Raiganj Surendranath Mahavidyalaya

Department of Physics

CBCS B.Sc PHYSICS Honours

2nd Semester, Internal Examination 2020

DC 3: Electricity and Magnetism

Full Marks: 10 **Date: 28-12-2020**

Time: 1 hour

Answer any Two questions: **2 x 5 = 10**

1. (a) Show that 'electric field' is conservative and hence explain the term 'scalar potential'. 3

(b) Calculate the energy density of an electric field . 2

2. (a) Distinguish between reactance and impedance of an ac circuit. 2

(b) A long solenoid with 15 turns per cm has a small loop of area 2 cm^2 placed inside the solenoid normal to its axis. If the current carried by the solenoid changes steadly from 2A to 4A in 0.1s, What is the induced emf in the loop. 3

3. (a) What are the 'acceptor' and 'rejector' circuits? Mention practical application of these circuits. 3

(b) What is the volume density of charge in a region of space where the potential is given by $\Phi = 3(x^2 + yz + xy)$. 2

4. (a) Define coefficient of coupling. Show that the magnatic energy of two coupled circuits is $U = 1/2\ L_1 i_1^2 + 1/2\ L_2 i_2^2 + M i_1 i_2$ 3

(b) Does $\vec{E} = k[xy\ \hat{i} + 2yz\ \hat{j} + 3xz\ \hat{k}]$ represent an electrostatic field? Explain. 2