CLASS:MTech   SEMESTER : II
BRANCH:ECE   SESSION : SP/22

SUBJECT: EC 572 OPTOELECTRONIC INSTRUMENTATION

TIME:2HOURS   **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a)	Compare the output characteristics of LED and Laser diode. Explain with diagram the working principle of surface emitting type DH structure LED.	[5]
Q.1(b)	A Si PIN photodiode operating at 950 nm has a quantum efficiency of 65%. Calculate its responsivity, the received optical power and the number of incident photons if the photocurrent is 8.5 µA.	[5]
Q.2(a)	What are the characteristics of optoelectronic couplers? Explain how a LED-phototransistor optoelectronic isolator circuit can be used to drive a TTL gate.	[5]
Q.2(b)	Show how a Mach-Zehnder fiber interferometer is used for measurement of strain. Compare it with Michelson fiber interferometer.	[5]
Q.3(a)	Distinguish between Q-switching and mode locking in laser devices. Explain with diagram how mode-locked laser pulse can be generated using saturable absorbers.	[5]
Q.3(b)	What are the advantages of Laser based methods for particle size distribution in gases and liquids? Demonstrate an experimental set up using three semiconductor lasers for particle diameter measurement.	[5]
Q.4(a)	Draw an experimental set up in block diagram form for heterodyne measurement of frequency dependent vibrations of ear drum and explain the functions of each block.	[5]
Q.4(b)	Demonstrate a technique for air pollution measurement using femto-second LIDAR.	[5]
Q.5(a)	Explain the holographic recording process. Show how a double exposure holographic interferometry is used for analysis of object deformation.	[5]
Q.5(b)	What is a Moire pattern? List the methods to obtain Moire pattern. Show how out of plane object deformation can be measured using shadow Moire method.	[5]

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