A

Reg. No. :

Question Paper Code: 59505

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2019

Elective

Electronics and Instrumentation Engineering

15UEI905 - OPTICAL AND LASER INSTRUMENTATION

(Regulation 2015)

Duration: Three hours   Maximum: 100 Marks

PART A - (10 x 1 = 10 Marks)

1. Laser Light is highly   CO1 -R

    (a) Mono chromatic   (b) directional   (c) coherent   (d) none of these

2. Which among the following is regarded as an inelastic scattering of a   CO1 -R
    photon?

    (a) Kerr Effect   (b) Raman Effect   (c) Hall Effect   (d) Miller Effect

3. Which is the correct order of sequential steps for an electric arc fusion   CO2- R
    technique?
    A. Pressing of fiber ends for fusion
    B. Application of heat for smoothening of end-surfaces
    C. Alignment of broken fiber edges

    (a) A, B, C   (b) B, A, C   (c) C, B, A   (d) C, A, B

4. Laser _____ is the controlled alteration of the attributes of a   CO2- R
    capacitor or a resistor by a laser action.

    (a) Heating   (b) Melting   (c) Trimming   (d) Welding

5. A fiber which is referred as non-dispersive shifted fiber is   CO3- R

    (a) Coaxial cables   (b) Standard single   mode fibers

    (c) Standard multimode fibers   (d) Non zero dispersion shifted fibers

6. The image produced by holography is   CO3-R

    (a) 1-dimensional   (b) 2-dimensional   (c) 3-dimensional   (d) 4-dimensional

7. Dispersion in fibre optics refers to   CO4- R

   (a) Loss of intensity   (b) Broadening of light waves

   (c) Mixing of light waves   (d) none of the above

8. Find the numerical aperture a of an optical fiber if $\mu1$(core)= 1.55,   CO4- R
   $\mu2$(cladding)= 1.50.
   (a) 0.39   (b) 0.48   (c) 0.48   (d) 0.43

9. Solar cell works based on   CO5- R

   (a) Laser technology   (b) Photo-conduction   (c) Thermal emission   (d) Tyndall effect

10. _____ is used to measure the fibre attenuation along fiber optics   CO5- R
    link.

   (a) Fiber sensor   (b) Optical domain reflectors

   (c) Modulators   (d) Interferometers

<center>PART – B (5 x 2= 10Marks)</center>

11. List the different types of laser sources based on the active medium.   CO1- R
12. What is LIDAR?   CO2- R
13. What are the different ways in which Laser interacts with tissues in laser   CO3 -R
    surgery?
14.   CO4- R
    Mention the different causes of absorption losses in optical fibre.
15. Describe the requirements of light source used for communication   CO5- R

<center>PART – C (5 x 16= 80Marks)</center>

16. (a) Discuss the Q switching and Mode locking techniques with neat   CO1- App   (16)
         sketch.
<center>Or</center>
    (b) Illustrate the principle and working of three level and four level   CO1 -App   (16)
         laser with neat diagram.

17. (a) Describe in detail the principle of measurement of voltage and   CO2- App   (16)
         current using laser.
<center>Or</center>
    (b) Describe in detail the principle of laser welding and melting   CO2 -Ana   (16)

18. (a) (i) Analyse the importance of laser based surgery in Plastic   CO3- Ana   (8)
         surgery
         (ii) Discuss the Laser instruments used in oncology treatment   CO3- U   (8)
<center>Or</center>

<center>2</center>

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(b)   (i) Explain how 3D dimensional image is constructed and reconstructed with holography.   CO3- Ana   (8)

        (ii) Illustrate the importance of laser based surgery in removal of tumors in vocal cords.   CO3- U   (8)

19. (a)   (i) Distinguish between step index and graded index fiber.   CO4 -U   (8)

        (ii) Illustrate Absorption and Scattering losses and its measurement technique with neat sketch   CO4 -U   (8)

<div align="center">Or</div>

(b)   What is meant by splicing? With neat diagram explain the different splicing technique.   CO4 -Ana   (16)

20. (a)   Explain in detail about different types of modulators   CO5 -U   (16)

<div align="center">Or</div>

(b)   Describe in detail bout measurement of pressure and temperature using fiber optic sensor.   CO5- U   (16)

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