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**Reg. No. :**

**Question Paper Code: 46054**

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

Sixeth Semester

Electronics and Instrumentation Engineering

14UEI906 - LASER AND FIBER OPTICS INSTRUMENTATION

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Internal Quantum efficiency of a laser is

(a) η = 2 τ / τr (b) η = τr / τ (c) η = τ / τr  (d) η = 3 τ / τr

2.  When the laser output is coupled with fiber, some light will be reflected back into the

laser clarity. This occurs at \_\_\_\_\_\_\_\_\_\_\_\_.

(a) Fiber joints (b) Reflection joints (c) Index joints (d) Non fiber joints

3. While measuring the velocity of the laser, the distance “S” between fringes is denoted by

(a) **** (b) **** (c) **** (d) ****

4. In conduction limited melting, the shape of the melted region is in the form of

hemispherical and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Where dE/dt is rte of laser energy

incidence and dH/dt is rate of heat conduction).

(a) ****  (b) **** (c) **** (d) ****

5. Which is used to store the testing data with 100 percent security?

(a) Electrocardiography (b) Electroretinography

(c) Holography (d) Electroengography

6.  In medical applications, the unit used for laser treatment is

(a) Milliwatt / cm2 (b)  Kilowatt / cm2 (c)  Megawatt / cm2 (d)  Nanowatt / cm2

7. The cut-off wavelength of the fiber is

(a) ****  (b) ****

(c) **** (d) ****

8. The low splice loss is \_\_\_\_\_\_\_

(a) < 0.06 dB (b) < = 0.06 dB (c) > 0.06 dB (d) > = 0.06 dB

9. Faraday rotation is \_\_\_\_\_\_\_\_

(a) **** (b) 

(c)  (d) 

10. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ sensor consists of two fibers which are connected at the base of a

glass micro prism in the total internal reflection process.

(a) Solid level (b) Gas level (c) Liquid level (d) Solid and liquid level

PART - B (5 x 2 = 10 Marks)

11. How does the LED work?

|  |
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| 12. Mention the various types of lasers are used for material removal and vapourisation. |

13. State the effect of photo thermal processes in tissues.

14. Define group refractive index of the fiber.

15. What is pockets effect?

PART - C (5 x 16 = 80 Marks)

16. (a) Explain the following in detail. (16)

(i) Two level laser (ii) Three level laser

(iii) Quasi Three level laser (iv) Four level laser

Or

(b) Describe the operations of following laser in detail: (16)

(i) Gas laser (Helium –neon) (ii) Solid laser (Nd : YAD)

(iii) Liquid laser (iv) Semiconductor laser

17. (a) Illustrate the laser for the measurement of distance, length, velocity and acceleration

with neat diagrams. (16)

Or

(b) Explain the operations of laser in material processing, heating, welding and melting in detail. (16)

|  |  |
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| 18. (a) (i) Brief holography for non-destructive testing. (8) |  |
| (ii) Mention the process of selecting a tissue interaction mechanism. (8) |  |

Or

(b) Write short notes on laser instruments for: (16)

(i) Brain Surgery (ii) Plastic surgery

1. Oncology (iv) Gynecology

19. (a) Elaborate different types of fibers and their properties, with examples. (16)

Or

(b) (i) Explain about the Optical sources and detectors (8)

(ii) Describr the working of PIN diode,with neat diagram. (8)

20. (a) (i) Educate the operations of phase modulated fiber optic sensors. (8)

(ii) How voltage and current are measured by the help of fiber optic sensor. Explain

with diagrams. (8)

Or

(b) (i) With a neat diagram, explain the fiber optic instrumentation system. (8)

(ii) Describe the working of Fiber Optic Gyroscope (FOG). (8)