A. Fundamental questions:

1. Define computer vision and outline its primary goals. How does computer vision relate to other fields such as image processing and machine learning?
2. What is image processing, and why is it a crucial step in computer vision tasks? Provide two examples of basic image processing operations and their purposes.
3. Explain the difference between RGB and grayscale color representations in images. When might you choose one representation over the other in a computer vision application?
4. Define image features and provide an example of a common feature used in computer vision. How are these features helpful in tasks such as object recognition?
5. Explain the difference between image classification and object detection.

B. Intermediate questions:

6. Define local features in the context of computer vision. How are local features different from global features, and why are they important for tasks like object matching?
7. Explain the concept of object matching in computer vision. How do local features contribute to the process of matching objects in images?
8. Describe two common methods for extracting local features from an image. How do these methods capture distinctive information about key points in the image?
9. Discuss two techniques used for matching local features between images. Provide a brief comparison of their strengths and weaknesses.
10. Identify and explain three key components involved in image object recognition. Provide a brief description of the role each component plays in the overall recognition process.
11. Describe two common methods for feature extraction in image object recognition. How do these methods help in capturing important information about objects in an image?
12. Briefly explain how deep learning techniques, particularly convolutional neural networks (CNNs), are employed in image object recognition. What advantages do CNNs offer for this task?
13. Discuss at least two evaluation metrics commonly used to assess the performance of image object recognition algorithms. How do precision, recall, and accuracy contribute to the evaluation process?
14. Define image object detection in computer vision. How does object detection differ from object recognition, and what are the main challenges in detecting objects in images?
15. Briefly explain two common techniques used in image object detection. Provide an example scenario where each technique might be particularly useful.
16. Describe the concept of bounding boxes in the context of object detection. How are bounding boxes utilized for object localization, and why is this information important?
17. Explain how deep learning, specifically convolutional neural networks (CNNs), has revolutionized object detection. What advantages do CNNs offer over traditional methods for object detection?

18. Identify and explain two commonly used evaluation metrics for assessing the performance of object detection algorithms. How do metrics like precision, recall, and mean average precision contribute to the evaluation process?

19. Explain the importance of semantic segmentation in computer vision applications. Provide an example scenario where semantic segmentation is crucial for understanding the content of an image.

20. Describe how instance segmentation distinguishes between multiple objects of the same class in an image. What information does instance segmentation provide beyond semantic segmentation?

21. Describe two common methods used in object tracking. Provide a brief explanation of the strengths and limitations of each method.