

SRM VALLIAMMAI ENGINEERING COLLEGE
(An Autonomous Institution)
SRM Nagar, Kattankulathur – 603 203
DEPARTMENT OF
ELECTRONICS AND INSTRUMENTATION ENGINEERING
QUESTION BANK



VII SEMESTER
1907704 FIBRE OPTICS AND LASER INSTRUMENTATION

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SUBJECT : 1907704 FIBRE OPTICS AND LASER INSTRUMENTS

SEM / YEAR : VII / IV

UNIT I - OPTICAL FIBRES AND THEIR PROPERTIES

SYLLABUS

Construction of optical fiber cable: Guiding mechanism in optical fiber and Basic component of optical fiber communication, –Principles of light propagation through a fibre: Total internal reflection, Acceptance angle (θ_a), Numerical aperture and Skew mode, –Different types of fibres and their properties: Single and multimode fibers and Step index and graded index fibers,– fibre characteristics: Mechanical characteristics and Transmission characteristics, – Absorption losses – Scattering losses – Dispersion – Connectors and splicers –Fibre termination – Optical sources: Light Emitting Diode (LED), – Optical detectors: PIN Diode.

PART – A

S.No	Questions	BT Level	CO	Competence
1	How numerical aperture is related to total internal reflection in optical fibers?	BLT-2	CO1	Understand
2	Compare permanent and semi-permanent Splicer.	BLT-2	CO1	Understand
3	Define Snell's law of refraction.	BLT-1	CO1	Remember
4	What is the principle involved in an optical detector?	BLT-1	CO1	Remember
5	Distinguish between intrinsic and extrinsic losses.	BLT-2	CO1	Understand
6	Define intermodal dispersion.What is its cause?	BLT-1	CO1	Remember
7	List the different types of glass fibers. Mention a potential application of each.	BLT-1	CO1	Remember
8	Differentiate Intermodal and Intramodal dispersions.	BLT-2	CO1	Understand
9	What is the necessity of cladding for an optical fibre?	BLT-2	CO1	Understand
10	Specify any two required properties of light sources used in optical fibre communication.	BLT-2	CO1	Understand
11	Mention the features of Single mode Graded Index Fibre.	BLT-1	CO1	Remember
12	Define total internal reflection.	BLT-1	CO1	Remember
13	Define the Snell's law and write the equation for critical angle.	BLT-2	CO1	Understand
14	Define Rayleigh Scattering.	BLT-1	CO1	Remember
15	What is the role of optical detector in fibre optics system?	BLT-1	CO1	Remember
16	A single mode step index fiber has a relative refractive index difference of 1% and a core refractive index of 1.5. The number of modes propagating at a wavelength of 1.3	BLT-2	CO1	Understand

	um is 1100. Estimate the diameter of the fiber core.				
17	Define acceptance angle.		BLT-1	CO1	Remember
18	Differentiate graded index fiber and step index fiber.		BLT-2	CO1	Understand
19	Decide among the different fibers which has the least dispersion?		BLT-2	CO1	Understand
20	List any two semi-permanent splicers. Why are they called so?		BLT-1	CO1	Remember
21	What is critical angle?		BLT-1	CO1	Remember
22	Point out the expression for Numerical aperture in the case of graded index fiber.		BLT-2	CO1	Understand
23	What is incident and reflected light?		BLT-1	CO1	Remember
24	What are the two basic modes of fibers?		BLT-1	CO1	Remember
PART B					
1	Explain the following terms: meridian ray, skew ray, acceptance and critical angle for skew ray.	(13)	BLT-3	CO1	Apply
2	Explain how light propagates through step index and graded index fibre.	(13)	BLT-3	CO1	Apply
3	(i) Compare and contrast the different parameters of glass fibers with plastic fibers. (ii) Compare and contrast all the parameters of single mode and multimode glass fibers.	(7) (6)	BLT-4	CO1	Analyze
4	Enumerate the different types of fibers and their properties with neat sketches.	(13)	BLT-4	CO1	Analyze
5	(i) Explain the construction details of different types of optical fibres. (ii) Differentiate an optical connector from a Splicer. Explain any one Splicer with a neat diagram.	(7) (6)	BLT-4	CO1	Analyze
6	Explain the characteristics of fiber in terms of (i) Mechanical characteristics. (ii) Transmission characteristics.	(5) (8)	BLT-3	CO1	Apply
7	Elaborate about the various attenuation losses possible in optical fibres. Also discuss how intra modal and inter modal dispersion can be minimized.	(13)	BLT-3	CO1	Apply
8	Elaborate the different absorption losses in an optical fiber.	(13)	BLT-4	CO1	Analyze
9	Illustrate the different types of dispersion in fibers.	(13)	BLT-3	CO1	Apply
10	(i) Explain the loss due to Rayleigh Scattering in optical fibers. (ii) What are linear and nonlinear scattering? Explain in detail with examples.	(6) (7)	BLT-3	CO1	Apply
11	(i) Elaborate the principles of splicing technique and illustrate the following	(8)	BLT-4	CO1	Analyze

	(1) Mechanical splicing (2) Fusion splicing (ii) Write short notes on fibre terminators.	(5)			
12	Illustrate the different types of joints and connectors with an example and explain their properties.	(13)	BLT-3	CO1	Apply
13	Enumerate and explain the requirement for an optical source and an optical detector with neat diagrams.	(13)	BLT-4	CO1	Analyze
14	Elaborate the construction and working of avalanche photo diode, PIN photo diode and photo conductive detector. State its merits and demerits.	(13)	BLT-4	CO1	Analyze
15	Analyze the importance of Ray optic theory and explain in detail.	(13)	BLT-4	CO1	Analyze
16	Illustrate the block diagram of optical fibre Transmission system and explain its functions.	(13)	BLT-3	CO1	Apply
17	Explain the types of losses due to scattering in optical fibers.	(13)	BLT-3	CO1	Apply
PART C					
1	Analyze the Meridional rays propagating in a fibre with neat diagrams and also explain the total distance travelled over a length of fibre 'L'.	(15)	BLT-4	CO1	Analyze
2	Compare and contrast all the parameters of step index fiber and Graded index fibers which are classified based on refractive index profile.	(15)	BLT-4	CO1	Analyze
3	What are the general requirements considered while selecting a light source for fibre optic link? Explain about the construction and working of photomultiplier Tubes used as optical source in fibre communication. (15)	(15)	BLT-5	CO1	Evaluate
4	Describe with the aid of suitable diagram. (i) The multimode fiber mechanical splice. (ii) A single mode fiber mechanical splice. (iii) The multimode fiber splicing using a silicon chip arrays.	(15)	BLT-5	CO1	Evaluate
5	Elucidate how the performance of mechanically coupling the fibres and aligning the cores of fibres is achieved for the light to pass.	(15)	BLT-4	CO1	Analyze

UNIT II-INDUSTRIAL APPLICATION OF OPTICAL FIBRES

SYLLABUS

Fibre optic sensors: Types of fiber optics sensor, Intrinsic sensor- Temperature/ Pressure sensor, Extrinsic sensors, Phase Modulated Fibre Optic Sensor and Displacement sensor (Extrinsic Sensor) – Fibre optic instrumentation system: Measurement of attenuation (by cut back method), Optical domain reflectometers, Fiber Scattering loss Measurement, Fiber Absorption Measurement, Fiber dispersion measurements, End

reflection method and Near field scanning techniques – Different types of modulators: Electro-optic modulator (EOM) –Interferometric method of measurement of length – Moire fringes – Measurement of pressure, temperature, current, voltage, liquid level and strain.

PART – A

S.No	Questions	BT Level	CO	Competence
1	Differentiate intrinsic and extrinsic fibre optic sensor.	BLT-2	CO2	Understand
2	What is the significance of polarization maintaining fibers in optical communication?	BLT-2	CO2	Understand
3	Mention any two industrial applications of an optical fibre.	BLT-1	CO2	Remember
4	Describe about fibre optic instrumentation system.	BLT-1	CO2	Remember
5	Classify the different types of modulators.	BLT-2	CO2	Understand
6	List the important parameters of optical detectors.	BLT-1	CO2	Remember
7	What is acoustic optic modulator?	BLT-1	CO2	Remember
8	Mention the need of Moire fringes	BLT-2	CO2	Understand
9	Classify the different types of fiber optic sensors.	BLT-2	CO2	Understand
10	What is the basic principle of electro optic modulators?	BLT-1	CO2	Remember
11	List the features of magneto optic modulators.	BLT-2	CO2	Understand
12	Draw the block diagram of fibre optic communication system.	BLT-1	CO2	Remember
13	What is the principle of Proximity sensor?	BLT-1	CO2	Remember
14	How the direct modulations broaden the spectral line width of the laser diode?	BLT-2	CO2	Understand
15	Specify the need for modulation.	BLT-2	CO2	Understand
16	How optical beam polarization achieved in external modulators?	BLT-2	CO2	Understand
17	Point out the main cause of degradation of the optical signal at the input of the modulator.	BLT-2	CO2	Understand
18	State any two industrial applications of optical fiber.	BLT-1	CO2	Remember
19	Describe Pockels effect.	BLT-2	CO2	Understand
20	What is Speckle pattern?	BLT-1	CO2	Remember
21	How Moire fringes formed?	BLT-2	CO2	Understand
22	What is the basic principle of opto modulator?	BLT-1	CO2	Remember
23	What is the main cause of degradation of optical signal at the input of modulator?	BLT-2	CO2	Understand
24	What are the types of external modulators?	BLT-1	CO2	Remember

PART-B

1	With the help of OTDR display diagram, explain how measurement of attenuation and fiber length is done using Optical time Domain Reflectometry.	(13)	BLT-4	CO2	Analyze
2	Explain how optical fibers are used as Displacement, Position and Level sensors.	(13)	BLT-3	CO2	Apply
3	Examine and explain the principle and working of any two types of fibre optic sensors.	(13)	BLT-3	CO2	Apply
4	Explain the working principle of acoustic optic modulator with a neat sketch.	(13)	BLT-4	CO2	Analyze
5	(i) Examine the principle of interferometric method of measurement of length. (ii) Obtain the method of measurement of temperature using optic fibre optic sensors.	(7) (6)	BLT-3	CO2	Apply

6	Elaborate in detail the role of optical fibers in the measurement of pressure.	(13)	BLT-4	CO2	Analyze
7	Illustrate the working principle of Electro optic modulator with a neat sketch.	(13)	BLT-4	CO2	Analyze
8	Elaborate in detail the construction and principle of working of laser Doppler velocity sensor.	(13)	BLT-4	CO2	Analyze
9	(i) Discuss the different micro bending sensors and their basic principles in detail. (ii) Give an account on “Moire Fringes”.	(7) (6)	BLT-3	CO2	Apply
10	Explain a Michelson interferometer used for high resolution displacement measurement.	(13)	BLT-4	CO2	Analyze
11	Elaborate the operation of optical pressure sensor and optical temperature sensor which works on the principle of reflection concept, transmission concept, micro bending concept and phase modulation type.	(13)	BLT-4	CO2	Analyze
12	(i) Describe the fibre optics instrumentation system for the measurement of strain. (ii) Explain different applications of modulators used in fiber optic instrumentation system.	(7) (6)	BLT-3	CO2	Apply
13	Analyze the features of fiber optic sensors and point out the uses in the measurement of current and voltage.	(13)	BLT-4	CO2	Analyze
14	Illustrate in detail the working of any three types of modulators.	(13)	BLT-3	CO2	Apply
15	Illustrate the Fiber Scattering loss Measurement in detail with neat diagrams.	(13)	BLT-3	CO2	Apply
16	Examine the Absorption Measurement in fiber optic instrumentation system in detail.	(13)	BLT-4	CO2	Analyze
17	Analyze the Fiber dispersion measurements by End reflection method and Near field scanning techniques in detail.	(13)	BLT-4	CO2	Analyze
PART-C					
1	Explain the significance of fibre optic sensor with other commercial sensor and describe in detail.	(15)	BLT-5	CO2	Evaluate
2	Construct a fibre optic sensor with the method of polarization technique.	(15)	BLT-5	CO2	Evaluate
3	Write short notes on the operation of the following i.Optical fluid level detector. ii.Optical reflective type displacement sensor. iii.Moire fringe modulator of displacement measurement.	(15)	BLT-4	CO2	Analyze
4	Enumerate the theory of fibre optic modulators and discuss its advantages.	(15)	BLT-4	CO2	Analyze
5	Elucidate the importance of fiber optic instrumentation system in the industrial application of optical sensors.	(15)	BLT-5	CO2	Evaluate

UNIT III-LASER FUNDAMENTALS

SYLLABUS

Fundamental characteristics of lasers – Level Lasers: Two-Level Laser, Three Level Laser, Quasi Three and four level lasers – Properties of laser: Monochromaticity, Coherence, Divergence and Directionality and Brightness –Laser modes – Resonator configuration – Q-switching and mode locking – Cavity

damping – Types of lasers; – Gas lasers, solid lasers, liquid lasers and semiconductor lasers.

PART –A

S.No	Questions	BT Level	CO	Competence
1.	How population inversion is achieved for Laser Generation?	BLT-2	CO3	Understand
2.	List the characteristics of laser.	BLT-2	CO3	Understand
3.	Draw the energy level diagram of a four level laser system.	BLT-1	CO3	Remember
4.	Define the term mode locking.	BLT-1	CO3	Remember
5.	Classify the different classes of lasers.	BLT-2	CO3	Understand
6.	What is mean by Mode locking? Explain its need in laser generation.	BLT-1	CO3	Remember
7.	State the important features of Nd-YAG laser.	BLT-1	CO3	Remember
8.	Why optical pumping is preferred in lasers?	BLT-2	CO3	Understand
9.	Inspect Double hetero structure Laser.	BLT-2	CO3	Understand
10.	How four level laser is better than three level laser?	BLT-2	CO3	Understand
11.	List the significance of pumping in lasers.	BLT-2	CO3	Understand
12.	Why population inversion cannot be achieved in a system under thermal equilibrium?	BLT-2	CO3	Understand
13.	Define the term population inversion.	BLT-1	CO3	Remember
14.	How the modulation rate of the laser diode is increased?	BLT-2	CO3	Understand
15.	Define LASER.	BLT-2	CO3	Understand
16.	Mention the advantages and disadvantages of solid state laser.	BLT-2	CO3	Understand
17.	Specify the properties of LASER.	BLT-2	CO3	Understand
18.	Define cavity damping.	BLT-1	CO3	Remember
19.	Define “Q-switching”.	BLT-2	CO3	Understand
20.	What is the principle of electron beam pumping?	BLT-1	CO3	Remember
21.	Point out the characteristics of stimulated emission.	BLT-2	CO3	Understand
22.	Why gain guided lasers are not in practice?	BLT-1	CO3	Remember
23.	Why Pump wavelength is shorter than the laser wavelength?	BLT-2	CO3	Understand
24.	Give the characteristics of spontaneous emission.	BLT-1	CO3	Remember

PART B

1	(i) Discuss about the Resonator configuration of a laser setup.	(8)	BLT-4	CO3	Analyze
	(ii) Differentiate 3 level lasers from four level laser systems.	(5)			
2	Write short notes on (i) LIDAR. (ii) Laser Tracking.	(6)	BLT-4	CO3	Analyze
		(7)			
3	Categorize lasers and explain the construction and working of semiconductor laser.	(13)	BLT-4	CO3	Analyze
4	With the help of an energy diagram, analyze how four level laser system is advantageous to three level laser system .Also explain the construction and working of a four level laser.	(13)	BLT-3	CO3	Apply
5	Examine the construction and operation of solid state lasers with neat diagram.	(13)	BLT-3	CO3	Apply
6	(i) Differentiate between direct and indirect band gap semiconductors. Give Examples. (ii) Illustrate the structure of multiplication of signals	(6)	BLT-3	CO3	Apply
		(7)			

	inside a cavity with a neat diagram.				
7	With neat diagram explain the working of arc excited gas laser.	(13)	BLT-3	CO3	Apply
8	Explain the process of Q Switching in laser system.	(13)	BLT-4	CO3	Analyze
9	(i) Enumerate the Characteristics of Lasers. Derive an expression for threshold gain for laser. (ii) With the help of diagram explain the principle of three level and four level lasers.	(7) (6)	BLT-4	CO3	Analyze
10	Elaborate the construction and working of carbon dioxide laser.	(13)	BLT-3	CO3	Apply
11	Write technical notes on (1) Laser modes (2) Frequency Chirping.	(13)	BLT-4	CO3	Analyze
12	(i) Explain in detail about the steps involved in the generation of laser. (ii) Compare the merits and demerits of gas laser with solid laser and liquid laser.	(6) (7)	BLT-4	CO3	Analyze
13	Explain the process of mode locking in laser system.	(13)	BLT-3	CO3	Apply
14	Explain about Q switching and Cavity damping in lasers.	(13)	BLT-4	CO3	Analyze
15	Illustrate the operation of liquid laser with neat diagrams and energy band sketches.	(13)	BLT-3	CO3	Apply
16	Describe the working principle of He-Ne gas laser with a neat diagram.	(13)	BLT-4	CO3	Analyze
17	Discuss about different types of hetero structures of a semiconductor laser. State the merits and demerits of each structure.	(13)	BLT-3	CO3	Apply

PART C

1.	Compare a homo junction laser with hetero junction laser based on the electron beam principle.	(15)	BLT-5	CO3	Evaluate
2.	Design a Fabry Perot resonator laser diode, having modes and threshold conditions also obtain its rate equations for steady state output.	(15)	BLT-5	CO3	Evaluate
3.	Compile the different laser operating modes used for the generation of Ultra short pulses.	(15)	BLT-4	CO3	Analyze
4.	Explain the working principle of Ruby laser with a neat diagram. Derive an expression for threshold gain for laser.	(15)	BLT-4	CO3	Analyze
5.	Explain the working principle of dye laser dissolved at a concentration of one part in ten thousand with a neat diagram.	(15)	BLT-5	CO3	Evaluate

UNIT IV- INDUSTRIAL APPLICATIONS OF LASER

SYLLABUS

Laser for measurement of distance, Laser for measurement of length, Laser for measurement of velocity, Laser for measurement of acceleration, Laser for measurement of current, voltage and Laser for measurement of Atmospheric Effect: Types of LIDAR, Construction And Working, and LIDAR Applications – Material processing: Laser instrumentation for material processing, Powder Feeder, Laser Heating, Laser Welding, Laser Melting, Conduction Limited Melting and Key Hole Melting – Laser trimming of material: Process Of Laser Trimming, Types Of Trim, Construction And Working Advantages – Material Removal and vaporization: Process Of Material Removal.

PART –A

S.No	Questions	BT Level	CO	Competence	
1.	Classify the common types of lasers used for material processing.	BLT-2	CO4	Understand	
2.	List the merits of Laser Heating.	BLT-2	CO4	Understand	
3.	Write any two industrial applications of laser.	BLT-1	CO4	Remember	
4.	Define laser vaporization.	BLT-1	CO4	Remember	
5.	What are the uses of shielding gas during material processing by lasers?	BLT-2	CO4	Understand	
6.	Mention the techniques used for distance measurement using Laser.	BLT-1	CO4	Remember	
7.	State the advantages of using laser in industry.	BLT-1	CO4	Remember	
8.	What is a laser rangefinder?	BLT-2	CO4	Understand	
9.	Discuss about laser melting.	BLT-2	CO4	Understand	
10.	Rewrite the significance of trimming of materials by lasers.	BLT-2	CO4	Understand	
11.	What type of atmospheric effects can be measured using laser?	BLT-2	CO4	Understand	
12.	Identify which type of laser is preferred for material processing and Give reasons.	BLT-2	CO4	Understand	
13.	Classify the different modes of laser heating.	BLT-1	CO4	Remember	
14.	How can laser be used to measure velocity?	BLT-2	CO4	Understand	
15.	Assess which type of materials oxidation cutting is preferred? Why?	BLT-2	CO4	Understand	
16.	Illustrate the industrial application laser	BLT-2	CO4	Understand	
17.	Point out the application of laser trimming and welding.	BLT-2	CO4	Understand	
18.	Discuss laser action. What are the conditions to achieve it?	BLT-1	CO4	Remember	
19.	Summarize the merits and demerits of laser welding.	BLT-2	CO4	Understand	
20.	Why population inversion is significant in lasers?	BLT-1	CO4	Remember	
21.	What is laser cutting?	BLT-2	CO4	Understand	
22.	Analyze laser hardening.	BLT-1	CO4	Remember	
23.	Assess the mechanism of interaction between the laser beam and the processed material?	BLT-2	CO4	Understand	
24.	Classify the types of LIDAR.	BLT-1	CO4	Remember	
PART B					
1	Elaborate about Laser Doppler Velocimetry for Fluid velocity and acceleration measurement.	(13)	BLT-4	CO4	Analyze
2	Write the principle involved in the design of resistors, capacitors and other electronic equipment using lasers.	(13)	BLT-4	CO4	Analyze
3	Analyze the role of laser for industrial measurements and explain anyone in detail.	(13)	BLT-4	CO4	Analyze
4	Illustrate the theory of material processing and explain the trimming of materials by laser.	(13)	BLT-3	CO4	Apply
5	Elaborate the principle of lasers for measurement of length and velocity with neat block diagram.	(13)	BLT-4	CO4	Apply
6	Illustrate the applications of laser with examples in (i) Heating.	(7)	BLT-3	CO4	Apply

	(ii) Vaporization.	(6)			
7	Categorize and explain how the current and distance can be measured by using laser.	(13)	BLT-3	CO4	Apply
8	(i) How voltage can be measured using laser? (ii) Explain briefly laser melting	(13)	BLT-3	CO4	Apply
9	Categorize the different modes of laser welding process.	(13)	BLT-4	CO4	Analyze
10	(i) Construct a basic atom interferometry and explain the concepts involved. (ii) Explain briefly the principle in LIDAR.	(8) (5)	BLT-3	CO4	Apply
11	Examine the industrial application of LASER in Material processing.	(13)	BLT-4	CO4	Analyze
12	Elaborate the apparatus used for laser drilling and explain its working.	(13)	BLT-4	CO4	Analyze
13	How will you measure the voltage and distance by using laser? Explain.	(13)	BLT-3	CO4	Apply
14	Explain in detail the measurement of acceleration and velocity of a smooth surface and rough surface plates using laser.	(13)	BLT-4	CO4	Analyze
15	With a neat schematic structure explain the operation of a laser trimming system.	(13)	BLT-3	CO4	Apply
16	Explain the operation of atmospheric effect in laser.	(13)	BLT-4	CO4	Analyze
17	Examine the accurate measurement of distance using FM Interferometer.	(13)	BLT-3	CO4	Apply

PART C

1.	Explain the principle of laser for the measurement of cold atom interferometry.	(15)	BLT-5	CO4	Evaluate
2.	Calculate the faraday rotation in degree for the silica whose Verdet constant is $4 \text{ rad m}^{-1}\text{T}^{-1}$ and $u_r = 1$ and $n = 10$ turns. There is a current flow through the conductor whose value is 30 A.	(15)	BLT-5	CO4	Evaluate
3.	Explain how the laser is used in material processing, heating, welding and melting. List out the specification and the type of laser used for these applications. How the power requirement for these applications are calculated?	(15)	BLT-4	CO4	Analyze
4.	Assess the different steps involved in laser materials processing.	(15)	BLT-4	CO4	Analyze
5.	Discuss the mechanism of laser-based removal of solid surface with a thin oxide or undesirable layer.	(15)	BLT-5	CO4	Evaluate

UNIT V- HOLOGRAM AND MEDICAL APPLICATIONS

SYLLABUS

Holography: Basic Principle, Holography vs. photography, Principle Of Hologram Recording, Condition For Recording A Hologram, Reconstructing and viewing the holographic image–Holography for non-destructive testing – Holographic components – Medical applications of lasers, laser-Tissue Interactions Photochemical reactions, Thermalisation, collisional relaxation, Types of Interactions and Selecting an Interaction Mechanism – Laser instruments for surgery, removal of tumors of vocal cards, brain surgery, plastic surgery, gynaecology and oncology.

PART –A

S.No	Questions	BT Level	CO	Competence
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1.	What modification is required in a Hologram to be used as sensors?		BLT-2	CO5	Understand
2.	List the types of laser used in Brain Tumor Treatment.		BLT-2	CO5	Understand
3.	What is the principle involved in holographic interferometry?		BLT-1	CO5	Remember
4.	Distinguish between hologram and photographic film.		BLT-2	CO5	Understand
5.	Mention the advantages of laser surgery.		BLT-2	CO5	Understand
6.	What are the precautions to be followed while handling Lasers for clinical applications?		BLT-2	CO5	Understand
7.	Label the components of Hologram.		BLT-1	CO5	Remember
8.	What is the principle of HNNT?		BLT-1	CO5	Remember
9.	Compare Oncology and Gynecology.		BLT-2	CO5	Understand
10.	Classify the uses of laser in medicine.		BLT-2	CO5	Understand
11.	Point out the limitations of photographic film compared to hologram.		BLT-2	CO5	Understand
12.	List any three lasers and their main use with respect to medical field.		BLT-1	CO5	Remember
13.	How holograms are classified?		BLT-2	CO5	Remember
14.	Why carbon dioxide laser is preferred in surgery?		BLT-2	CO5	Understand
15.	Write about wave front reconstruction.		BLT-2	CO5	Understand
16.	Outline the advantages of laser in plastic surgery.		BLT-2	CO5	Understand
17.	State the procedure in the removal of tumors in vocal cords using laser.		BLT-1	CO5	Understand
18.	What is the basic principle of holographic reconstruction?		BLT-1	CO5	Remember
19.	State the changes that take place during laser-cell interaction.		BLT-2	CO5	Understand
20.	List the safety issues of laser in medical surgery.		BLT-2	CO5	Remember
21.	What are endoscopes?		BLT-1	CO5	Understand
22.	Define PDT.		BLT-1	CO5	Remember
23.	How are lasers used during cancer surgery?		BLT-2	CO5	Understand
24.	Which laser is used to treat actinic keratosis?		BLT-2	CO5	Remember
PART B					
1	Analyze the principles of holographic interferometry and its application in Non-destructive Testing of materials.	(13)	BLT-4	CO5	Analyze
2	Examine the need of holography and compare holography with commercial photographic techniques and explain in detail.	(13)	BLT-4	CO5	Analyze
3	Examine the medical applications of LASER in gynaecology.	(13)	BLT-4	CO5	Analyze
4	Classify the methods of holography and explain each method in detail with suitable diagrams.	(13)	BLT-3	CO5	Apply
5	Explain how laser is used for Brain surgery with neat diagrams.	(13)	BLT-4	CO5	Apply
6	Summarize the spectral features and conditions involved in holography for NDT.	(13)	BLT-3	CO5	Apply
7	Explain any two medical applications of laser.	(13)	BLT-3	CO5	Apply

8	(i) Illustrate the advantages and potential applications of holography.	(6)	BLT-3	CO5	Apply
	(ii) Illustrate the principle of holographic recording and reconstruction.	(7)			
9	Elaborate the techniques involved in PDT and explain in detail.	(13)	BLT-4	CO5	Analyze
10	What are the uses of LASER in the field of medicine and explain in detail also state the precaution to be considered while using laser in the field of medicine.	(13)	BLT-3	CO5	Apply
11	Give an account of laser surgery instruments which are used in plastic surgery and gynaecology.	(13)	BLT-4	CO5	Analyze
12	(i) Examine the working of holographic optical elements with a neat diagram.	(8)	BLT-4	CO5	Analyze
	(ii) Assess how laser is used for removal of tumors of vocal cards.	(5)			
13	Write technical note on	(13)	BLT-3	CO5	Apply
	(i) Laser based Microsurgery (ii) Endoscopes.				
14	(i) What is the advantage of using LASER in the field of medicine compared with the other older techniques?	(6)	BLT-4	CO5	Analyze
	(ii) Elaborate the photocoagulation of ocular tissues done in retina.	(7)			
15	Explain how laser is used for plastic surgery with neat diagrams.	(13)	BLT-3	CO5	Apply
16	Examine the medical applications of LASER in oncology.	(13)	BLT-4	CO5	Analyze
17	Explain the medical application of laser in IRLS scanning with neat diagrams.	(13)	BLT-3	CO5	Apply
PART C					
1.	Compile a detailed report on real time hologram, double exposure hologram and time average hologram, Also compare and state its applications.	(15)	BLT-5	CO5	Evaluate
2.	Develop a 3D image using the different holographic procedures used in the non-destructive Testing of Engineering components.	(15)	BLT-5	CO5	Evaluate
3.	Interpret the different stages involved in the capturization of 3D image with suitable diagrams.	(15)	BLT-4	CO5	Analyze
4.	Explain how the data is transmitted and recovered in the Holographic memory or data storage system.	(15)	BLT-4	CO5	Analyze
5.	Elucidate the working principle of modulated beam holography with neat schematic.	(15)	BLT-5	CO5	Evaluate