

J.D.B. Government Girls' College, Kota

M.Sc. SEM-IV

Paper-401 (Nuclear Physics-II)

Monthly Test

Maximum Marks: 15

Very Short Questions (1 Mark each)

1. What are the basic differences between single particle and collective motions in nuclei?
2. What do you mean by the nuclear isotopes, isobars and isomers?
3. In what respect, collective model is superior than the shell model?
4. Write the Hamiltonian in quadratic approximation for the collective motions.
5. Why 0 to 0 transition cannot be possible for nuclear gamma emission?

Short Questions (2.5 Marks each)

6. Discuss nuclear extreme single particle shell model and its applications.
7. Prove that due to spin-orbit potential energy interaction splitting is proportional to $v+1$.

Long Answer Questions (5 Marks)

8. Discuss the experimental facts in supports of the nuclear collective model

Or

Draw the vibrational energy levels of ${}_{48}\text{Cd}^{114}$ using collective model and compare the results with experimental data.

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Paper-402 (Solid State Physics)

Monthly Test

Maximum Marks: 15

Very Short Questions (1 Mark each)

1. Define magnetic moment.
2. What do you mean by ferro-magnetism?
3. What do you understand by polarization in dielectrics?
4. What is dielectric strength?
5. Define Weiss molecular field.

Short Questions (2.5 Marks each)

6. Discuss the difference between diamagnetism and para-magnetism.
7. Discuss Heisenberg exchange interaction.

Long Answer Questions (5 Marks)

8. Write a note on ionic materials and semiconductors.

Or

Discuss atomic and electronic interactions.

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Paper-403 (Laser Physics)

Monthly Test

Maximum Marks: 15

Very Short Questions (1 Mark each)

1. Define longitudinal mode.
2. What is spontaneous emission?
3. What are the applications of Dye laser?
4. What is the ratio of mixing of different gases in CO₂ laser?
5. Define population inversion.

Short Questions (2.5 Marks each)

6. Establish stability criteria of laser cavity.
7. Explain energy level diagrams of 4-level lasing system and discuss transitions between the levels.

Long Answer Questions (5 Marks)

8. Give the difference between Q switching and mode locking. Which method gives you maximum energy pulse and which gives you smaller pulse width?

Or

Explain the working of excimer laser.

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Paper-404 (Microwave Electronics-II)

Monthly Test

Maximum Marks: 15

Very Short Questions (1 Mark each)

1. Explain the noise in parametric amplifier.
2. Write the use of circulator.
3. Explain coupling reflectometer.
4. Name the instrument used to measure large microwave power.
5. Define complex permittivity of material.

Short Questions (2.5 Marks each)

6. Explain equation of capacitance in linearly graded and abrupt P-N junction.
7. What are Manley-Rowe relations?

Long Answer Questions (5 Marks)

8. Write a note on microwave measurement.

Or

Explain the method for measuring microwave power with necessary diagram.