(1). Express the Maxwell's equations in integral form and explain their physical meaning. 10%

(2) Explain and derive the following equations in thermodynamics.

(a) $C_p - C_v = R$. 8%

(b) $PV^\gamma = \text{Constant}$. 7%.

(3). (a) Describe the Bohr model of the hydrogen atom. 5%

(b) Derive the expression for the energy levels of hydrogen atom. 10%

(c). Calculate the wavelength of the H_α - line. 5% [$m = 9.11 \times 10^{-31}$ kg, $h = 6.626 \times 10^{-34}$ J-s, $e = 1.602 \times 10^{-19}$ C, $\epsilon_0 = 8.854 \times 10^{-12}$ C^2-N^{-1}-m^{-2}, $c = 2.9979 \times 10^8$ m-s^{-1}.]

(4). (a) Derive the intensity distribution function of a Fraunhofer diffraction grating. [with N = numbers of slits. d = distance between slits. a = width of the slit.] 10%.

(b) Explain the chromatic resolving power of the grating. 5%.

(5). The circuit shown in the Fig 1.

(a) What is the potential difference V_{23} when the switch S is open? 5%.

(b). What is the current through switch S when it is closed? 10%

(c) What is the equivalent resistance of this circuit when the switch S is closed? 5%.

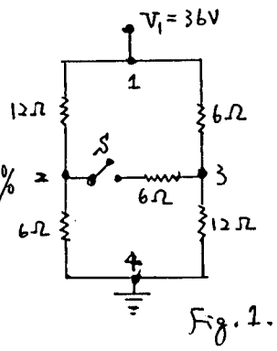

Fig. 1.

(6). A particle of mass m and charge +q, starts from rest at origin. There is a uniform electric field E in the positive y-direction and a uniform magnetic field B in the positive z-direction.

(a). Express the forces exerted on the particle and set up the equations of motion for the particle. 10%.

(b) Find out the path of the particle? 10%.