

Hall Ticket Number:

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I/IV B.Tech (Regular/Supplementary) DEGREE EXAMINATION

February, 2024

First Semester

Time: Three Hours

Common to EC, EE & EI
Waves and Modern Physics

Maximum: 70 Marks

Answer question 1 compulsorily.

(14X1 = 14Marks)

Answer one question from each unit.

(4X14=56 Marks)

		CO	BL	M
1	a) List the four properties of Laser light.	CO1	L1	1M
	b) Define the working principle of optical fibre.	CO1	L1	1M
	c) What are the advantages of optical fibre.	CO1	L1	1M
	d) Define pointing vector.	CO2	L1	1M
	e) Define Hall effect.	CO2	L1	1M
	f) Write the Energy stored in magnetic field.	CO2	L1	1M
	g) What is the working principle of scanning tunnelling microscope.	CO3	L1	1M
	h) State the Heisenberg's uncertainty principle.	CO3	L1	1M
	i) Write the expression for energy of a particle in 1- dimensional box.	CO3	L2	1M
	j) List any two properties of ultrasonic waves.	CO4	L1	1M
	k) What is meant by magnetostriction.	CO4	L1	1M
	l) Expand NDT and mention an example for it.	CO4	L1	1M
	m) Define population inversion.	CO1	L1	1M
	n) Explain the physical significance of wave function.	CO3	L1	1M
Unit-I				
2	a) Derive the relation between the Einstein coefficients and write their significance.	CO1	L3	6M
	b) Discuss the construction and working principle of He-Ne Laser.	CO1	L2	8M
(OR)				
3	a) Define numerical aperture. Derive the expression for numerical aperture.	CO1	L3	8M
	b) List and explain the types of optical fibres based on modes and refractive index.	CO1	L2	6M
Unit-II				
4	a) Write Maxwell equations.	CO2	L1	4M
	b) Discuss the resonance frequency in series LCR resonance circuit and derive the expression for it.	CO2	L3	10M
(OR)				
5	a) Explain the working principle of cyclotron with a neat diagram.	CO2	L2	10M
	b) Write the applications of Hall effect.	CO2	L2	4M
Unit-III				
6	a) Derive the 1-dimensional Shrodinger's time independent wave equation.	CO3	L3	7M
	b) Discuss the concept of matter waves using Debroglie's hypothesis.	CO3	L1	7M
(OR)				
7	a) What is quantum tunnelling and explain.	CO3	L1	4M
	b) Derive the expression for wave function associated with a particle moving in a one-dimensional potential box.	CO3	L2	10M
Unit-IV				
8	a) Explain the piezo-electric method to produce the ultrasonic waves.	CO4	L2	8M
	b) Write the applications of ultrasonics.	CO4	L2	6M
(OR)				
9	a) Discuss the working mechanism of GM counter.	CO4	L2	8M
	b) Briefly explain the radio isotopes and mention the medical applications of radio iso topes.	CO4	L1	6M



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I/IV B.Tech(Regular/Supplementary) DEGREE EXAMINATION

March,2023

Common to ECE,EEE & EIE

First Semester

Waves and Modern Physics

Time: Three Hours

Maximum:70 Marks

<i>Answer question 1 compulsory.</i>		(14X1 = 14 Marks)	
<i>Answer one question from each unit.</i>		(4X14=56 Marks)	
1.	a) What is population inversion in Lasers?	CO1	L1
	b) Define the basic principle in semi conducting lasers.	CO1	L1
	c) List out any four applications of optical fibers.	CO1	L1
	d) Write the equation for frequency for LC circuit.	CO1	L2
	e) What is skin effect?	CO2	L1
	f) What is the expression for velocity of electromagnetic wave in vacuum?	CO2	L2
	g) State Heisenberg's uncertainty principle with any kind of equation.	CO2	L1
	h) Write the Physical significance of a wave function (ψ).	CO2	L1
	i) Which experiment can give the existence of matter waves?	CO3	L1
	j) What is Magnetostriction effect?	CO3	L1
	k) What is the advantage of using NDT technique in industry over other methods?	CO3	L1
	l) Write any two applications of radio isotopes.	CO4	L1
	m) What are the different type of losses in optical fibers?	CO4	L3
	n) Write the expression for de-Broglie's wavelength.	CO4	L1
Unit –I			
2.	a) Distinguish between spontaneous emission and stimulated emission.	CO1	L4 7M
	b) Explain the construction and working of Ruby LASER system with a neat sketch.	CO1	L1 7M
(OR)			
3.	a) Explain the structure and principle of Optical fibers. Obtain the relations between Numerical aperture and acceptance angle.	CO1	L1 7M
	b) What are the types of optical fibers based on their modes and refractive index profile and explain them with schematic representations.	CO1	L2 7M
Unit –II			
4.	a) Write the Maxwell's equations in both differential and integral forms in the case of conducting media and vacuum.	CO2	L2 7M
	b) Obtain the velocity of electromagnetic wave in vacuum.	CO2	L2 7M
(OR)			
5.	a) Derive an expression for resonance frequency in series LCR resonance circuit.	CO2	L1 7M
	b) What is Hall effect? Obtain an equation for Hall coefficient and give it's significance.	CO2	L1 7M
Unit –III			
6.	a) What is de-Broglie hypothesis related to dual nature of matter waves? Explain it briefly.	CO3	L2 7M
	b) Describe the Dvission and Germer's experiment with necessary theory and schematic diagram.	CO3	L3 7M
(OR)			
7.	a) Obtain Schrodinger time independent wave equation, show that energy of a particle in a one-dimensional potential box is quantized.	CO3	L4 7M
	b) Discuss the construction and working of scanning electron microscope with neat sketch.	CO3	L2 7M
Unit –IV			
8.	a) Explain the production of Ultrasonic waves by piezo electric method with neat sketch.	CO4	L3 7M
	b) List out the medical and industrial applications of ultrasonics	CO4	L2 7M
(OR)			
9.	a) What are radio isotopes? Give any four examples for radio isotopes. Write any two each application of medical and industrial applications of radio isotopes.	CO4	L3 7M
	b) Explain the construction and working of GM counter with a neat sketch.	CO4	L2 7M



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I/IV B.Tech (Regular) DEGREE EXAMINATION

April, 2022

Common to ECE,EEE & EIE

First Semester

WAVES AND MODERN PHYSICS

Time: Three Hours

Maximum:70 Marks

Answer **Question NO. 1** compulsorily.

(14X1 = 14 Marks)

Answer **ONE** questions from each unit.

(4X14=56 Marks)

			M	CO	BL
1.	a)	List out the applications of lasers			CO1
	b)	Write the importance of V-number			CO1
	c)	Define the basic principle involved in optical fibre			CO1
	d)	Name the important components of laser device.			CO1
	e)	What is Resonant frequency			CO1
	f)	Write about quality factor			CO2
	g)	Write the equation of Velocity of electromagnetic wave in vacuum			CO2
	h)	Write the physical significance of wave function			CO3
	i)	Write the Schrodinger Time independent wave equation			CO3
	j)	What is quantum tunnelling			CO3
	k)	Determine wavelength of an electron accelerated through a potential of 1600V.			CO3
	l)	Mention the properties of Ultrasonics			CO4
	m)	What are radio isotopes			CO4
	n)	Identify the applications of Ultrasonics in Medical field			CO4
UNIT I					
2.	a)	Distinguish between the spontaneous and stimulated emission of radiation	7M		CO1
	b)	Explain the construction and working of Ruby Laser With the help of suitable diagram.	7M		CO1
OR					
3.	a)	Derive the expression for Acceptance angle and Numerical Aperture of an optical fiber	7M		CO1
	b)	Explain in detail the optical communication system with a neat block diagram	7M		CO1
UNIT II					
4.	a)	Write the Maxwell equations in vacuum and conducting medium	7M		CO2
	b)	Derive an expression for resonance frequency in series LCR resonance circuit	7M		CO2
(OR)					
5.	a)	Write a short note on Hall effect	7M		CO2
	b)	Explain the construction and working mechanism of cyclotron	7M		CO2
UNIT III					
6.	a)	Explain Heisenberg's uncertainty principle. Discuss the nonexistence of the electron inside the nucleus using this principle	7M		CO3
	b)	Describe an experiment to prove dual nature of matter waves	7M		CO3
(OR)					
7.	a)	Applying Schrodinger time independent wave equation, show that energy of a particle in a one dimensional potential box is quantized.	7M		CO3
	b)	Discuss the working mechanism of scanning electron microscope	7M		CO3
UNIT IV					
8.	a)	Explain the production of Ultrasonic waves by Magnetostriction method	7M		CO4
	b)	Discuss the pulse echo NDT Technique in detail	7M		CO4
(OR)					
9.	a)	Demonstrate the ultrasonic imaging technique and mention its advantages and limitations	7M		CO4
	b)	Explain the working mechanism of G.M.Counter with neat sketch	7M		CO4

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I/IV B.Tech (Regular) DEGREE EXAMINATION

JULY, 2021

Common to ECE,EEE & EIE

First Semester

WAVES AND MODERN PHYSICS

Time: Three Hours

Maximum:70 Marks

Answer **Question NO. 1** compulsorily.

(14X1 = 14 Marks)

Answer **ONE** questions from each unit.

(4X14=56 Marks)

			M	CO	BL
1.	a)	Explain the term "Pumping".			CO1
	b)	Define Acceptance angle.			CO1
	c)	List out the advantages of optical fibres.			CO1
	d)	What are matter waves?			CO3
	e)	Define inductive reactance in AC circuit.			CO2
	f)	Define quality factor.			CO2
	g)	What is Poynting Vector?			CO2
	h)	What is Hall effect?			CO2
	i)	Discuss the applications of Ultrasonic waves.			CO4
	j)	What are radio isotopes?			CO4
	k)	Define piezo electric effect.			CO4
	l)	What is the purpose of quenching agent?			CO4
	m)	Write the properties of laser.			CO1
	n)	What is the de-Broglie wavelength of an electron accelerating in 100V potential difference?			CO3
UNIT I					
2.	a)	Illustrate the construction and working of Ruby Laser With neat diagram.	8M		CO1
	b)	Write the applications of laser.	6M		CO1
OR					
3.	a)	Define Acceptance angle and Numerical Aperture and derive the expression for them.	10M		CO1
	b)	Calculate the numerical aperture of a given optical fiber, if the refractive indices of core and cladding are 1.54 and 1.42 respectively.	4M		CO1
UNIT II					
4.	a)	Derive the expressions for impedance of LCR series circuit and obtain the condition for resonance.	10M		CO2
	b)	Write the integral and differential forms of Maxwell's equations.	4M		CO2
OR					
5.	a)	Explain the construction and working mechanism of cyclotron and write its limitations.	10M		CO2
	b)	Write applications of Hall effect.	4M		CO2
UNIT III					
6.	a)	Explain de-Broglie hypothesis and derive the wavelength of matter waves.	8M		CO3
	b)	State and explain Heisenberg's uncertainty principle.	6M		CO3
OR					
7.	a)	Derive one dimensional time independent Schrodinger wave equation for a particle.	8M		CO3
	b)	Explain the physical significance of wave function and write its Limitations.	6M		CO3
UNIT IV					
8.	a)	Describe the production of Ultrasonic waves by Magnetostriction method.	10M		CO4
	b)	Discuss various properties of ultrasonic waves.	4M		CO4
OR					
9.	a)	Explain the construction and working of G.M.Counter.	10M		CO4
	b)	Write the applications of radio isotopes in medicine.	4M		CO4