

B.E (FULL TIME) DEGREE END SEMESTER EXAMINATIONS, APR/MAY 2011

MATERIALS SCIENCE AND ENGINEERING

EIGHTH SEMESTER (R 2004)

ML 514-LASER PROCESSING OF MATERIALS

9

TIME: 3 Hrs.

Max. Marks: 100

Answer all questions

Part-A (10 x 2 = 20 marks)

1. What do you understand by stimulated emission?
2. Define the term population inversion.
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. Mention the advantages of laser peening.
7. Mention the technique used for cutting ceramics.
8. Mention the benefits of laser assisted machining?
9. Why it is necessary to provide gas shielding during laser welding?
10. What do you understand by welding efficiency in laser processing?

Part – B (5x 16 = 80 marks)

11. Discuss with schematic the laser surface alloying process and its industrial applications.

12. (a) Discuss the principle and working of CO₂ Laser.

(OR)

(b) Derive Einstein relation and explain with reasons the type of emission observed under thermal equilibrium.

13. (a). Obtain an expression for heat flow in thin plate with line heat source.

(OR)

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

14. (a) Discuss briefly the various forms and components of laser cutting process.

(OR)

14. (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)

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

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