S-1130

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PHY-552

Electromagnetic Theory and Spectroscopy

M.Sc. Physics (MSCPHY)

2nd Year Examination, 2022 (Dec.)

Time : 2 Hours] **Max. Marks : 70**

Note : This paper is of Seventy (70) marks divided into two (02) Sections A and B. Attempt the questions contained in these sections according to the detailed instructions given therein.

SECTION–A
(Long Answer Type Questions)

Note : Section 'A' contains Five (05) long answer type questions of Nineteen (19) marks each. Learners are required to answer any Two (02) questions only.

(2×19=38)

1. What is an electromagnetic radiation? Derive the expression for power radiated by an accelerated charge.

2. Distinguish between normal Zeeman, anomalous Zeeman and Paschen-Back effects. Determine the Lande g-values for the various levels of ^3P and ^3D multiplets.

3. Derive the rotational energy value for a diatomic rigid rotator by using the quantum mechanical model. Identify the transition frequency value for two rotational level transition.

4. Explain the intensity distribution in absorption and emission band from Franck-condon principle.

5. State Gauss's theorem in electrostatics. Apply it to find the electric field strength at a point near an infinite uniform flat sheet of charge.

SECTION–B

(Short Answer Type Questions)

Note : Section 'B' contains Eight (08) short answer type questions of Eight (08) marks each. Learners are required to answer any Four (04) questions only. (4×8=32)

1. Discuss the Maxwell's equations with their physical significance. Does monopole exist?

2. Differentiate between L-S and j-j coupling. Give examples to support your answer.

3. Derive continuity equation, starting from Maxwell's equation.

4. Explain Amperes circuital law and determine the magnetic field inside solenoid using this law.

5. Write the expressions for Lorentz and Coulombs gauges. Hence explain the two conditions.

6. Discuss stark effect in weak field and strong field in hydrogen.

7. Write the differences of Raman spectra and Infrared absorption spectra.

8. Explain the Larmor Precession.
