B.E (FULL TIME) DEGREE END SEMESTER EXAMINATIONS, APRIL/MAY 2012

MATERIALS SCIENCE AND ENGINEERING

Regulation 2008

EIGHTH SEMESTER

ML 9034-LASER PROCESSING OF MATERIALS

Time: 3 Hrs. **Max. Marks: 100**

Answer all questions

Part-A (10 x 2 = 20 marks)

1. What do you understand by mode volume?
2. Define "Laser efficiency"
3. What are the difference modes of heats source used in Laser processing?
4. Define the phenomenon mode hopping.
5. What do you understand by masking in laser hardening?
6. What do you understand by photochemical ablation?
7. Mention the technique used for cutting ceramics.
8. Define "Trepanning"
9. Why it is necessary to provide gas shielding during laser welding?
10. What do you understand by spiking?

Part – B (5x 16 = 80 marks)

11. Obtain the relationship between Einstein coefficients and hence determine the probability for stimulated emission under thermal equilibrium.

12. (a) Discuss the principle and working of CO_2 Laser.

(OR)

(b) Obtain an expression for heat flow in thin plate with line heat source

13. (a) Describe the methodology of Laser shock peening.

(OR)

(b). Discuss the principle, steps and process parameters of laser surface heat treatment.

14. (a) Write a brief note on process defects in (i) laser drilling and (ii) Laser cutting. (8+8)

(OR)

(b) What are the different forms of laser drilling? Describe the laser beam characteristics in laser drilling process.

15. (a) Discuss the effect of beam characteristics and plasma formation in laser welding.

(OR)

(b) (i) Describe the mechanism of laser welding process. (10)

(ii) Discuss the common weld defects found in laser welding. (6)