Code: 9A10804

1

B.Tech IV Year II Semester (R09) Regular Examinations, March/April 2013

OPTO - ELECTRONICS AND LASER INSTRUMENTATION

(Electronics and Instrumentation Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1 (a) Explain the elements of optical fiber communications.
  (b) List the advantages and disadvantages of optical fiber cable.

2   Explain the various splicing method.

3 (a) Discuss about Q-switching.
  (b) What are different modes of LASER? Explain in detail.

4   With neat diagram explain about:
  (a) Measurement of pressure.
  (b) Measurement of strain.

5   With neat diagrams explain the following applications of lasers in detail:
  (a) Laser in material processing.
  (b) Laser fusion in power plants.

6 (a) Explain in detail, Hologram recording and reconstruction process.
  (b) List of out hologram application.

7 (a) Explain the application of laser in dermatology.
  (b) Explain the application of lasers in surgery.

8 (a) Explain the various noise mechanisms in photo diode and derive expression for the signal - to - noise ratio for the case of direct detection using a photodiode.
  (b) An APD generates a current of 100 mA, when the incident power is 5 nW.
      The operating wave length is 1.5 μm.
      Find its responsivity. If the quantum efficiency is 0.7, find the multiplication factor.

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OPTO - ELECTRONICS AND LASER INSTRUMENTATION
(Electronics and Instrumentation Engineering)

Time: 3 hours   Max Marks: 70

Answer any FIVE questions
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*****

1   (a)   Explain different types of fibers and their properties.
     (b)   A silicon optical fiber with a core diameter large enough to be considered by ray theory analysis has core refractive index of 1.5 and cladding refractive index of 1.47. Determine:
         (i) The critical angle at the core cladding interface.
         (ii) The N.A. of the fiber.
         (iii) The acceptance angle in air.

2   Explain about various source coupling method.

3   (a)   What is Q - Switching? Explain the various techniques of Q - Switching of lasers.
     (b)   Explain mode locking and derive the expression for pulse duration and peak intensity of output pulse.

4   (a)   With a neat diagram. Explain the interferometer method of measurement of length.
     (b)   Discuss about polarization maintaining fibers and its applications.

5   (a)   Explain about laser Doppler velocity meter.
     (b)   With neat diagrams, explain laser heating.

6   (a)   With the help of neat sketches explain reconstruction of hologram with a wave identical to reference wave and with a wave conjugate to reference wave.
     (b)   Mention few application of hologram.

7   (a)   Write a short notes on laser application in plastic surgery.
     (b)   Explain in detail about laser in removal tumors of vocal cords.

8   (a)   Explain the working principle of LED in detail with neat diagram.
     (b)   Briefly explain the electro - optic modulator.

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OPTO - ELECTRONICS AND LASER INSTRUMENTATION
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Time: 3 hours   Max Marks: 70

Answer any FIVE questions
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*****

1 (a) Write the equations for the total internal reflection of the light rays in a optical fiber cable and derive the expression for the numerical aperture of the fiber.
   (b) Explain different types of dispersion in fiber optics.

2 (a) Explain about connectors.
   (b) Briefly explain various light sources used in fiber optics communications.

3 (a) Describe the operations of a He - Ne laser, with the energy level diagram.
   (b) Explain the principle and working of Orgon - ion laser.

4 (a) Explain a method for measurement of current by a single mode fiber optic sensor with the help of a diagram.
   (b) Explain the principle and working of a fiber optic gyroscope.

5 (a) Explain the industrial applications of lasers.
   (b) Explain the bio - medical applications of lasers.

6 (a) Explain the basic principles of holography. Give its applications.
   (b) Explain in detail various recording and reconstruction devices of hologram.

7 (a) Discuss about lasers and tissue interaction.
   (b) Explain laser application in biomedical field.

8 (a) Explain how light is modulated and explain quantum efficiency.
   (b) With the help of neat sketches, explain the construction and working principle of PIN diode.

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B.Tech IV Year II Semester (R09) Regular Examinations, March/April 2013

OPTO - ELECTRONICS AND LASER INSTRUMENTATION
(Electronics and Instrumentation Engineering)

Time: 3 hours									Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1	(a)	Explain about step - index and graded index fibers.
	(b)	Draw the block diagram of a typical fiber optic communication system and explain the function of each block in detail.

2		Explain any two types of photo detectors.

3	(a)	Explain the basic principle of operation of lasers. Bring out their application in various fields. Point out the disadvantages if any.
	(b)	Draw and explain the principle, construction and working of Ruby laser.

4		Explain in detail about various IR, sources and detectors.

5	(a)	With neat sketch, explain about laser Doppler velocity meter.
	(b)	Explain application of laser in material processing.

6	(a)	With the help of neat sketches explain the recording mechanism of hologram.
	(b)	Explain the terms coherence requirements resolution in connection with hologram.

7	(a)	Discuss how laser is used for removing tumors and eye surgeries.
	(b)	Discuss about laser in dermatology.

8		Write short notes on:
	(a)	Magneto – optic modulators.
	(b)	Acoustic – optic modulators.

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