

RISE-AcSIR PhD Admission Written Test 2024 (August session)

SYLLABUS

The syllabus for the written test in RISE for PhD admission will closely follow the syllabus of CSIR-UGC (NET) EXAM for the award of JRF fellowship. The questions will be from areas of Chemical Science, Physical Science and Biological Science for applicants from respective disciplines. There may also be a few questions from general sciences. The examination will have short multiple choice type questions (MCQ) only.

Model Questions (Chemical Sciences)

1. What are the number of vibrational modes for pyridine and acetylene

- (i) 28 and 6
- (ii) 21 and 8
- (iii) 27 and 7
- (iv) None of the above

2. What are respectively the charge carriers in Cu wire carrying current and a CuSO_4 solution

- (i) Electrons and ions
- (ii) Electrons in both cases
- (iii) Ions in both cases
- (iv) None of the above

3. Which protective agent has been used in the Umpolung reaction

- (i) Dithiol
- (ii) Mercaptan
- (iii) Alcohol
- (iv) Acid

Model questions (Physical Sciences)

1. The volume and temperature of a spherically cavity filled with black body radiation are V and 400 K , respectively. If it expands adiabatically to a volume $2V$, its temperature will be closest to

- A) 150 K
- B) 320 K
- C) 340 K
- D) 300 K

2. In the inelastic Compton scattering of electrons, by photons with incident wavelength λ ,

- A) $\frac{\Delta\lambda}{\lambda}$ is independent of λ
- B) $\frac{\Delta\lambda}{\lambda}$ increases with decreasing λ
- C) $\frac{\Delta\lambda}{\lambda}$ decreases with decreasing λ
- D) $\frac{\Delta\lambda}{\lambda}$ decreases with constant λ

3. The Scanning Tunneling Microscopy (STM) measurement

- A) Relies on the principle of tunneling which is a quantum property of electrons
- B) Needs a conductive tip and a conductive surface
- C) Produces images at the atomic level by constant current or constant height mode
- D) All of the above

Model Questions (Biological Sciences)

1. Which one of the following statements about *Zymogen* is **NOT** true?

- (i) It is inactive precursor of an enzyme
- (ii) It is activated by cleavage of one or more specific peptide bonds
- (iii) Proteolytic activation occurs only once in the lifetime of an enzyme molecule
- (iv) ATP is needed for the cleavage

2. What are the major electron donors for green and purple nonsulfur photosynthetic bacteria?

- (i) H_2 , H_2S , S
- (ii) H_2O
- (iii) Amino acids and organic molecules
- (iv) Metal oxides

3. Which of the following is an example of microbial electrosynthesis?

- (i) Acetyl CoA to CO_2
- (ii) CO_2 to Acetate
- (iii) Pyruvate to Ethanol
- (iv) Glyceraldehyde to Glyceraldehyde 3-Phosphate