Code No: RR321002 **Set No.1**

III B.Tech. II Semester Regular Examinations, April/May -2005
OPTO ELECTRONIC & LASER INSTRUMENTATION
(Electronics & Instrumentation Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) What are the different types of optical fibres, explain about them in detail with the necessary figures, graphs and equations.
   (b) List and explain the reasons for signal distortion in Optical wave guides.
2. (a) List out the various stages of a communication system using optical fibers with a figure .Explain the function of each block in detail.
   (b) Give any three applications of optical fibers for instrumentation and explain them with the necessary figures.
3. (a) Bring out the importance of Q Switching. Compare mechanical switching with Electronic switching.
   (b) CO_2 laser is more efficient as compared to other gas lasers - Say "True" or " False". Justify your answer comparing the performances.
4. (a) Describe the working of Moire-fringe modulation fiber optic sensor.
   (b) Write in detail about IR sources.
5. (a) What is an Evanescent sensor? Explain.
   (b) List the limitations of the Evanescent sensor ?
6. (a) With a neat sketches explain the operation of Laser Doppler velocity meter.
   (b) With a neat diagram explain the operation of laser endoscope.
7. (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) Explain in detail various recording and reconstruction devices of hologram?
8. (a) Compare the performance characteristic of a p.i.n photodiode and p.n photodiode.
   (b) Distinguish between internal and external quantum efficiency.

⋆ ⋆ ⋆ ⋆ ⋆

Code No: RR321002 **Set No.2**

III B.Tech. II Semester Regular Examinations, April/May -2005
OPTO ELECTRONIC & LASER INSTRUMENTATION
(Electronics & Instrumentation Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Explain about the light guidance in a optical fibre with figures, and explain the total internal reflection and Numerical aperture with diagrams and equations
   (b) Explain about the single mode fibres with figures.
2. (a) List out the various stages of a communication system using optical fibers with a figure .Explain the function of each block in detail.
   (b) Give any three applications of optical fibers for instrumentation and explain them with the necessary figures.
3. (a) Obtain an expression for intensity for each mode in mode locked system; what is the value of peak intensity of each mode locked pulse.
   (b) For a three level laser medium obtain an expression for rate equation, peak power and pulse duration.
4. (a) Describe the working of Moire-fringe modulation fiber optic sensor.
   (b) Differentiate between an intensity modulated sensor and interferometric fiber optic sensor.
5. (a) Differentiate between a transducer and a sensor
   (b) Describe the arrangement and working of an optical fiber liquid level detector.
6. With neat diagrams explain:
   (a) Lasers in material processing
   (b) Lasers in medicine.
7. (a) Describe the construction and working of a LED.
   (b) Estimate the power generated internally within a double heterojunction LED at a drive current of 60mA and a peak emission wavelength of 1.31 μm. The radiative and non-raidiative recombination life time of the minority carriers in the active region are 100 μs. and 60μs respectively.
8. (a) Discuss the mechanism of electro - optic effect for modulation of phase.
   (b) What is pockets effect ?

⋆ ⋆ ⋆ ⋆ ⋆

Code No: RR321002 **Set No.3**

III B.Tech. II Semester Regular Examinations, April/May -2005
OPTO ELECTRONIC & LASER INSTRUMENTATION
(Electronics & Instrumentation Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Briefly explain about the optical fibre construction details and show a figure for transmission of light rays and discuss about the refractive index distribution with a graph.
   (b) Write the equations for the total internal reflection of the light rays in a optical fibre cable and derive the expression for the Numerical Aperture of the fibre.
2. (a) Give any three applications of optical fibers for instrumentation and explain them with the necessary figures.
   (b) Draw the block diagram of a typical fiber optic communication system and explain the function of each block in detail.
3. (a) For a three level laser medium obtain an expression for rate equation, peak power and pulse duration.
   (b) Explain different techniques used for Q switching
4. (a) Compare and contrast double exposure interferometry and real time interferometry.
   (b) Describe the working of Moire-Fringe modulation fiber optic sensor.
5. (a) Differentiate between a transducer and a sensor.
   (b) Explain a method for measurement of current by a single mode fiber optic sensor with the help of a diagram.
   (c) How do you estimate the transmission line loss using the above sensor.
6. With neat diagrams explain:
   (a) Lasers in material processing
   (b) Lasers in medicine.
7. (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) Explain in detail various recording and reconstruction devices of hologram?
8. (a) What is a Bragg modulator?
   (b) Obtain expression for the bandwidth of a Bragg acousto - optic modulator.

⋆ ⋆ ⋆ ⋆ ⋆

Code No: RR321002 **Set No.4**

III B.Tech. II Semester Regular Examinations, April/May -2005
OPTO ELECTRONIC & LASER INSTRUMENTATION
(Electronics & Instrumentation Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Briefly explain about the optical fibre construction details and show a figure for transmission of light rays and discuss about the refractive index distribution with a graph.
   (b) Write the equations for the total internal reflection of the light rays in a optical fibre cable and derive the expression for the Numerical Aperture of the fibre.
2. (a) List out the various stages of a communication system using optical fibers with a figure .Explain the function of each block in detail.
   (b) Give any three applications of optical fibers for instrumentation and explain them with the necessary figures.
3. (a) Explain the principle and operation of a semiconductor lasers. Discuss the merits and demerits of lasers melting.
   (b) Estimate the number of photons emitted per second from a laser that puts out one watt of power. State clearly the assumptions made.
4. (a) Write in detail about IR detectors.
   (b) Describe the working of Moire-Fringe modulation fiber optic sensor.
5. (a) What is an Evanescent sensor? Explain.
   (b) List the limitations of the Evanescent sensor ?
6. With neat diagrams explain the following applications of lasers in detail :
   (a) Lasers in material processing.
   (b) Laser fusion in power plants.
7. (a) Describe the construction and working of a LED.
   (b) Estimate the power generated internally within a double heterojunction LED at a drive current of 60mA and a peak emission wavelength of 1.31 μm. The radiative and non-raidiative recombination life time of the minority carriers in the active region are 100 μs. and 60μs respectively.
8. (a) Differentiate between Magneto - optic and Acusto - optic modulators.
   (b) Why acousto - optic modulators have to be used at low acoustic frequencies.

⋆ ⋆ ⋆ ⋆ ⋆