

Reg. No. :

--	--	--	--	--	--	--	--	--	--

Question Paper Code: 59051

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

Elective

Electronics and Instrumentation Engineering

15UEI905 - OPTICAL AND LASER INSTRUMENTATION

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

- Mode locking is used to obtain
 - Polarized pulse
 - Uniform pulse
 - Amplified pulse
 - High irradiance pulse
- In He-Ne Laser 'He' has
 - 3 Energy states
 - 2 Energy states
 - 4 Energy states
 - 1 Energy states
- _____ welding is done using pulse lasers or continuous wave laser beams with shutters.
 - Micro
 - Macro
 - Seam
 - Ultrasonic
- Laser _____ is the controlled alteration of the attributes of a capacitor or a resistor by a laser action.
 - Heating
 - Melting
 - Trimming
 - Welding
- The types of laser that is used in gynecology is
 - O₂
 - Nd
 - YAG
 - Argon and KTP

6. _____ is used to reduce the amount of blood supply to a tumor by blocking the flow of blood in selected arteries during laser surgery.
- (a) Embolization (b) Endoscopy
(c) Stereotactic surgery (d) Photo dynamic surgery
7. Dispersion in fibre optics refers to
- (a) Loss of intensity (b) Broadening of light waves
(c) Mixing of light waves (d) Shifting of light waves
8. Find the numerical aperture a of an optical fiber if $\mu_1(\text{core})= 1.55$, $\mu_2(\text{cladding})= 1.50$.
- (a) 0.39 (b) 0.48 (c) 0.48 (d) 0.43
9. Basic principle of interferometric sensor is
- (a) Deflection (b) Scattering
(c) Phase shift (d) Frequency shift
10. _____ is used to measure the fibre attenuation along fiber optics link.
- (a) Fiber sensor (b) Optical domain reflectors
(c) Modulators (d) Interferometers

PART - B (5 x 2 = 10 Marks)

11. List the different types of laser sources based on the active medium.
12. Draw the laser setup for material processing.
13. What are the different ways in which Laser interacts with tissues in laser surgery?
14. Mention the different causes of absorption losses in optical fibre.
15. Describe the requirements of light source used for communication.

PART - C (5 x 16 = 80 Marks)

16. (a) (i) Describe the construction and working of Liquid laser with neat diagram. (6)
(ii) Discuss the Q switching and Mode locking techniques with neat sketch. (10)
- Or
- (b) (i) Summarize any five properties of Laser. (6)
(ii) Illustrate the principle and working of three level and four level laser with neat diagram. (10)

17. (a) Describe in detail the principle of laser welding and melting. (16)

Or

(b) Explain in detail how Laser is used for the measurement of distance, length, Velocity and Acceleration. (16)

18. (a) (i) Analyse the importance of laser based surgery in Plastic surgery. (8)

(ii) Discuss the Laser instruments used in oncology treatment. (8)

Or

(b) (i) Illustrate the importance of laser based surgery in removal of tumors in vocal cords. (8)

(ii) Explain how 3D dimensional image is constructed and reconstructed with holography. (8)

19. (a) (i) Distinguish between step index and graded index fiber. (8)

(ii) Illustrate Absorption and Scattering losses and its measurement technique with neat sketch. (8)

Or

(b) (i) What is meant by splicing? With neat diagram explain the different splicing technique. (10)

(ii) Enumerate and explain the requirements of optical sources and optical detector. (6)

20. (a) (i) Describe the special features of fibre optic sensors and explain any two industrial applications of fibre optic sensors. (10)

(ii) How interferometric method is used for the measurement of length. (6)

Or

(b) (i) Write the need for fiber optic sensors and explain in detail about any two extrinsic fiber optic sensors. (10)

(ii) Classify Optical Modulators and explain the working of Electro Optic Modulator. (6)

