Instrument Design Development Centre

Dated: 29/04/2010

Major Test (IDL-734)
Marks - 50
Duration – 2 hours

Attempts all questions –

Q1. Explain in brief –

(a) Why with conventional line source it is difficult to obtain monochromatic line with high intensity. 2
(b) Establish that under thermal equilibrium condition and at 300^0 Kelvin the stimulated emission at radio frequencies is much more than at visible frequencies. 2
(c) Causes of laser beam divergence. 1
(d) Role of quadrant detector in laser alignment systems. 2
(e) How using circular grating and moiré read out one can design a sensor for its use in laser based alignment systems? 3

Q2. Explain in brief how intense, collimated, and monochromatic beam results in laser? 4

Q3. Explain in brief the role of reference beam and main characteristics of recording material in recording holograms. 4

Q4. Explain in brief major difference between real time and double exposure holographic interferometry. 4

Q5. Explain main differences between classical and holographic lenses. From what type of aberrations holographic lenses suffer? Explain how using holographic optical elements spherical aberration can be corrected in video disc lenses. 1+3+2 = 6

Q6. Explain how speckle shearing interferometry can be used to measure temperature profile of axi-symmetric gaseous flames. 5

Q7. What is Talbot effect? Explain with proper ray diagram its application in measurement/ monitoring of vibration. 2+4 = 6

Q8. Define the collimation. How it can be achieved by using circular gratings and Talbot effect? 2+4 = 6

Q9. What is the need for profiling? Discuss the basic principle of any interferometric method for for profiling. 1+4 = 5