

Major Test
Centre for Energy Studies

Time : 2 hrs.

Max.Marks : 38

ESL – 870 FUSION ENERGY

Section – A

ATTEMPT SECTION A AND B ON SEPARATE SHEETS

1. a) Estimate input laser energy required for breakeven condition for an uncompressed spherical D-T pellet in laser driven fusion. (5)
b) Write down the dispersion relation of R-wave and L-wave. Show that the Whistler mode has maximum phase velocity at $\omega = \omega_{ci}/2$ and this maximum is less than the velocity of light. (3)
2. a) Write down the dispersion relation for an extraordinary wave propagating perpendicular to magnetic field and discuss in detail the cut off and resonance phenomenon for this wave. (6)
b) Prove that in the dispersion curve of extraordinary wave $\omega_L < \omega_p < \omega_h$, $\omega_L < \omega_R$, where symbols have their usual meanings. (4)
c) Prove that the extraordinary wave is purely electrostatic at resonance. (4)
3. a) Explain the following : (4 x 4 = 16)
 - i) Stimulated Raman scattering
 - ii) Stimulated Brillouin scattering
 - iii) Thermonuclear burn fraction
 - iv) Collisional absorption in laser plasma interaction