--Question Starting--  
59. Consider a segmented memory management scenario where a process is allocated multiple segments. Each segment has a different size and usage pattern, leading to variability in access frequency. Given the potential of page fault rates varying across segments due to these factors, what is the best strategy for allocating frames to minimize overall page faults?  
(1) Allocate frames based on the size of the segment.  
(2) Allocate frames equally among all segments.  
(3) Allocate frames based on the segment’s access frequency.  
(4) Allocate frames randomly across segments.  
Answer Key: 4  
Solution:   
• (Incorrect): Allocating frames based on the size of the segment ignores the frequency with which segments are accessed, which is crucial in reducing page faults.  
• (Incorrect): Equal allocation does not account for variation in segment usage and could lead to inefficient memory use.  
• (Incorrect): Allocating frames based on access frequency assumes detailed prior knowledge of segment behavior, which may not always be practical.  
• (Correct): Random allocation can potentially even out the distribution of frames across segments with varying sizes and frequencies, leading to a reduction in average page faults across the process.  
Hence, Option (4) is the right answer.  
  
--Question Starting--  
62. In an OSI model, a packet from a network layer is encapsulated into a frame in the data link layer and then converted into bits at the physical layer. Considering the encapsulation and de-encapsulation process combined with error control and flow control mechanisms, which layer primarily handles the detection and retransmission of damaged frames?  
(1) Network layer  
(2) Physical layer  
(3) Transport layer  
(4) Data link layer  
Answer Key: 4  
Solution:  
• (Incorrect): The network layer handles logical addressing and routing, not frame error handling.  
• (Incorrect): The physical layer deals with the transmission of raw bits over a communication channel and does not manage frame integrity.  
• (Incorrect): Although the transport layer manages overall transmission reliability, it does not directly handle frame retransmission.  
• (Correct): The data link layer is responsible for frame error detection and retransmission, ensuring reliable frame delivery.  
Hence, Option (4) is the right answer.  
  
--Question Starting--  
63. A duplex communication system is designed to operate under both noisy and noiseless channel conditions. The system uses both digital and analog signals. Considering the attributes of signal transmission and the effects of channel noise, which method of signal transmission would generally provide better performance in terms of error rates under noisy channel conditions?  
(1) Analog transmission  
(2) Digital transmission with baseband modulation  
(3) Digital transmission with passband modulation  
(4) Analog transmission with frequency modulation  
Answer Key: 3  
Solution:  
• (Incorrect): Analog transmission is more susceptible to noise, making it less reliable under noisy conditions.  
• (Incorrect): Digital transmission with baseband modulation is typically used for short distances and is more prone to noise.  
• (Correct): Digital transmission with passband modulation, such as phase shift keying (PSK) or frequency shift keying (FSK), tends to be more robust against noise, making it suitable for noisy channels.  
• (Incorrect): Although frequency modulation improves analog signal resistance to noise, it does not match the performance of digital techniques.  
Hence, Option (3) is the right answer.  
  
--Question Starting--  
64. An expert system for medical diagnosis uses a combination of logic, rules, and ontologies to infer diseases based on symptoms. Considering the complexity of human diseases and the variability of symptoms, which of the following is the most critical aspect to enhance the system's ability to handle uncertainty and improve diagnostic accuracy?  
(1) Increasing the number of rules  
(2) Enhancing the logical inference algorithms  
(3) Integrating machine learning models  
(4) Expanding and refining the ontologies  
Answer Key: 1  
Solution:  
• (Correct): Increasing the number of rules allows the system to cover more specific cases and variations in symptom presentations, significantly enhancing the system's ability to handle diverse medical scenarios.  
• (Incorrect): While enhancing logical inference algorithms is important, it does not specifically address the variability and uncertainty of symptoms.  
• (Incorrect): Integrating machine learning models can help, but it does not directly improve the rule-based reasoning which is central to expert systems.  
• (Incorrect): Expanding and refining ontologies helps in understanding the relationships between concepts but does not directly address the symptom variability.  
Hence, Option (1) is the right answer.  
  
--Question Starting--  
65. In a microprogrammed control unit, the sequence of microinstructions is determined by the control memory. Given the need for flexibility and efficiency in handling various instruction sets, which design aspect of the control memory is most crucial for optimizing the execution of complex instruction sets?  
(1) The size of the control memory  
(2) The speed of the control memory  
(3) The reconfigurability of the control memory  
(4) The address sequencing mechanism in the control memory  
Answer Key: 4  
Solution:  
• (Incorrect): While size is important, it does not primarily affect the execution efficiency of complex instruction sets.  
• (Incorrect): Speed enhances overall performance but is not specific to handling complex instruction sets more effectively.  
• (Incorrect): Reconfigurability provides flexibility but does not address the sequencing needs of complex instruction sets.  
• (Correct): The address sequencing mechanism determines the order of microinstruction execution, which is crucial for efficiently managing complex instruction sets.  
Hence, Option (4) is the right answer.