursive grammars and rely on predictive parsing using a single lookahead symbol.

Statement II: LR parsers perform better than LL parsers in terms of grammar acceptance because they can handle a wider class of context-free grammars including left-recursive ones.

In light of the above statements, choose the correct answer from the options given below:

(1) Both Statement I and Statement II are correct

(2) Both Statement I and Statement II are incorrect

(3) Statement I is correct but Statement II is incorrect

(4) Statement I is incorrect but Statement II is correct

Answer Key: 1

Solution:

• I(Correct): LL(1) parsers use top-down parsing with one-symbol lookahead. They fail on left-recursive grammars because recursive calls lead to infinite loops (e.g., A → Aα | β). Hence, left recursion must be eliminated for LL(1) grammars.

• II(Correct): LR parsers (including SLR, LALR, and canonical LR) use bottom-up parsing. They can handle left recursion, left factoring, and more complex grammar constructs. Thus, they accept a strictly larger set of context-free grammars than LL parsers.

Hence, Option (1) is the right answer.

--Question Starting--

46. Consider the following statements:

Statement I: A queue can be efficiently implemented using two stacks, but the time complexity of the enqueue and dequeue operations may vary based on the chosen strategy.

Statement II: A circular queue overcomes the limitation of a linear queue by reusing vacant spaces created after dequeue operations, thereby optimizing memory usage.

(1) Both Statement I and Statement II are correct

(2) Both Statement I and Statement II are incorrect

(3) Statement I is correct but Statement II is incorrect

(4) Statement I is incorrect but Statement II is correct

Answer Key: 1

Solution:

• I(Correct): A queue can be implemented using two stacks:

One strategy pushes all elements during enqueue, and performs stack reversal during dequeue (or vice versa).

The time complexity for either operation can be amortized O(1) in certain strategies, but not always.

• II(Correct): A circular queue allows reusing the empty spaces in the array once front moves forward, unlike a linear queue that wastes space after repeated dequeue operations. This optimizes memory and is widely used in buffer implementations.

Hence, Option (1) is the right answer.

--Question Starting--

88. Consider the following two statements related to Cloud Computing:

Statement I: In cloud computing, virtualization allows multiple operating systems to run concurrently on a single physical server, which enhances the hardware utilization and provides isolation between different systems.

Statement II: SaaS (Software as a Service) strictly offers software tools for developers to build applications, similar to PaaS (Platform as a Service), limiting users to application development environments only.

(1) Both Statement I and Statement II are correct

(2) Both Statement I and Statement II are incorrect

(3) Statement I is correct but Statement II is incorrect

(4) Statement I is incorrect but Statement II is correct

Answer Key: 3

Solution:

• I(Correct): Virtualization is a technology used in cloud computing that enables multiple virtual machines to operate on a single physical server. It maximizes resource utilization and provides isolation, which is crucial for security and efficient management.

• II(Incorrect): SaaS provides users with access to applications hosted on cloud infrastructure, not tools for building applications. It differs from PaaS, which indeed provides development tools and environments. SaaS applications are typically end-user applications and do not restrict users to development environments.

Hence, Option (3) is the right answer.

--Question Starting--

89. Consider the following statements:

Statement I: In a multiplexed system, bandwidth is shared among multiple data channels by interleaving the signals in time, frequency, or code within the same transmission medium.

Statement II: Baseband transmission is a method of sending multiple signals over a single channel by shifting each signal to a different frequency.

(1) Both Statement I and Statement II are correct

(2) Both Statement I and Statement II are incorrect

(3) Statement I is correct but Statement II is incorrect

(4) Statement I is incorrect but Statement II is correct

Answer Key: 3

Solution:

• I(Correct): Multiplexing is a technique used in data communication where multiple analog or digital signals are combined into one signal over a shared medium. The methods include time division (TDM), frequency division (FDM), and code division (CDM) multiplexing.

• II(Incorrect): Baseband transmission refers to sending a single digital signal over the transmission medium without altering the frequency of the signal. This is in contrast to broadband transmission, where multiple signals are sent over the same medium by shifting them to different frequencies.

Hence, Option (3) is the right answer.

--Question Starting--

90. Consider these two statements regarding CPU scheduling:

Statement I: Round-robin scheduling is a preemptive algorithm that utilizes time slicing to ensure that all processes receive an equal share of CPU time.

Statement II: Non-preemptive scheduling algorithms, such as Shortest Job First (SJF), can lead to shorter average waiting times compared to preemptive versions due to reduced context switching.

(1) Both Statement I and Statement II are correct

(2) Both Statement I and Statement II are incorrect

(3) Statement I is correct but Statement II is incorrect

(4) Statement I is incorrect but Statement II is correct

Answer Key: 1

Solution:

• I(Correct): Round-robin is a preemptive CPU scheduling algorithm that uses fixed time slices or "quantum" to allocate CPU time to processes in a circular order, ensuring a balanced use of CPU.

• II(Correct): Non-preemptive scheduling algorithms like SJF can indeed result in reduced average waiting times, primarily because once a process starts executing, it runs to completion without interruption, minimizing the overhead caused by context switching.

Hence, Option (1) is the right answer.

--Question Starting--

91. Consider the following statements regarding error handling in data communication:

Statement I: Parity bits are added to data to allow the detection of single bit errors, enhancing the reliability of transmitted data.

Statement II: Automatic Repeat reQuest (ARQ) is an error-control method for data transmission that ensures error-free communication by using acknowledgments and timeouts.

(1) Both Statement I and Statement II are correct

(2) Both Statement I and Statement II are incorrect

(3) Statement I is correct but Statement II is incorrect

(4) Statement I is incorrect but Statement II is correct

Answer Key: 1

Solution:

• I(Correct): Parity bits are utilized in data communication to detect errors in transmitted data. Adding a parity bit helps in identifying single-bit errors, which is a simple form of error detection.

• II(Correct): ARQ is a protocol for error control in data transmission that uses acknowledgments (ACK) and retransmissions (in case of timeouts or negative acknowledgments) to ensure that data is transmitted without errors.

Hence, Option (1) is the right answer.

--Question Starting--

92. Analyze the following statements related to Instruction Scheduling in code optimization:

Statement I: Instruction scheduling is a technique used in compilers to improve execution speed by rearranging the order of instructions to reduce stalls caused by data hazards.

Statement II: Local optimization techniques in compilers focus on optimizing smaller sections of code, often limited to single basic blocks, and do not take into account the effects of instruction scheduling across multiple blocks.

(1) Both Statement I and Statement II are correct

(2) Both Statement I and Statement II are incorrect

(3) Statement I is correct but Statement II is incorrect

(4) Statement I is incorrect but Statement II is correct

Answer Key: 1

Solution:

• I(Correct): Instruction scheduling is an optimization technique used by compilers to reorder instructions to minimize waiting times for CPU resources and reduce pipeline stalls, thereby enhancing the program's execution speed.

• II(Correct): Local optimization focuses on optimizing code within a single block and does not consider interdependencies between blocks, which is different from more complex global optimization strategies that might involve reordering instructions across multiple blocks.

Hence, Option (1) is the right answer.