

# Electron Microscopist Interview Questions And Answers Guide.



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## Electron Microscopist Job Interview Preparation Guide.

### Question # 1

The substage condenser:

- A) changes the wavelength of the light reaching the specimen
- B) focuses light on the specimen
- C) decreases the amount of light reaching the specimen

**Answer:-**

B) focuses light on the specimen

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### Question # 2

A 40X objective and an 10X ocular produce a total magnification of:

- A) 50
- B) 400
- C) 90

**Answer:-**

B) 400

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### Question # 3

Living, unstained cells and organisms can be observed best using:

- A) fluorescent microscopy
- B) TEM
- C) phase contrast microscopy

**Answer:-**

C) phase contrast microscopy

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### Question # 4

Scanning electron microscopy (SEM) is best used to study

- A) small internal cell structures.
- B) surface morphology.
- C) all of the above

**Answer:-**

B) surface morphology.

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### Question # 5

A microscope in which an image is formed by passing an electron beam through a specimen and focusing the scattered electrons with magnetic lenses is called a:

- A) transmission electron microscope
- B) scanning electron microscope
- C) phase-contrast microscope

**Answer:-**

A) transmission electron microscope

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### Question # 6

Resolution is the ability of a lens to distinguish between small objects close together. What approximate resolution can be obtained with a lower power (10X, N.A. 0.25) objective lens?



- A) 0.2 microns
- B) 0.3 microns
- C) 0.9 microns
- D) 0.25

**Answer:-**

- C) 0.9 microns

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### Question # 7

Fixation is the process by which the structures of the cells are preserved and fixed in position. An advantage of chemical fixation over heat fixation is that it:

- A) magnifies the specimen
- B) does not destroy internal structures

**Answer:-**

- B) does not destroy internal structures

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### Question # 8

Monochromatic (one color) light is sometimes used to increase the resolution of light microscopes. Light of which color below would give you the best resolution?

- A) Red
- B) Orange
- C) Green
- D) Blue

**Answer:-**

- D) Blue

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### Question # 9

Which of the following objectives would give you the best resolution of small objects?

- A) 10x air, N.A. 0.25
- B) 40x air, N.A. 0.65
- C) 64x oil, N.A. 1.4
- D) 100x oil, N.A. 1.25

**Answer:-**

- C) 64x oil, N.A. 1.4

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### Question # 10

Transmission electron microscopy is best for high magnification viewing of:

- A) internal structure of fixed cells.
- B) internal structure of live, motile cells.
- C) surface structure of fixed cells.
- D) surface membranes of live, motile cells

**Answer:-**

- A) internal structure of fixed cells.

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### Question # 11

Which of the following statements is most correct about the differential Gram stain?

- A) Crystal violet differentially stains Gram positive cells.
- B) Gram's iodine differentially stains Gram positive cells.
- C) Acetone differentially destains Gram negative cells.
- D) Saffron red differentially stains Gram negative cells

**Answer:-**

- C) Acetone differentially destains Gram negative cells.

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### Question # 12

Which of the following statements is most correct about Atomic Force Microscopy (AFM)?

- A) AFM can visualize protein bound to DNA molecules.
- B) AFM can visualize unfixed specimens in water or buffer.
- C) AFM moves a very sharp tip over the surface of the specimen to "feel" its shape.
- D) All the statements above are true

**Answer:-**

- D) All the statements above are true

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### Question # 13



Which of the following statements about Transmission Electron Microscopy is not true.

- A) The specimen must be stained with osmium or other heavy metal.
- B) The specimens are placed in a high vacuum for viewing.
- C) The specimens must be sliced very thin, 20-100 nm in thickness.
- D) The beam is focused by electromagnetic lenses

**Answer:-**

- A) The specimen must be stained with osmium or other heavy metal.

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### **Question # 14**

Phase Contrast microscopy:

- A) Continuously changes the phase of the incident light from the condenser to improve contrast in the specimen.
- B) Uses circular filters in the condenser and objective to give contrast to parts of the cell with different refractive indices.
- C) Uses special lenses to distinguish between solid and liquid phases of the cell.
- D) Uses special lenses to change the color of light passing through them

**Answer:-**

- B) Uses circular filters in the condenser and objective to give contrast to parts of the cell with different refractive indices.

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### **Question # 15**

Which of the following is NOT equivalent to 10 micrometers.

- A) 0.0001 cm
- B) 0.01 mm
- C) 10,000 nm
- D) 100,000 Angstroms

**Answer:-**

- A) 0.0001 cm

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### **Question # 16**

"Parfocal" refers to microscopes with multiple objectives where:

- A) objectives are used in pairs for stereoscopic effects.
- B) each objective has the same working distance above the specimen.
- C) each objective is positioned to be in focus at the same stage height.
- D) sequential objectives increase power by a factor of two.

**Answer:-**

- C) each objective is positioned to be in focus at the same stage height.

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### **Question # 17**

Differential Interference Contrast microscopy

- A) compares two identical specimens on the same microscope.
- B) illuminates the specimen with light of two different colors.
- C) illuminates the specimen with light of two different phases.
- D) illuminates the specimen with both reflected and transmitted light

**Answer:-**

- C) illuminates the specimen with light of two different phases.

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### **Question # 18**

In a compound microscope, the primary image is formed by an objective lens and enlarged by the optical lens to reveal a virtual image.

- A) True
- B) False

**Answer:-**

- A) True

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### **Question # 19**

Microscope resolution increases as the wavelength of radiation used to illuminate the specimen decreases.

- A) True
- B) False

**Answer:-**

- A) True

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### **Question # 20**



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The fluorescence microscope has become an essential tool in medical microbiology to identify bacterial pathogens.

- A) True
- B) False

**Answer:-**

- A) True

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### **Question # 21**

Objective lenses with higher magnification generally have a shorter working distance.

- A) True
- B) False

**Answer:-**

- A) True

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### **Question # 22**

Even on the best light microscopes, increasing total magnification beyond 1500 cannot result in better resolution of the image.

- A) True
- B) False

**Answer:-**

- A) True

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### **Question # 23**

Darkfield microscopy is best for visualizing live, motile microorganisms.

- A) True
- B) False

**Answer:-**

- A) True

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### **Question # 24**

Fluorescence microscopy must be done on fixed and stained microorganisms.

- A) True
- B) False

**Answer:-**

- B) False

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### **Question # 25**

Fluorescence microscopy may be used with specially stained antibodies to detect specific microorganisms.

- A) True
- B) False

**Answer:-**

- A) True

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### **Question # 26**

Chromogenic stains which consist of a single dye rather than several dyes in combination are known as basic stains .

- A) True
- B) False

**Answer:-**

- B) False

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### **Question # 27**

Transmission electron microscopy has a practical magnification of greater than 100,000x.

- A) True
- B) False

**Answer:-**

- A) True

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### **Question # 28**



Negative stains color the structures of interest a deep black.

- A) True
- B) False

**Answer:-**

- B) False

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### **Question # 29**

Acid fast stains interact with the waxy structures of the cell wall of Mycobacterium species.

- A) True
- B) False

**Answer:-**

- A) True

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### **Question # 30**

Bacterial flagella are too small to be seen by light microscopy without staining the specimen.

- A) True
- B) False

**Answer:-**

- A) True

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### **Question # 31**

The diploid state of a microorganism refers to the times when cells contain \_\_\_\_\_ copy (ies) of each chromosome and occurs after mitotic cell division.

- A) one
- B) two
- C) three

**Answer:-**

- B) two

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### **Question # 32**

The mitochondria is the site of:

- A) protein synthesis
- B) lipid synthesis
- C) energy production

**Answer:-**

- C) energy production

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### **Question # 33**

Which of the following statements about Endoplasmic reticulum (ER) is not true?

- A) ER can transport proteins and lipids to the plasma membrane or for secretion.
- B) ER is the main site for cell membrane biosynthesis.
- C) ER is contiguous with the nuclear membrane.
- D) ER is the main site for synthesis of cytoplasmic proteins

**Answer:-**

- D) ER is the main site for synthesis of cytoplasmic proteins

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### **Question # 34**

The cytoplasmic matrix is best described as:

- A) A dilute aqueous solution that fills most of the cell.
- B) A solution of inorganic salts intended to balance osmotic pressure in the cell.
- C) A semicrystalline mixture mostly of proteins and bound water molecules.
- D) Material in transit between membrane bound organelles

**Answer:-**

- C) A semicrystalline mixture mostly of proteins and bound water molecules.

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### **Question # 35**

When *Listeria monocytogenes* invades a eucaryotic cell, it secretes the ActA protein that:

- A) polymerizes actin filaments, causing the bacterium to move through the cytoplasm.
- B) depolymerizes microfilaments, allowing the bacterium to move more easily in the cytoplasm.
- C) degrades the cytoskeleton, allowing the bacterium to travel through the plasma membrane to adjacent cells.



D) attaches to microtubules, allowing the bacterium to move along the fibers

**Answer:-**

A) polymerizes actin filaments, causing the bacterium to move through the cytoplasm.

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### Question # 36

Which of the following is NOT a mechanism for a cell to degrade its own cytosolic proteins?

- A) Autophagic vacuoles
- B) Phagocytosis and secondary lysosome fusion.
- C) 26S Proteosome degradation.
- D) All the above are correct mechanisms

**Answer:-**

B) Phagocytosis and secondary lysosome fusion.

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### Question # 37

Colchicine treatment of cells to disrupt microtubules can result in

- A) loss of cell shape
- B) loss of directional movement.
- C) loss of nutrient transport.
- D) all of the above

**Answer:-**

D) all of the above

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### Question # 38

Lysosomes of the cell are where

- A) lysozyme is synthesized.
- B) secretory proteins are transported to the surface.
- C) endocytosed material is degraded.
- D) glycogen is stored as an energy source

**Answer:-**

C) endocytosed material is degraded.

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### Question # 39

Mitochondria are similar to bacteria in several ways. Which of the following is NOT a similarity?

- A) Both have peptidyl glycan in their cell wall.
- B) Both have circular, double stranded DNA.
- C) Both are about the same size.
- D) Both have 70S ribosomes

**Answer:-**

A) Both have peptidyl glycan in their cell wall.

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### Question # 40

Plastids are

- A) protrusions of plasma membrane that bud off of plant cells.
- B) cytoplasmic organelles that often contain photosynthetic pigments.
- C) pieces of circular, double stranded DNA that can carry drug resistance.
- D) areas of the nucleus where rRNA is transcribed

**Answer:-**

B) cytoplasmic organelles that often contain photosynthetic pigments.

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### Question # 41

The F1 particles of mitochondria are:

- A) a type of ribosome that synthesizes mitochondrial proteins.
- B) a structural component of the mitochondrial inner membrane.
- C) an enzyme complex that synthesizes ATP during respiration.
- D) a storage complex for calcium phosphate in the mitochondria

**Answer:-**

C) an enzyme complex that synthesizes ATP during respiration.

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### Question # 42



The nucleus of the cell is where

- A) energy for cell division is generated.
- B) ribosomes translate mRNA into proteins.
- C) chromatin is kept within a membrane delimited body.
- D) endocytic vacuoles fuse with lysosomes

**Answer:-**

C) chromatin is kept within a membrane delimited body.

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### **Question # 43**

DNA is the primary molecule for information storage in

- A) procaryotes only.
- B) eucaryotes only.
- C) both procaryotes and eucaryotes

**Answer:-**

C) both procaryotes and eucaryotes

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### **Question # 44**

Cell walls, when they exist, usually contain peptidoglycan in:

- A) procaryotes only.
- B) eucaryotes only.
- C) both procaryotes and eucaryotes

**Answer:-**

A) procaryotes only.

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### **Question # 45**

When flagella exist, their movement is powered by ATP in

- A) procaryotes only.
- B) eucaryotes only.
- C) both procaryotes and eucaryotes

**Answer:-**

B) eucaryotes only.

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### **Question # 46**

Membrane bound organelles such as mitochondria and Golgi are found in

- A) procaryotes only.
- B) eucaryotes only.
- C) both procaryotes and eucaryotes

**Answer:-**

B) eucaryotes only.

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### **Question # 47**

Ribosomes are required for synthesis of proteins in:

- A) procaryotes only.
- B) eucaryotes only.
- C) both procaryotes and eucaryotes

**Answer:-**

C) both procaryotes and eucaryotes

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### **Question # 48**

Exoenzymes are contained in the periplasmic space in:

- A) procaryotes only.
- B) eucaryotes only.
- C) both procaryotes and eucaryotes

**Answer:-**

A) procaryotes only.

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### **Question # 49**

All the cells chromosomes are contained in the cell nucleus for:

- A) procaryotes only.





- B) eucaryotes only.
- C) both procaryotes and eucaryotes

**Answer:-**

- B) eucaryotes only.

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### **Question # 50**

The nuclear pores are passageways between the nuclear matrix and the cytoplasm which

- A) allow DNA to reach the cytoplasm to be translated to RNA.
- B) allow ribosomes to enter the nuclear matrix.
- C) allow proteins synthesized in the cytoplasm to enter the nucleus.
- D) structurally reinforce the nuclear membrane

**Answer:-**

- C) allow proteins synthesized in the cytoplasm to enter the nucleus.

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