

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Bachelor of Technology (Civil Engineering) SEMESTER - 2 Summer 2025 (Regular)

Course : Bachelor of Technology (Civil Engineering) Branch : Engineering and Technology

Semester : SEMESTER - 2

Subject Code & Name: 24AF1PHYBS202 - ENGINEERING PHYSICS

Time : 3 Hours]

[Total Marks : 60

Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and include objective-type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6
4. Use of non-programmable scientific calculators is allowed.
5. Assume suitable data wherever necessary and mention it clearly.

Q1. Objective type questions. (Compulsory Question)

12

- 1 O.W.U. is the unit of
 - a. Absorption
 - b. Reverberation time
 - c. Loudness
 - d. Absorption coefficient
- 2 How does ionic polarization occur?
 - a. Splitting of ions
 - b. Passing magnetic field
 - c. Displacement of cations and anions
 - d. Never occurs
- 3 In the Newton's rings experiment, if the radius of curvature of the lens increases, the diameter of the rings will
 - a. Increase
 - b. decrease
 - c. Remain the same
 - d. Become zero
- 4 If the light is made incident on any transparent medium at the polarizing angle, the reflected light is
 - a. unpolarised
 - b. Plane polarised
 - c. partially Polarised
 - d. none of these
- 5 What is the life time of electron in metastable state?
 - a. 10^{-3} sec
 - b. 10^{-5} Sec
 - c. 10^{-8} sec
 - d. 10^{-7} sec
- 6 What is the term for the maximum angle at which light can enter an optical fiber and still be guided through it?
 - a. Refraction angle
 - b. Critical angle
 - c. Acceptance angle
 - d. Numerical aperture
- 7 The concept of matter wave was suggested by
 - a. Heisenberg
 - b. De- Broglie
 - c. Schrodinger
 - d. Laplace
- 8 What is the fundamental unit of information in quantum computing?
 - a. Qubit
 - b. Bit
 - c. Byte
 - d. Quantum Byte
- 9 Which of the following acts as quenching in Geiger Muller counter?
 - a. Alcohol
 - b. Argon
 - c. Krypton
 - d. Hydrogen
- 10 What is the smallest repeating unit in a crystal lattice that, when repeated in three dimensions, generates the entire crystal structure?
 - a. Unit Cell
 - b. Space lattice
 - c. Basis
 - d. Miller indices

11. What is the typical size range for nanomaterials (in at least one dimension)?
 a. 1-10 micrometers b. 10- 1000 nanometer c. 1-100 nanometers d. 0.1-1 nanometer
12. The magnetic lines of force cannot penetrate the body of a superconductor, a phenomenon is known as
 a. Isotopic effect b. BCS Theory c. Meissner effect d. London theory
- Q2. Solve the following.
- A) What is Magnetostriction effect? Describe the production of ultrasonic waves by using Magnetostriction method. 6
- B) Explain the types of dielectric polarization. 6
- The volume of an auditorium is 12000 m^3 . Its reverberation time is 1.5 sec. If the average absorption coefficient of interior surface is $0.4 \text{ Sabine m}^{-2}$. Find the area of interior surface. 6
- Q3. Solve the following.
- A) Explain the construction and working of semiconductor diode laser. 6
- B) Explain the phenomenon of interference in thin films in reflected light. 6
- Q4. Solve Any Two of the following.
- A) State Heisenberg's Uncertainty Principle. Using this principle, if uncertainty in the location of a particle is equal to its De-Broglie wavelength. Show that the uncertainty in its velocity is equal to its velocity. 6
- B) Derive Schrodinger's time dependent wave equation. 6
- C) Write a note on quantum computing. What is difference between bits and qubits? 6
- Q5. Solve Any Two of the following.
- A) Define atomic radius. Derive an expression for atomic radii for SC, BCC and FCC. 6
- B) What are Miller Indices? Explain procedure for find Miller Indices. Find the miller Indices of a set of parallel planes which makes intercepts in the ration $3a:4b$ on X and Y axis and are parallel to Z axes. 6
- C) State different properties of α , β and γ rays. 6
- Q6. Solve Any Two of the following.
- A) Distinguish between Type -I and Type -II superconductors along with examples. 6
- B) Derive an expression for Hall voltage and Hall coefficient with neat labeled diagram. 6
- C) What is nanomaterial? Explain top-down and Bottom-up approach. 6

*** End ***

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular Winter Examination – 2024

Course: F. Y. B. Tech

Branch: Common To All Branches

Semester: I

Subject Code & Name: 24AF2PHYBS102, Engineering Physics

Max Marks: 60

Date: 08/02/2025

Duration: 3 Hr.

Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and include objective-type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6.
4. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
5. Use of non-programmable scientific calculators is allowed.
6. Assume suitable data wherever necessary and mention it clearly.

					(Level/CO)	Marks
Q. 1	Objective type questions. (Compulsory Question)					12
1	The speed of propagation of ultrasonic waves increases with increase in a. Wavelength b. Frequency c. Amplitude d. Intensity				Remember (CO1)	1
2	Dielectric materials are generally a. Insulating Materials b. Ferri Electric Materials c. Ferro Electric Materials d. Superconducting Materials				Remember (CO1)	1
3	In Newton's ring shape of interference pattern is a. Straight fringes b Circular fringes c. Elliptical fringes. d. Straight & Equidistant lines				Remember (CO2)	1
4	The substance which rotates the plane of polarization to left is called as Dextrorotatory b. Levorotatory c. Oscillatory d. None of these				Remember (CO2)	1
5	The principle of Laser is a. Spontaneous emission b. Stimulated emission c. Thermionic emission d. All of these				Remember (CO2)	1
6	Numerical aperture is also called as a. Reflecting angle b. Sine of Acceptance angle c. Scattering angle d. Recoiling angle				Remember (CO2)	1
7	According to Heisenberg's principle, certainty in position involves a. Uncertainty in momentum b. certainty in momentum c. uncertainty in position d. certainty in position				Remember (CO3)	1
8	What is the fundamental unit of information in quantum computing				Remember	1

	a. Bit	b. Qubit	c. Byte	d. Quantum Byte	(CO3)	
9	Geiger Muller Counter is used to measure a. α particles	b. β and γ particles	c. α, β & γ particles	d. None of these	Remember (CO4)	1
10	Number of atoms per unit cell for Face centered Cubic structure is a. 1	b. 4	c. 2	d. 6	Remember (CO4)	1
11	The temperature at which normal material turns into superconductor is a. Absolute Temperature	b. Critical Temperature	c. Mean Temperature	d. Crystallization Temperature	Remember (CO5)	1
12	1 Nanometer = _____ m a. 10^9	b. 10^{-10}	c. 10^9	d. 10^{10}	Remember (CO5)	1
Q. 2	Solve the following.					12
A)	What is Piezoelectric effect? Describe the production of ultrasonic waves by using Piezoelectric method.				Remember/ Understand (CO1)	6
B)	Explain any three factors affecting architectural acoustics of a building. A cinema hall has a volume of 7500 m^3 . It is required to have reverberation time of 1.5 sec. What should be the total absorption in the hall?				Understand (CO1)	6
Q. 3	Solve the following.					12
A)	Derive an expression for diameter of n^{th} bright and dark Newton's rings.				Understand (CO2)	6
B)	Explain the construction and working of Helium Neon laser.				Understand (CO2)	6
Q. 4	Solve Any Two of the following.					12
A)	What is Heisenberg's uncertainty principle? If the uncertainty in position of an electron is $4 \times 10^{-10} \text{ m}$. Calculate the uncertainty in its momentum.				Remember/ Understand (CO3)	6
B)	Derive time independent Schrodinger wave equation.				Understand (CO3)	6

C)	Derive time dependent Schrodinger wave equation.	Understand (CO3)	6
Q.5	Solve Any Two of the following.		12
A)	Define atomic packing fraction. Calculate the atomic packing fraction in SC, BCC, FCC lattices.	Remember/ Understand (CO4)	6
B)	Derive the relation between lattice parameter 'a' and crystal density 'ρ' Copper has FCC structure and its atomic radius is 1.278 Å . Calculate density of Cu. Given atomic weight of Cu=63.5.	Understand (CO4)	6
C)	With neat diagram explain the construction & working of Geiger Muller Counter.	Understand (CO4)	6
Q. 6	Solve Any Two of the following.		12
A)	Explain the B-H curve for ferromagnetic materials. Define Coercivity and retentivity	Understand (CO5)	6
B)	Define superconductivity and distinguish between Type I & Type II superconductors.	Understand (CO5)	6
C)	What is nanomaterial? Explain top-down and bottom-up approach for synthesis of nanomaterial	Understand (CO5)	6

*** End ***

51702595

51702595

51702595

	<p>DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE Mid SEM. Test Examination Course: B. Tech in Mech/Civil Subject Name: Engineering Physics Max Marks: 20 Date:- 03/10/2019 Sem: I Subject Code: BTBS102 Duration:- 1 Hr.</p>	
	<p>Instructions to the student: 1. All questions are compulsory. 2. Figures to right indicate full marks</p>	
		(Level/CO)
Q. 1	Attempt the following	Marks
	<p>1. Ultra sonic waves are A. Electromagnetic wave. B. Elastic wave C. Matter wave D. None of these</p>	Remember
	<p>2. The sound is heard in a organ pipe. The phenomenon used here is A. Oscillatory motion B. Resonance C. Periodic Motion D Both A & C</p>	Remember
	<p>3. When the particle is subjected to an oscillatory motion with the help of external periodic force ,the oscillations are called A. Free oscillation B. Forced oscillation C. Damped oscillation D. None of these</p>	Remember
	<p>4. Light waves are transverse in nature, can be demonstrated by observing the phenomenon of A. Dispersion B. Interference C. Polarization D. Diffraction</p>	Remember
	<p>5. A system in which population inversion is achieved is called..... A. Parallel system B. Active system. C. Metastable state D. pumping</p>	Remember
	<p>6. Optical fibre works on the principle of A. Photo-electric effect B. Laser Effect C. Total internal reflection D. Refraction</p>	Remember

Q.2	Solve Any Two of the following.	3 X 2
(A)	Explain Production of ultrasonic wave with the help of Magnetostriiction effect.	Understanding
(B)	The refractive index of core and cladding material of a step index fibre are 1.48 & 1.45 respectively. Calculate: i)Numerical aperature ii)Acceptance angle	Applying
(C)	Explain interference of light in thin film.	Understanding
Q. 3	Solve Any One of the following.	8
(A)	i) Define Free Oscillation. Obtain the differential equation & find general solution. ii) Discuss the effect of temperature & frequency dependence of polarization in dielectrics.	
(B)	i) Explain construction & working of ruby Laser ii) Distinguish between Positive crystal & Negative crystal	Understanding
	*** End ***	

<https://www.batuonline.com>

Whatsapp @ 9300930012

Send your old paper & get 10/-

अपने पुराने पेपर्स भेजे और 10 रुपये पायें,

Paytm or Google Pay से

	DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE Regular & Supplementary Examination – Winter 2023			
	Course: B. Tech.	Branch: All	Semester: I	
	Subject Code & Name: BTBS102P (Engineering Physics)			
	Max Marks: 60	Date: 03-01-24	Duration: 3 Hr.	
	Instructions to the Students:			
	<ol style="list-style-type: none"> 1. All the questions are compulsory. 2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question. 3. Use of non-programmable scientific calculators is allowed. 4. Assume suitable data wherever necessary and mention it clearly. 			
		(Level/CO)	Marks	
Q. 1	Solve Any Two of the following.		12	
A)	Define free oscillations. Derive an expression for differential equation of free oscillations.	(CO1) (Remember & Understand)	6	
B)	Explain the construction, working for production of ultrasonic waves using Magnetostriction method.	(CO1) (Understand)	6	
C)	State properties of ultrasonic waves. A quartz crystal having 03 mm thickness is vibrating at resonance. Calculate the fundamental frequency of vibrations for which ultrasonic waves are generated. Given for quartz, Young's Modulus is 7.9×10^{10} N/m ² , Density is 2650 Kg/m ³	(CO1) (Remember & Understand)	6	
Q.2	Solve Any Two of the following.		12	
A)	Derive an expression for the optical path difference for the reflected rays in a thin film of constant thickness and hence find the conditions for maxima and minima.	(CO2) (Understand)	6	
B)	Explain the construction & working of Helium-Neon Laser with neat & labeled diagram.	(CO2) (Understand)	6	
C)	Explain the structure of optical fiber with suitable diagram. Refractive index of the core is 1.48 and that of cladding is 1.47 in an optical fiber. Calculate numerical aperture.	(CO2) (Remember & understand)	6	
Q. 3	Solve Any Two of the following. https://www.batuonline.com		12	
A)	With neat diagram, explain the construction & working of Bainbridge mass spectrograph.	(CO3) (Understand)	6	
B)	With graph and suitable diagram explain the construction & working of Geiger Muller Counter.	(CO3) (Understand)	6	
C)	Derive Schrodinger's time independent wave equation.	(CO3) (Understand)	6	
Q.4	Solve the following questions.		12	
A)	Calculate Atomic Packing Fraction for SC, BCC and FCC structures.	(CO4) (Understand)	6	

B)	Explain Characteristics X-ray spectra. Calculate the wavelength of X-rays when a potential difference of 20 KV is applied between filament and anode.	(CO4) (Understand)	6
Q. 5	Solve Any Two of the following.		12
A)	Explain B-H curve for ferromagnetic materials.	(Remember & Understand)	6
B)	What is Superconductivity? Explain Meissner effect in Superconductors.	(Remember & Understand)	6
C)	What is Hall effect? Derive an expression for Hall Voltage and Hall coefficient.	(Remember & Understand)	6
	*** End ***		

<https://www.batuonline.com>

Whatsapp @ 9300930012

Send your old paper & get 10/-

अपने पुराने पेपर्स भेजे और 10 रुपये पायें,

Paytm or Google Pay से

	<p>DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE Winter Examination – 2022</p> <p>Course: B. Tech. Branch : All Semester : I</p> <p>Subject Code & Name: Engineering Physics (BTBS102P)</p> <p>Max Marks: 60 Date:23/03/23 Duration: 3 Hr.</p>	
	<p>Instructions to the Students:</p> <ol style="list-style-type: none"> 1. All the questions are compulsory. 2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question. 3. Use of non-programmable scientific calculators is allowed. 4. Assume suitable data wherever necessary and mention it clearly. 	
		(Level/CO) Marks
Q. 1	Solve Any Two of the following:	12
A)	Describe the construction and working for producing ultrasonic waves using magnetostriiction method.	CO1 6
B)	Define free oscillation. Set up a differential equation for free oscillations and find it's solution.	CO1 6
C)	Define ultrasonic waves. List their applications in various fields. Give the details of any one application with labeled diagram.	CO1 6
Q.2	Solve Any Two of the following. https://www.batuonline.com	12
A)	Derive an expression for darkness due to reflected light for thin film interference.	CO2 6
B)	Explain the production of polarization due to birefringence (Double refraction) with neat diagram.	CO2 6
C)	Explain the construction and working of He-Ne laser with neat and labeled diagram.	CO2 6
Q. 3	Solve Any Two of the following.	12
A)	Derive Schrodinger's time independent wave equation.	CO3 6
B)	With neat diagram, explain the construction & working of Geiger-Muller Counter.	CO3 6
C)	Explain with neat diagram, how isotopes can be separated with the help of Bainbridge mass spectrograph.	CO3 6
Q.4	Solve the following.	12
A)	Describe the production of characteristic X-rays. Calculate the minimum wavelength of X-rays, if the X-ray is operated	CO4 6

	at 20 kV.		
B)	Calculate the relation between atomic radius and lattice constant for BCC and FCC.	CO4	6
Q. 5	Solve Any Two of the following.		12
A)	Differentiate between conductor, semiconductor and insulator on the basis of energy band diagram and discuss their properties.		6
B) ✓	Explain Meissner effect in superconductors. State any two applications of superconductors.		6
C)	Explain B-H curve for ferromagnetic materials. Write the significance of B-H curve.		6
	*** End ***		

<https://www.batuonline.com>

Whatsapp @ 9300930012

Send your old paper & get 10/-

अपने पुराने पेपर्स भेजे और 10 रुपये पायें,

Paytm or Google Pay से

	<p>DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE Supplementary End Semester Examination – Winter 2023 Course: B. Tech. Branch: All Semester: II Subject Code & Name: Engineering Physics (BTBS202P) Max Marks: 60 Date: 17/01/2024 Duration: 3 Hr.</p>	
	<p>Instructions to the Students:</p> <ol style="list-style-type: none"> 1. All the questions are compulsory. 2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question. 3. Use of non-programmable scientific calculators is allowed. 4. Assume suitable data wherever necessary and mention it clearly. 	
		(Level/CO) Marks
Q. 1	Solve Any Two of the following.	12
A)	Define forced Vibrations. Derive differential equation for forced vibrations.	(CO1) (Remember & understand) 6
B)	Explain the construction, working for production of ultrasonic waves using Piezoelectric oscillator.	(CO1) (Understand) 6
C)	Derive differential equation for wave motion.	(CO1) (Understand) 6
Q.2	Solve Any Two of the following.	12
A)	In Newton's rings, derive an expression for diameter of n^{th} bright ring and dark ring.	(CO2) (Understand) 6
B)	Explain the terms 1) Absorption 2) Spontaneous emission 3) Stimulated Emission 4) Population Inversion https://www.batuonline.com	(CO2) (Understand) 6
C)	Explain Huygen's theory of double refraction. A glass plate is to be used as a polarizer. Find the angle of polarization for it. Also find the angle of refraction. ($\mu = 1.54$)	(CO2) (Understand) 6
Q. 3	Solve Any Two of the following.	12
A)	Explain the motion of electron in parallel and perpendicular magnetic field.	(CO3) (Understand) 6
B)	Write short note on Geiger Muller Counter.	(CO3) (Understand) 6

C)	Derive Schrodinger's time dependent wave equation.	(CO3) (Understand)	6
Q.4	Solve the following questions.		12
A)	Define Atomic Radius, Coordination Number and Atomic Packing Fraction. Derive the relation between lattice parameter 'a' and crystal density 'ρ'.	(CO4) (Understand)	6
B)	Explain Characteristics X-ray spectra. Calculate the wavelength of X-rays when a potential difference of 20 KV is applied between filament and anode.	(CO4) (Understand)	6
Q. 5	Solve Any Two of the following.		12
A)	Explain Diamagnetic, Paramagnetic and Ferromagnetic materials with examples and diagram.	(Understand)	6
B)	Distinguish between Type I and Type II superconductors.	(Understand)	6
C)	Derive an expression for conductivity of Intrinsic and extrinsic (P Type & N Type) Semiconductors.	(Understand)	6
	*** End ***		

<https://www.batuonline.com>

Whatsapp @ 9300930012

Send your old paper & get 10/-

अपने पुराने पेपर्स भेजे और 10 रुपये पायें,

Paytm or Google Pay से

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular End Semester Examination - Summer 2023

Course: B. Tech.

Branch: All

Semester: II

Subject Code & Name: BTBS202P (Engineering Physics)

Max Marks: 60

Date: 14/07/2023

Duration: 3 Hr.

Instructions to the Students:

1. All the questions are compulsory.
2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

		(Level/CO)	Marks
Q. 1	Solve Any Two of the following.		
A)	Define Damped Vibrations. Set up differential equation for damped vibrations.	(CO1) (Remember & Understand)	6
B)	Explain the construction, working for production of ultrasonic waves using Piezoelectric oscillator.	(CO1) (Understand)	6
C)	State any two applications of ultrasonic waves. Calculate the length of iron rod which can be used to produce ultrasonic waves of 20 KHz. Density of iron is $7.23 \times 10^3 \text{ kg/m}^3$. Young's modulus is $11.6 \times 10^{10} \text{ N/m}^2$	(CO1) (Remember & Understand)	6
Q. 2	Solve Any Two of the following.		
A)	In Newton's rings, derive an expression for diameter of n^{th} bright ring and dark ring.	(CO2) (Understand)	6
B)	Explain the construction & working of Ruby laser.	(CO2) (Understand)	6
C)	Explain the structure of optical fiber with suitable diagram. Calculate the numerical aperture of a optical fiber with core index $n_1=1.61$ and cladding index $n_2=1.55$	(CO2) (Remember & Understand)	6
Q. 3	Solve Any Two of the following.		
A)	With neat diagram, explain the construction & working of Bainbridge mass spectrograph.	(CO3) (Understand)	6
B)	Write short note on Geiger Muller Counter.	(CO3) (Understand)	6
C)	State Heisenberg's Uncertainty Principle with formula.	(CO3)	6

If the uncertainty in position of an electron is 4×10^{-10} m, Calculate the uncertainty in its momentum. ($\hbar = 6.62 \times 10^{-34}$ J Sec) (Understand)

Q.4 Solve the following questions.

- A) Calculate Atomic Packing Fraction for SC, BCC and FCC lattices. (CO4) 6
(Understand)

- B) Explain Continuous X-ray spectra. (CO4) 6
Calculate the wavelength of X-rays when a potential difference of 30 KV is applied between filament and anode. (Understand)

Q. 5 Solve Any Two of the following.

- A) Explain Diamagnetic, Paramagnetic and Ferromagnetic materials with examples and diagram. (Understand) 6
- B) Distinguish between Type I and Type II superconductors. (Understand) 6
- C) Derive an expression for conductivity of Intrinsic and extrinsic (P Type & N Type) Semiconductors. (Understand) 6

*** End ***

<https://www.batuonline.com>

Whatsapp @ 9300930012

Send your old paper & get 10/-

अपने पुराने पेपर से भेजे और 10 रुपये पायें,

Paytm or Google Pay से

	<p>DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE</p> <p>Regular and Supplementary Summer 2024</p> <p>Course: B. Tech. Branch: All Semester: II</p> <p>Subject Code & Name: BTBS202P Engineering Physics</p> <p>Max Marks: 60. Date: 14/06/2024 Duration: 3 Hr.</p>					
Instructions to the Students:						
<ol style="list-style-type: none"> 1. All the questions are compulsory 2. The level of question expected answer as per OBF or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question 3. Use of non-programmable scientific calculator is allowed 4. Assume suitable data wherever necessary and mention it clearly 						
		(Level CO)	Marks			
Q. 1	Solve Any Two of the following.		12			
A)	Define Damped oscillations. Derive an expression for differential equation of Damped oscillations.	(CO1) (Remember & Understand)	6			
B)	Define i) Magnetostriction Effect ii) Piezoelectric Effect iii) Resonance. Calculate the natural frequency of the ultrasonic waves generated by a quartz crystal having thickness of 5.5 mm. [Given $Y = 8 \times 10^{10} \text{ N/m}^2$, ρ (density) = 2650 Kg/m^3]	(CO1) (Remember & Understand)	6			
C)	Derive differential equation of wave motion.	(CO1) (Understand)	6			
Q. 2	Solve Any Two of the following.		12			
A)	Derive an expression for diameter of n th bright and dark Newton's ring.	(CO2) (Understand)	6			
B)	Explain the construction & working of Helium Neon Laser with neat, labeled diagram.	(CO2) (Understand)	6			
C)	State any six applications of optical fiber. Numerical aperture of a fiber is 0.5 and core refractive index is 1.48. Find cladding refractive index.	(CO2) (Remember & Understand)	6			
Q. 3	Solve Any Two of the following.		12			
A)	Explain the construction & working of Bainbridge mass spectograph with neat & labeled diagram.	(CO3) (Understand)	6			
B)	Explain the construction & working of Geiger Muller Counter.	(CO3) (Understand)	6			

C)	Derive Schrodinger's time independent wave equation.	(CO3) (Understand) 6
Q.4	Solve the following questions.	12
A)	Calculate atomic radii for Simple cubic, Body centered, and face centered cubic structure.	(CO4) 6 (Understand)
B)	Explain Continuous X-ray spectra. Prove that, $\lambda_{\min} = \frac{12400}{V} \text{ Å}^0$	(CO4) 6 (Understand)
Q. 5	Solve Any Two of the following.	12
A)	Explain B-H Curve for ferromagnetic materials. Define the terms Retentivity & Coercivity.	(Understand) 6
B)	Explain Type-I & Type II superconductors.	(Understand) 6
C)	Explain Conductor, Semiconductor, and Insulator on the basis of band theory of Solids.	(Understand) 6
	*** End ***	

<https://www.batuonline.com>

Whatsapp @ 9300930012

Send your old paper & get 10/-

अपने पुराने पेपर्स भेजे और 10 रुपये पायें,

Paytm or Google Pay से

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular End Semester Examination – Summer 2022

Course: B. Tech. Branch: All branches (Group B)

Semester: II

Subject Code & Name: BTBSP202 Engineering Physics

Max Marks: 60

Date:20/08/2022

Duration: 3.45 Hr.

Instructions to the Students:

1. All the questions are compulsory.
2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

(Level/CO) Marks

Q. 1 Solve Any Two of the following.

A) In case of Forced vibrations, prove that

$$A = \frac{f}{\sqrt{(\omega^2 - p^2)^2 + 4b^2p^2}}$$

(CO1) 6
(Understand)

B) Explain the construction and working for production of ultrasonic waves using Piezoelectric Oscillator.

(CO1) 6
(Understand)

C) Write any two applications of ultrasonic waves.

Calculate the thickness of quartz plate which is used to produce ultrasonic waves of 2 MHz. Density of quartz is $2.65 \times 10^3 \text{ kg/m}^3$ and Young's modulus is $8 \times 10^{10} \text{ N/m}^2$

(CO1) 6
(Remember & Understand)

Q.2 Solve Any Two of the following.

A) Derive an expression for diameter of Newton's bright and dark rings.

(CO2) 6
(Understand)

B) Explain the construction and working of Ruby Laser.

(CO2) 6
(Understand)

C) State and explain Brewster's law.

(CO2) 6
(Remember & Understand)

With a slab of flint glass, the angle of polarization is found to be $62^\circ 24'$. Calculate the refractive index of the flint glass.

Q. 3 Solve Any Two of the following.

A) With neat diagram, explain the construction and working of Bainbridge Mass Spectrograph.

(CO3) 6
(Understand)

B) Explain the construction and working of Geiger Muller Counter.

(CO3) 6
(Understand)

C) Derive Schrodinger's time independent wave equation.

(CO3) 6
(Understand)

Q.4 Solve the following questions.

A) Calculate atomic radii in SC, BCC and FCC lattices with suitable diagrams.

(CO4) 6
(Understand)

B) Explain characteristics and continuous X-ray spectra.

(CO4) 6
(Understand)

Q. 5 Solve Any Two of the following.

A) Explain B-H curve for ferromagnetic materials. Define the terms Coercivity and Retentivity.

6
(Understand)

B) Distinguish between Type I and Type II superconductors.

6
(Understand)

C) What is Hall effect? Derive an expression for Hall Voltage and Hall Coefficient.

6
(Understand)
(Remember & Understand)

***** End *****

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular End Semester Examination – Summer 2022

Course: B. Tech. Branch: All branches (Group B)

Semester: II

Subject Code & Name: BTBSP202 Engineering Physics

Max Marks: 60

Date:20/08/2022

Duration: 3.45 Hr.

Instructions to the Students:

1. All the questions are compulsory.
2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

(Level/CO) Marks

Q. 1 Solve Any Two of the following.

A) In case of Forced vibrations, prove that

$$A = \frac{f}{\sqrt{(\omega^2 - p^2)^2 + 4b^2p^2}}$$

(CO1) 6

(Understand)

B) Explain the construction and working for production of ultrasonic waves using Piezoelectric Oscillator.

(CO1) 6

(Understand)

C) Write any two applications of ultrasonic waves.

Calculate the thickness of quartz plate which is used to produce ultrasonic waves of 2 MHz. Density of quartz is $2.65 \times 10^3 \text{ kg/m}^3$ and Young's modulus is $8 \times 10^{10} \text{ N/m}^2$

(CO1) 6

(Remember &

Understand)

Q.2 Solve Any Two of the following.

A) Derive an expression for diameter of Newton's bright and dark rings.

(CO2) 6

(Understand)

B) Explain the construction and working of Ruby Laser.

(CO2) 6

(Understand)

C) State and explain Brewster's law.

(CO2) 6

(Remember &

Understand)

With a slab of flint glass, the angle of polarization is found to be $62^\circ 24'$. Calculate the refractive index of the flint glass.

Q. 3 Solve Any Two of the following.

A) With neat diagram, explain the construction and working of Bainbridge Mass Spectrograph.

(CO3) 6

(Understand)

B) Explain the construction and working of Geiger Muller Counter.

(CO3) 6

(Understand)

C) Derive Schrodinger's time independent wave equation.

(CO3) 6

(Understand)

Q.4 Solve the following questions.

A) Calculate atomic radii in SC, BCC and FCC lattices with suitable diagrams.

(CO4) 6

(Understand)

B) Explain characteristics and continuous X-ray spectra.

(CO4) 6

(Understand)

Q. 5 Solve Any Two of the following.

A) Explain B-H curve for ferromagnetic materials. Define the terms Coercivity and Retentivity.

6

(Understand)

B) Distinguish between Type I and Type II superconductors.

6

(Understand)

C) What is Hall effect? Derive an expression for Hall Voltage and Hall Coefficient.

6

(Remember &

Understand)

***** End *****



Seat No.	
----------	--

**F.E. (Part – I) (CGPA) (Old) Examination, 2018
ENGINEERING PHYSICS**

Day and Date : Wednesday, 12-12-2018

Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :**
- 1) Make suitable assumptions, **if necessary**.
 - 2) Figures to the **right** indicate **full marks**.
 - 3) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each question carries one mark**.
 - 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

- Constants :**
- 1) Avogadro's no., $N = 6.02 \times 10^{26} / \text{k.mol.}$
 - 2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec.}$
 - 3) Charge of electron, $e = 1.6 \times 10^{-19} \text{ C.}$

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

SECTION – I1. Choose the correct answer : **(14x1=14)**

- 1) Acceptor type semiconductor is formed by adding impurity of valency
a) 3 b) 4 c) 5 d) 2
- 2) The number of died axes symmetry elements that are present in a cubic crystal are
a) 4 b) 6 c) 8 d) 10
- 3) The Miller indices of the plane parallel to y and z axes are
a) (0 0 1) b) (0 1 0) c) (1 0 0) d) (1 1 1)
- 4) The audible range of frequency is
a) 20 KHz to 20 MHz b) 200 KHz to 200 MHz
c) 200 Hz to 200 MHz d) 20 Hz to 20 KHz
- 5) Reverberation time is _____ to/of volume of the hall.
a) directly proportional b) inversely proportional
c) independent d) none of these
- 6) The inertial frame of reference is _____ frame of reference
a) An accelerated b) Non-accelerated
c) A rotating d) None of these

P.T.O.



7) The Lorentz transformation equation for x' co-ordinate from s to s'

- | | |
|---|---|
| a) $x' = (x + vt) / \sqrt{1 - v^2/c^2}$ | b) $x' = (x - ct) / \sqrt{1 - v^2/c^2}$ |
| c) $x' = (x - vt) / \sqrt{1 - v^2/c^2}$ | d) $x' = x - vt (\sqrt{1 - v^2/c^2})$ |

SECTION – II

8) The resolving power of a grating having N slits in n^{th} order will be

- | | | | |
|------------|--------------|----------|----------|
| a) $(n+N)$ | b) $(n - N)$ | c) n/N | d) $n.N$ |
|------------|--------------|----------|----------|

9) The substances that rotate the plane of polarization are said to be

- | | |
|---------------------|-----------------------|
| a) opaque | b) optically inactive |
| c) optically active | d) polaroid |

10) Stimulated emission process is represented by equation

- | | |
|---|--|
| a) $A^* + h\gamma \rightarrow A + 2h\gamma$ | b) $A + h\gamma \rightarrow A^*$ |
| c) $A^* \rightarrow A + h\gamma$ | d) $A^* + h\gamma \rightarrow A + h\gamma$ |

11) The hologram records _____ of the object.

- | |
|--|
| a) Only intensity variation |
| b) Only phase distribution |
| c) Both intensity variation and phase distribution |
| d) None of these |

12) In total internal reflection phenomenon the light ray incident from

- | | |
|---------------------|--------------------|
| a) Rarer to denser | b) Rarer to rarer |
| c) Denser to denser | d) Denser to rarer |

13) Energy released per fission of a $_{92}^{235}\text{U}$ nucleus is nearly

- | | |
|------------|-----------|
| a) 200 eV | b) 20 eV |
| c) 200 MeV | d) 20 MeV |

14) The chirality of armchair CNT is

- | | | | |
|-----------|-----------|-----------|-----------|
| a) (a, b) | b) (a, 0) | c) (a, a) | d) (0, b) |
|-----------|-----------|-----------|-----------|
-



Seat No.	
----------	--

F.E. (Part – I) (CGPA) (Old) Examination, 2018
ENGINEERING PHYSICS

Day and Date : Wednesday, 12-12-2018

Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :** 1) Make suitable assumptions, **if necessary**.
2) Figures to the **right** indicate **full** marks.

SECTION – I

2. Attempt **any five** of the following : 15

- a) Describe in brief the formation of energy bands in solids.
- b) Calculate no. of atoms per unit cell for SC, BCC and FCC crystal.
- c) Explain the various requirements of a good auditorium.
- d) Deduce an expression for length contraction.
- e) Obtain the relativistic formula for the addition of velocities.
- f) A hall with volume of 1000 m^3 has a sound-absorbing surface of area 400 m^2 . If the average absorption coefficient of the hall is 0.2 sabines, what is the reverberation time of the hall ?
- g) A rocket ship is 100 meter long on the ground. When it is in flight, its length is 99 meters to an observer on the ground. What is its speed ?

3. a) What is Hall effect ? Obtain an expression for Hall voltage and Hall coefficient. 5

OR

- b) Discuss the various types of symmetry elements and symmetry operations present in a cubic crystal.

4. Attempt **any two** of the following : 8

- a) Explain effect of impurity on Fermi level in p-type and n-type semiconductor.
- b) Define atomic radius and obtain its values for SC, BCC and FCC crystals.
- c) Explain acoustic diffraction method for determination of wavelength of ultrasonic waves.
- d) Deduce the expression for relativistic mass variation, to show $m = m_0/(1 - v^2/c^2)^{1/2}$.

Set P



SECTION – II

5. Attempt **any five** of the following : 15

- a) Distinguish between Fresnel and Fraunhofer class of diffraction.
- b) Define :
 - i) Spontaneous emission
 - ii) Stimulated emission
 - iii) Stimulated absorption
- c) Explain with neat diagram basic concept and structure of optical fiber.
- d) Explain with diagram types of carbon nano tubes.
- e) Explain Proton - Proton cycle.
- f) A fiber cable has an acceptance angle of 30° and core index of refraction 1.4. Calculate the cladding index of refraction.
- g) Calculate power output of a nuclear reactor. Which consumes 20.4 Kg of U 235 in 1000 hours of operations. Assume that energy released per fission of U 235 is 200 MeV.

6. a) Define optical activity. Explain construction and working of Laurent's half shade polarimeter. 5

OR

- b) Describe He-Ne laser with its construction and working.

7. Attempt **any two** of the following : 8

- a) Derive an expression for the resolving power of a plane diffraction grating.
- b) Explain the construction and reconstruction of hologram with neat diagram.
- c) Explain the fiber optics communication system with block diagram.
- d) Write a note on: Classification of nuclear reactor.



Seat No.	
----------	--

**F.E. (Part – I) (CGPA) (Old) Examination, 2018
ENGINEERING PHYSICS**

Day and Date : Wednesday, 12-12-2018

Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :**
- 1) Make suitable assumptions, *if necessary*.
 - 2) Figures to the **right** indicate **full marks**.
 - 3) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each question carries one mark**.
 - 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

- Constants :**
- 1) Avogadro's no., $N = 6.02 \times 10^{26} / \text{k.mol.}$
 - 2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec.}$
 - 3) Charge of electron, $e = 1.6 \times 10^{-19} \text{ C.}$

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

SECTION – I1. Choose the correct answer : **(14x1=14)**

- 1) The Miller indices of the plane parallel to y and z axes are
a) (0 0 1) b) (0 1 0) c) (1 0 0) d) (1 1 1)
- 2) The audible range of frequency is
a) 20 KHz to 20 MHz b) 200 KHz to 200 MHz
c) 200 Hz to 200 MHz d) 20 Hz to 20 KHz
- 3) Reverberation time is _____ to/of volume of the hall.
a) directly proportional b) inversely proportional
c) independent d) none of these
- 4) The inertial frame of reference is _____ frame of reference
a) An accelerated b) Non-accelerated
c) A rotating d) None of these
- 5) The Lorentz transformation equation for x' co-ordinate from s to s'
a) $x' = (x + vt) / \sqrt{1 - v^2/c^2}$ b) $x' = (x - ct) / \sqrt{1 - v^2/c^2}$
c) $x' = (x - vt) / \sqrt{1 - v^2/c^2}$ d) $x' = x - vt (\sqrt{1 - v^2/c^2})$
- 6) Acceptor type semiconductor is formed by adding impurity of valency
a) 3 b) 4 c) 5 d) 2

P.T.O.



- 7) The number of died axes symmetry elements that are present in a cubic crystal are
a) 4 b) 6 c) 8 d) 10

SECTION – II

- 8) Stimulated emission process is represented by equation

 - a) $A^* + h\gamma \rightarrow A + 2h\gamma$
 - b) $A + h\gamma \rightarrow A^*$
 - c) $A^* \rightarrow A + h\gamma$
 - d) $A^* + h\gamma \rightarrow A + h\gamma$

9) The hologram records _____ of the object.

 - a) Only intensity variation
 - b) Only phase distribution
 - c) Both intensity variation and phase distribution
 - d) None of these

10) In total internal reflection phenomenon the light ray incident from

 - a) Rarer to denser
 - b) Rarer to rarer
 - c) Denser to denser
 - d) Denser to rarer

11) Energy released per fission of a $_{92}U^{235}$ nucleus is nearly

 - a) 200 eV
 - b) 20 eV
 - c) 200 MeV
 - d) 20 MeV

12) The chirality of armchair CNT is

 - a) (a, b)
 - b) (a, 0)
 - c) (a, a)
 - d) (0, b)

13) The resolving power of a grating having N slits in n^{th} order will be

 - a) $(n+N)$
 - b) $(n - N)$
 - c) n/N
 - d) $n.N$

14) The substances that rotate the plane of polarization are said to be

 - a) opaque
 - b) optically inactive
 - c) optically active
 - d) polaroid



Seat No.	
----------	--

F.E. (Part – I) (CGPA) (Old) Examination, 2018
ENGINEERING PHYSICS

Day and Date : Wednesday, 12-12-2018

Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :** 1) Make suitable assumptions, **if necessary**.
2) Figures to the **right** indicate **full** marks.

SECTION – I

2. Attempt **any five** of the following : 15

- Describe in brief the formation of energy bands in solids.
- Calculate no. of atoms per unit cell for SC, BCC and FCC crystal.
- Explain the various requirements of a good auditorium.
- Deduce an expression for length contraction.
- Obtain the relativistic formula for the addition of velocities.
- A hall with volume of 1000 m^3 has a sound-absorbing surface of area 400 m^2 . If the average absorption coefficient of the hall is 0.2 sabines, what is the reverberation time of the hall ?
- A rocket ship is 100 meter long on the ground. When it is in flight, its length is 99 meters to an observer on the ground. What is its speed ?

3. a) What is Hall effect ? Obtain an expression for Hall voltage and Hall coefficient. 5

OR

- Discuss the various types of symmetry elements and symmetry operations present in a cubic crystal.

4. Attempt **any two** of the following : 8

- Explain effect of impurity on Fermi level in p-type and n-type semiconductor.
- Define atomic radius and obtain its values for SC, BCC and FCC crystals.
- Explain acoustic diffraction method for determination of wavelength of ultrasonic waves.
- Deduce the expression for relativistic mass variation, to show $m = m_0/(1 - v^2/c^2)^{1/2}$.

Set Q



SECTION – II

5. Attempt **any five** of the following : 15

- a) Distinguish between Fresnel and Fraunhofer class of diffraction.
- b) Define :
 - i) Spontaneous emission
 - ii) Stimulated emission
 - iii) Stimulated absorption
- c) Explain with neat diagram basic concept and structure of optical fiber.
- d) Explain with diagram types of carbon nano tubes.
- e) Explain Proton - Proton cycle.
- f) A fiber cable has an acceptance angle of 30° and core index of refraction 1.4. Calculate the cladding index of refraction.
- g) Calculate power output of a nuclear reactor. Which consumes 20.4 Kg of U 235 in 1000 hours of operations. Assume that energy released per fission of U 235 is 200 MeV.

6. a) Define optical activity. Explain construction and working of Laurent's half shade polarimeter. 5

OR

- b) Describe He-Ne laser with its construction and working.

7. Attempt **any two** of the following : 8

- a) Derive an expression for the resolving power of a plane diffraction grating.
- b) Explain the construction and reconstruction of hologram with neat diagram.
- c) Explain the fiber optics communication system with block diagram.
- d) Write a note on: Classification of nuclear reactor.



Seat No.	
----------	--

**F.E. (Part – I) (CGPA) (Old) Examination, 2018
ENGINEERING PHYSICS**

Day and Date : Wednesday, 12-12-2018

Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :**
- 1) Make suitable assumptions, **if necessary**.
 - 2) Figures to the **right** indicate **full marks**.
 - 3) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each question carries one mark**.
 - 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

- Constants :**
- 1) Avogadro's no., $N = 6.02 \times 10^{26} / \text{k.mol.}$
 - 2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec.}$
 - 3) Charge of electron, $e = 1.6 \times 10^{-19} \text{ C.}$

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

SECTION – I1. Choose the correct answer : **(14x1=14)**

- 1) Reverberation time is _____ to/of volume of the hall.
a) directly proportional b) inversely proportional
c) independent d) none of these
- 2) The inertial frame of reference is _____ frame of reference
a) An accelerated b) Non-accelerated
c) A rotating d) None of these
- 3) The Lorentz transformation equation for x' co-ordinate from s to s'
a) $x' = (x + vt) / \sqrt{1 - v^2/c^2}$ b) $x' = (x - ct) / \sqrt{1 - v^2/c^2}$
c) $x' = (x - vt) / \sqrt{1 - v^2/c^2}$ d) $x' = x - vt (\sqrt{1 - v^2/c^2})$
- 4) Acceptor type semiconductor is formed by adding impurity of valency
a) 3 b) 4 c) 5 d) 2
- 5) The number of died axes symmetry elements that are present in a cubic crystal are
a) 4 b) 6 c) 8 d) 10
- 6) The Miller indices of the plane parallel to y and z axes are
a) (0 0 1) b) (0 1 0) c) (1 0 0) d) (1 1 1)

P.T.O.



- 7) The audible range of frequency is
- a) 20 KHz to 20 MHz
 - b) 200 KHz to 200 MHz
 - c) 200 Hz to 200 MHz
 - d) 20 Hz to 20 KHz

SECTION – II

- 8) In total internal reflection phenomenon the light ray incident from
- a) Rarer to denser
 - b) Rarer to rarer
 - c) Denser to denser
 - d) Denser to rarer
- 9) Energy released per fission of a $_{92}U^{235}$ nucleus is nearly
- a) 200 eV
 - b) 20 eV
 - c) 200 MeV
 - d) 20 MeV
- 11) The chirality of armchair CNT is
- a) (a, b)
 - b) (a, 0)
 - c) (a, a)
 - d) (0, b)
- 11) The resolving power of a grating having N slits in n^{th} order will be
- a) $(n+N)$
 - b) $(n - N)$
 - c) n/N
 - d) $n.N$
- 12) The substances that rotate the plane of polarization are said to be
- a) opaque
 - b) optically inactive
 - c) optically active
 - d) polaroid
- 13) Stimulated emission process is represented by equation
- a) $A^* + h\gamma \rightarrow A + 2h\gamma$
 - b) $A + h\gamma \rightarrow A^*$
 - c) $A^* \rightarrow A + h\gamma$
 - d) $A^* + h\gamma \rightarrow A + h\gamma$
- 14) The hologram records _____ of the object.
- a) Only intensity variation
 - b) Only phase distribution
 - c) Both intensity variation and phase distribution
 - d) None of these
-



Seat No.	
----------	--

F.E. (Part – I) (CGPA) (Old) Examination, 2018
ENGINEERING PHYSICS

Day and Date : Wednesday, 12-12-2018

Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :** 1) Make suitable assumptions, **if necessary**.
2) Figures to the **right** indicate **full** marks.

SECTION – I

2. Attempt **any five** of the following : 15

- Describe in brief the formation of energy bands in solids.
- Calculate no. of atoms per unit cell for SC, BCC and FCC crystal.
- Explain the various requirements of a good auditorium.
- Deduce an expression for length contraction.
- Obtain the relativistic formula for the addition of velocities.
- A hall with volume of 1000 m^3 has a sound-absorbing surface of area 400 m^2 . If the average absorption coefficient of the hall is 0.2 sabines, what is the reverberation time of the hall ?
- A rocket ship is 100 meter long on the ground. When it is in flight, its length is 99 meters to an observer on the ground. What is its speed ?

3. a) What is Hall effect ? Obtain an expression for Hall voltage and Hall coefficient. 5

OR

- Discuss the various types of symmetry elements and symmetry operations present in a cubic crystal.

4. Attempt **any two** of the following : 8

- Explain effect of impurity on Fermi level in p-type and n-type semiconductor.
- Define atomic radius and obtain its values for SC, BCC and FCC crystals.
- Explain acoustic diffraction method for determination of wavelength of ultrasonic waves.
- Deduce the expression for relativistic mass variation, to show $m = m_0/(1 - v^2/c^2)^{1/2}$.

Set R



SECTION – II

5. Attempt **any five** of the following : 15
- Distinguish between Fresnel and Fraunhofer class of diffraction.
 - Define :
 - Spontaneous emission
 - Stimulated emission
 - Stimulated absorption
 - Explain with neat diagram basic concept and structure of optical fiber.
 - Explain with diagram types of carbon nano tubes.
 - Explain Proton - Proton cycle.
 - A fiber cable has an acceptance angle of 30° and core index of refraction 1.4. Calculate the cladding index of refraction.
 - Calculate power output of a nuclear reactor. Which consumes 20.4 Kg of U 235 in 1000 hours of operations. Assume that energy released per fission of U 235 is 200 MeV.

6. a) Define optical activity. Explain construction and working of Laurent's half shade polarimeter. 5

OR

- b) Describe He-Ne laser with its construction and working.

7. Attempt **any two** of the following : 8
- Derive an expression for the resolving power of a plane diffraction grating.
 - Explain the construction and reconstruction of hologram with neat diagram.
 - Explain the fiber optics communication system with block diagram.
 - Write a note on: Classification of nuclear reactor.



Seat No.	
----------	--

**F.E. (Part – I) (CGPA) (Old) Examination, 2018
ENGINEERING PHYSICS**

Day and Date : Wednesday, 12-12-2018

Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :**
- 1) Make suitable assumptions, **if necessary**.
 - 2) Figures to the **right** indicate **full marks**.
 - 3) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each question carries one mark**.
 - 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

- Constants :**
- 1) Avogadro's no., $N = 6.02 \times 10^{26} / \text{k.mol.}$
 - 2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec.}$
 - 3) Charge of electron, $e = 1.6 \times 10^{-19} \text{ C.}$

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

SECTION – I

1. Choose the correct answer : **(14x1=14)**
 - 1) The audible range of frequency is
 - a) 20 KHz to 20 MHz
 - b) 200 KHz to 200 MHz
 - c) 200 Hz to 200 MHz
 - d) 20 Hz to 20 KHz
 - 2) Reverberation time is _____ to/of volume of the hall.
 - a) directly proportional
 - b) inversely proportional
 - c) independent
 - d) none of these
 - 3) The inertial frame of reference is _____ frame of reference
 - a) An accelerated
 - b) Non-accelerated
 - c) A rotating
 - d) None of these
 - 4) The Lorentz transformation equation for x' co-ordinate from s to s'
 - a) $x' = (x + vt) / \sqrt{1 - v^2/c^2}$
 - b) $x' = (x - ct) / \sqrt{1 - v^2/c^2}$
 - c) $x' = (x - vt) / \sqrt{1 - v^2/c^2}$
 - d) $x' = x - vt (\sqrt{1 - v^2/c^2})$
 - 5) Acceptor type semiconductor is formed by adding impurity of valency
 - a) 3
 - b) 4
 - c) 5
 - d) 2



- 6) The number of died axes symmetry elements that are present in a cubic crystal are
a) 4 b) 6 c) 8 d) 10

7) The Miller indices of the plane parallel to y and z axes are
a) (0 0 1) b) (0 1 0) c) (1 0 0) d) (1 1 1)

SECTION – III

- 8) The hologram records _____ of the object.

 - Only intensity variation
 - Only phase distribution
 - Both intensity variation and phase distribution
 - None of these

9) In total internal reflection phenomenon the light ray incident from

 - Rarer to denser
 - Rarer to rarer
 - Denser to denser
 - Denser to rarer

10) Energy released per fission of a $_{92}U^{235}$ nucleus is nearly

 - 200 eV
 - 20 eV
 - 200 MeV
 - 20 MeV

11) The chirality of armchair CNT is

 - (a, b)
 - (a, 0)
 - (a, a)
 - (0, b)

12) The resolving power of a grating having N slits in n^{th} order will be

 - (n+N)
 - (n - N)
 - n/N
 - n.N

13) The substances that rotate the plane of polarization are said to be

 - opaque
 - optically inactive
 - optically active
 - polaroid

14) Stimulated emission process is represented by equation

 - $A^* + h\gamma \rightarrow A + 2h\gamma$
 - $A + h\gamma \rightarrow A^*$
 - $A^* \rightarrow A + h\gamma$
 - $A^* + h\gamma \rightarrow A + h\gamma$



Seat No.	
----------	--

F.E. (Part – I) (CGPA) (Old) Examination, 2018
ENGINEERING PHYSICS

Day and Date : Wednesday, 12-12-2018

Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :** 1) Make suitable assumptions, **if necessary**.
2) Figures to the **right** indicate **full** marks.

SECTION – I

2. Attempt **any five** of the following : 15

- a) Describe in brief the formation of energy bands in solids.
- b) Calculate no. of atoms per unit cell for SC, BCC and FCC crystal.
- c) Explain the various requirements of a good auditorium.
- d) Deduce an expression for length contraction.
- e) Obtain the relativistic formula for the addition of velocities.
- f) A hall with volume of 1000 m^3 has a sound-absorbing surface of area 400 m^2 . If the average absorption coefficient of the hall is 0.2 sabines, what is the reverberation time of the hall ?
- g) A rocket ship is 100 meter long on the ground. When it is in flight, its length is 99 meters to an observer on the ground. What is its speed ?

3. a) What is Hall effect ? Obtain an expression for Hall voltage and Hall coefficient. 5

OR

- b) Discuss the various types of symmetry elements and symmetry operations present in a cubic crystal.

4. Attempt **any two** of the following : 8

- a) Explain effect of impurity on Fermi level in p-type and n-type semiconductor.
- b) Define atomic radius and obtain its values for SC, BCC and FCC crystals.
- c) Explain acoustic diffraction method for determination of wavelength of ultrasonic waves.
- d) Deduce the expression for relativistic mass variation, to show $m = m_0/(1 - v^2/c^2)^{1/2}$.

Set S



SECTION – II

5. Attempt **any five** of the following : 15
- a) Distinguish between Fresnel and Fraunhofer class of diffraction.
 - b) Define :
 - i) Spontaneous emission
 - ii) Stimulated emission
 - iii) Stimulated absorption
 - c) Explain with neat diagram basic concept and structure of optical fiber.
 - d) Explain with diagram types of carbon nano tubes.
 - e) Explain Proton - Proton cycle.
 - f) A fiber cable has an acceptance angle of 30° and core index of refraction 1.4. Calculate the cladding index of refraction.
 - g) Calculate power output of a nuclear reactor. Which consumes 20.4 Kg of U 235 in 1000 hours of operations. Assume that energy released per fission of U 235 is 200 MeV.

6. a) Define optical activity. Explain construction and working of Laurent's half shade polarimeter. 5

OR

- b) Describe He-Ne laser with its construction and working.

7. Attempt **any two** of the following : 8
- a) Derive an expression for the resolving power of a plane diffraction grating.
 - b) Explain the construction and reconstruction of hologram with neat diagram.
 - c) Explain the fiber optics communication system with block diagram.
 - d) Write a note on: Classification of nuclear reactor.

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY,
LONERE – RAIGAD - 402103**
End Semester Examination, May 2018

Branch: F.Y. B.Tech.

Semester: II

Subject: Engineering Physics (PHY 203)

Marks: 60

Date: 18 / 05 / 2018

Time: 3 Hrs

Instructions to the Students:

1. Each question carry 12 marks
 2. Attempt any five questions of the following
 3. Illustrate your answers with neat sketches, diagrams etc., wherever necessary.
 4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.
-

Q. No.1 Attempt the following.

- a. Which are the forces involved in Forced Oscillations? Obtain the differential equation of forced oscillations. 06
- b. What are ultrasonic waves? Describe magnetostriction method for generating ultrasonic waves. 06

Q. No. 2 Attempt any two of the following.

- a. In case of Newton's rings in reflected light show that diameter of bright rings is proportional to the square root of odd natural numbers.
In Newton's rings, the diameter of a certain bright ring is 0.65 cm and that of tenth ring is 0.95 cm. If $\lambda = 6000 \text{ A}^0$, calculate the radius of curvature of a convex lens. 06
- b. Give the diagrammatic representation of polarized and unpolarized light. 06
Explain the method of producing plane polarized light by reflection.
- c. Explain the construction and working of He-Ne laser with neat diagram. 06

Q. No. 3 Attempt the following.

- a. What is Q-value of nuclear reaction? Calculate the Q-value of given reaction and state whether reaction is exothermic or endothermic. 06



Given Mass of Li = 7.01822

Mass of H = 1.00814

Mass of He = 4.00387,

b. State Heisenberg's Uncertainty Principle and prove that electron cannot exists in the nucleus.

06

Q. No. 4 Attempt the following.

a. Define Packing Density. Find the packing density in SC, BCC, and FCC lattices.

OR

a. Derive the relation between crystal density ' ρ ' and lattice parameter 'a'.

The density of copper is 8980 Kg/ m³ and unit cell dimension is 3.61 Å⁰. Atomic weight of copper is 63.54. Determine crystal structure.

06

06

b. State and Derive Moseley's law for characteristics X-ray spectrum.

06

Q. No. 5 Attempt the following.

a. Discuss the different types of magnetic materials interms of magnetic moments.

OR

a. Prove Bohr magneton $\mu_B = e\hbar / 2m$. Differnetiate between hard and soft magnetic materials.

06

b. What is Microscopic Ohm's Law? Differentiate between Type I and Type II superconductors.

06

Q. No. 6 Attempt any two of the following.

a. Derive an expression for conductivity in an intrinsic and extrinsic semiconductor.

06

Calculate conductivity of pure silicon when the concentration of carriers is $1.6 \times 10^{10} / \text{cm}^3$, and $\mu_e = 1500 \text{ cm}^2/\text{V-s}$, $\mu_h = 500 \text{ cm}^2/\text{V-s}$.

b. Explain the terms

- i. Dielectric constant
- ii. Electric Displacement
- iii. Polarizability

06

c. What is displacement current? Write Maxwell's equations in differnetial and integral form.

06

Dr. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE- RAIKAD
End Semester Examination Dec 2018 (Supplementary)

Course: B. Tech (All Branches)

Semester: I/II

Subject Name with Subject Code: Engineering Physics (PHY103/ PHY203)

Date: 04/12/2018

Marks: 60

Time: 3 Hrs

Instructions to the Student:

1. Each question carries 12 marks.
2. Attempt any five questions of the following.
3. Illustrate your answer with neat sketches, diagrams, etc. Wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

Q. 1 Attempt the following

- A What is free vibration? Derive an expression for differential equation of free vibration. (6)
- B What is Piezoelectric effect? Explain production of ultrasonic waves using piezoelectric oscillator. (6)

Q. 2 Attempt any two of the following.

- A. In case of Newton's rings, prove $D_n \propto \sqrt{n}$, where D_n is diameter of n^{th} dark ring. (6)
- B. Explain Double refraction using Huygen's wave theory of light. (6)
- C. Explain the construction and working of Ruby laser with neat diagram. (6)

Q. 3 Attempt the following

- A. Discuss Thomson's method for determination of e/m of an electron. (6)
- B. Derive time independant Schrodinger's wave equation. (6)

Q. 4 Attempt the following

- A. What is primitive and nonprimitive unit cells? Find the number of atoms per unit cell in SC, BCC, FCC lattices. (6)

OR

- A. Define atomic radius. Find the atomic radius in SC, BCC, FCC lattices. (6)
- B. State and Derive Bragg's law of X-ray diffraction. An X-ray is operated at 20 kV. Calculate the minimum wavelength of X-rays emitting from it. (6)

Q. 5 Attempt the following

- A. What are Ferrites and Garnets? Write their general formula. Determine the magnetization and flux density of the diamagnetic, if its magnetic susceptibility is -0.4×10^{-5} and magnetic field in it is 10^4 A/m . (6)

OR

A. Prove Bohr Magnetron $\mu_B = e\hbar / 2m$. Differentiate between hard and soft magnetic materials. (6)

B. What is Superconductivity? Explain Meissner effect in superconductor. (6)

Q. 6 Attempt any two of the following

A. What is Hall effect? Derive an expression for Hall coefficient of p and n type semiconductor. (6)

B. Explain the effect of frequency and temperature on Dielectric material. (6)

C. What is Displacement current? Write Maxwell's equations in differential and integral form. (6)

*** End ***

Dr. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE- RAIKAD
End Semester Examination Dec 2018 (Supplementary)

Course: B. Tech (All Branches)

Semester: I/II

Subject Name with Subject Code: Engineering Physics (PHY103/ PHY203)

Date: 04/12/2018

Marks: 60

Time: 3 Hrs

Instructions to the Student:

1. Each question carries 12 marks.
2. Attempt any five questions of the following.
3. Illustrate your answer with neat sketches, diagrams, etc. Wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

Q. 1 Attempt the following

- A What is free vibration? Derive an expression for differential equation of free vibration. (6)
- B What is Piezoelectric effect? Explain production of ultrasonic waves using piezoelectric oscillator. (6)

Q. 2 Attempt any two of the following.

- A. In case of Newton's rings, prove $D_n \propto \sqrt{n}$, where D_n is diameter of n^{th} dark ring. (6)
- B. Explain Double refraction using Huygen's wave theory of light. (6)
- C. Explain the construction and working of Ruby laser with neat diagram. (6)

Q. 3 Attempt the following

- A. Discuss Thomson's method for determination of e/m of an electron. (6)
- B. Derive time independant Schrodinger's wave equation. (6)

Q. 4 Attempt the following

- A. What is primitive and nonprimitive unit cells? Find the number of atoms per unit cell in SC, BCC, FCC lattices. (6)

OR

- A. Define atomic radius. Find the atomic radius in SC, BCC, FCC lattices. (6)
- B. State and Derive Bragg's law of X-ray diffraction. An X-ray is operated at 20 kV. Calculate the minimum wavelength of X-rays emitting from it. (6)

Q. 5 Attempt the following

- A. What are Ferrites and Garnets? Write their general formula. Determine the magnetization and flux density of the diamagnetic, if its magnetic susceptibility is -0.4×10^{-5} and magnetic field in it is 10^4 A/m . (6)

OR

A. Prove Bohr Magnetron $\mu_B = e\hbar / 2m$. Differentiate between hard and soft magnetic materials. (6)

B. What is Superconductivity? Explain Meissner effect in superconductor. (6)

Q. 6 Attempt any two of the following

A. What is Hall effect? Derive an expression for Hall coefficient of p and n type semiconductor.

B. Explain the effect of frequency and temperature on Dielectric material. (6)

C. What is Displacement current? Write Maxwell's equations in differential and integral form. (6)

*** End ***

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL
UNIVERSITY, LONERE**
Winter Examination – Dec. 2019

Brach: B. Tech.

Subject: Engineering Physics (PHY103/PHY203)

Date: 13/12/2019

Semester –I/II

Marks: 60

Time:3 Hrs

Instructions to the students:

1. All questions are compulsory and each question carries 10 marks
2. Illustrate your answers with neat sketches, diagrams etc. wherever necessary.
3. Necessary data is given in the respective questions. If such data is not given, it means that the knowledge of the part is part of examination.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly

Que. 1 Attempt the following. (10)

- a) Obtain the differential equation of free oscillation and find its general (8) solution.
- b) Calculate the fundamental frequency of quartz crystal 1 mm thick. (2)

Given: density of quartz is 2650 kg/m^3 and Young's modulus is $8 \times 10^{10} \text{ N/m}^2$

Que. 2 Attempt the following. (10)

- a) Discuss interference of light in thin film for reflected rays. (8)
- b) A wedge shaped film is illuminated by light of wavelength 4650 \AA . The (2) angle of wedge is 40° . Calculate the fringe separation between two consecutive fringes.

OR

Que. 2 Attempt the following. (10)

- a) Explain the principle and working of Ruby Laser. (8)
- b) Calculate the numerical aperture of an optical fibre whose core and (2) cladding are made of materials of refractive indices 1.6 and 1.5 respectively.

Que. 3 Attempt the following. (10)

- a) Describe Millikan's oil drop method for determination of electronic charge. (8)
- b) Find the lowest energy of a neutron confined to a nucleus of size 10^{-14} m . (2)

Que. 4 Attempt the following.**(10)**

- a) Derive the relation between lattice constant and density of the cubic (8) crystal.
- b) Lead has a FCC crystal structure with an atomic radius of 1.746 Å. (2)
Calculate the spacing between (200) and (220) planes.

Que. 5 Attempt the following.**(10)**

- a) What is Hysteresis Curve? Explain retentivity, coercivity. Explain B-H (8) curve on the basis of domain theory.
- b) The magnetic susceptibility of a medium is 940×10^{-4} . Calculate its (2) absolute and relative permeability.

Que. 6 Attempt any two the following.**(10)**

- a) Write Maxwell equations in differential and integral form and write its (5) physical significance
- b) What is Hall effect? Derive an expression for Hall Coefficient and mobility (5) of charge carriers.
- c) What is electric polarization? Explain with diagrams different types of (5) polarizations in dielectric

Paper End

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE.
End Semester Examination (Supplementary)

Course: F. Y. B. Tech

Subject Name: Engineering Physics

Max. Marks: 60

Date: 03/06/2019

Sem. I & II

Subject Code: PHY103/203

Duration: 3 Hrs.

Instructions to the Students:

1. Each question carries 12 marks.
2. Attempt any five questions of the following.
3. Illustrate your answer with neat sketches, diagrams, etc. Wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and mention it clearly.

Q. No.	Questions	Marks
Q. No. 1 Attempt the following.		
A	State the Condition of resonance. With the help of figure explain the sharpness of resonance.	6
B	Explain Piezoelectric and Magnetostriction Effect. Calculate the fundamental frequency of quartz crystal of 1mm thick having density 2650 kg/m^3 . Given $Y = 8 \times 10^8 \text{ N/m}^2$.	6
Q. No. 2 Attempt any two of the following.		
A	Discuss the interference of light in thin film due to reflected ray.	6
B	What is angle of polarization? State and prove Brewster's Law.	6
C	Differentiate between spontaneous and stimulated emission of radiation. Calculate the numerical aperture of an optical fibre whose core and cladding are made of materials with refractive index 1.6 and 1.5 respectively.	6
Q. No. 3 Attempt the following		
A	What is Heisenberg's Uncertainty Principle? Using this prove that electron cannot exist in the nucleus.	6
B	Derive time dependent Schrodinger's wave equation.	6
Q. No. 4 Attempt the following		
A	Derive the relation between lattice constant 'a' and density 'p' of the cubic crystal. Calculate the number of atoms per cell for a metal with lattice parameter 2.9 \AA . Given : $M=55.385$ $\rho = 7.87 \text{ gm/cm}^3$	6
OR		
A	Explain different type of lattices in cubic system. Find the packing density for SC, BCC and FCC lattices	6
B	State and prove Moseley's Law.	6

Q.5 Attempt the following

- A Explain ferrimagnetic material with examples.

A magnetic field of 1000 A/m produces a magnetic flux of 2×10^{-5} Wb in a bar of iron of 0.2 cm^2 cross section. Calculate permeability and susceptibility of bar.

OR

- A Derive an expression for resistivity of conducting materials in terms of relaxation time of an electron.

- B What is superconductivity? Explain Type-I and Type-II superconductors.

Q.6. Attempt any two of the following

- A Derive relation for conductivity of intrinsic and extrinsic semiconductors.

- B Explain various types of polarization in dielectric materials.

- C Derive an expression for electromagnetic wave in free space.

END

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE.
End Semester Examination – Winter 2018.

Course : B. Tech
Subject Name : Engineering Physics
Max. Marks : 60 **Date 13/12/2018**

Sem. I
Subject Code : PHY1202
Duration: 3 Hrs.

Instructions:

1. All the questions are compulsory.
2. The level question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

Level/CO Marks

Q.1 Solve any two of the following

- A) In case of forced vibration, prove that

$$A = \frac{f}{\sqrt{(\omega^2 - P^2)^2 + 4b^2 p^2}}$$

- B) Explain Pizoelectric effect and Magnetostriction effect.

What will be the Young's modulus of quartz plate if 5.5 mm thick quartz is used to produce an ultrasonic waves of frequency 0.4999 MHz. The density of the quartz is $2.65 \times 10^3 \text{ kg/m}^3$.

- C) Explain with diagrams different types of polarization in dielectrics.

CO1 6

CO1 6

CO6 6

Q.2 Solve any two of the following

- A) In case of wedge shaped film, prove that $\beta = \lambda / 2\theta$.

CO2 6

- B) Explain the principle and working of He-Ne Laser.

CO2 6

- C) i. A 20 cm long glass tube filled with a sugar solution of 15 gm of cane sugar in 100 cc of water is kept in the path of polarized light. Calculate the angle of rotation of cane sugar, specific rotation of cane sugar is 66° .

CO3 3

ii. Calculate the refractive index of core and cladding of an optical fiber such that the numerical aperture of fiber is 0.27 and relative refractive index is 0.015.

CO3 3

Q.3 Solve any two of the following

- A) With neat diagram explain the construction and working of G.M. Counter.

CO3 6

- B) What is Heisenberg's Uncertainty Principle?

CO3 6

If the uncertainty in position of an electron is $4 \times 10^{-10} \text{ m}$. Calculate the uncertainty in its momentum

- C) Derive Schrodinger's time independant wave equation

CO3 6

Q.4 Solve any two of the following.

- A) Deduce the relation between interplaner spacing d and lattice constant a. Calculate the interplaner spacing for a (311) plane in a simple cubic lattice whose lattice constant is $2.109 \times 10^{-10} \text{ m}$.

CO4 6

- B) State and prove Moseley's law. What is its importance?

CO4 6

- C) Derive an expression for electromagnetic wave in free space and find the value of velocity of light in free space.

CO6 6

Q.5 Solve the following.

- A) What are magnetic domain and domain wall? Explain the B-H curve based on domain theory.
- B) Derive an expression for conductivity of a conductor in terms of relaxation time of electron.

CO5 6

CO3 6

End

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE.
End Semester Examination – Winter 2018.

Course : B. Tech
Subject Name : Engineering Physics
Max. Marks : 60 **Date 13/12/2018**

Sem. I
Subject Code : PHY1202
Duration: 3 Hrs.

Instructions:

1. All the questions are compulsory.
2. The level question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

Level/CO Marks

Q.1 Solve any two of the following

- A) In case of forced vibration, prove that

$$A = \frac{f}{\sqrt{(\omega^2 - P^2)^2 + 4b^2 p^2}}$$

- B) Explain Pizoelectric effect and Magnetostriction effect.

What will be the Young's modulus of quartz plate if 5.5 mm thick quartz is used to produce an ultrasonic waves of frequency 0.4999 MHz. The density of the quartz is $2.65 \times 10^3 \text{ kg/m}^3$.

- C) Explain with diagrams different types of polarization in dielectrics.

CO1 6

CO1 6

CO6 6

Q.2 Solve any two of the following

- A) In case of wedge shaped film, prove that $\beta = \lambda / 2\theta$.

CO2 6

- B) Explain the principle and working of He-Ne Laser.

CO2 6

- C) i. A 20 cm long glass tube filled with a sugar solution of 15 gm of cane sugar in 100 cc of water is kept in the path of polarized light. Calculate the angle of rotation of cane sugar, specific rotation of cane sugar is 66° .

CO3 3

ii. Calculate the refractive index of core and cladding of an optical fiber such that the numerical aperture of fiber is 0.27 and relative refractive index is 0.015.

CO3 3

Q.3 Solve any two of the following

- A) With neat diagram explain the construction and working of G.M. Counter.

CO3 6

- B) What is Heisenberg's Uncertainty Principle?

CO3 6

If the uncertainty in position of an electron is $4 \times 10^{-10} \text{ m}$. Calculate the uncertainty in its momentum

- C) Derive Schrodinger's time independant wave equation

CO3 6

Q.4 Solve any two of the following.

- A) Deduce the relation between interplaner spacing d and lattice constant a. Calculate the interplaner spacing for a (311) plane in a simple cubic lattice whose lattice constant is $2.109 \times 10^{-10} \text{ m}$.

CO4 6

- B) State and prove Moseley's law. What is its importance?

CO4 6

- C) Derive an expression for electromagnetic wave in free space and find the value of velocity of light in free space.

CO6 6

Q.5 Solve the following.

- A) What are magnetic domain and domain wall? Explain the B-H curve based on domain theory.
- B) Derive an expression for conductivity of a conductor in terms of relaxation time of electron.

CO5 6

CO3 6

End

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE.
End Semester Examination – Winter 2018.

Course : B. Tech
Subject Name : Engineering Physics
Max. Marks : 60 **Date 13/12/2018**

Sem. I
Subject Code : PHY1202
Duration: 3 Hrs.

Instructions:

1. All the questions are compulsory.
2. The level question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

Level/CO Marks

Q.1 Solve any two of the following

- A) In case of forced vibration, prove that

$$A = \frac{f}{\sqrt{(\omega^2 - P^2)^2 + 4b^2 p^2}}$$

- B) Explain Pizoelectric effect and Magnetostriction effect.

What will be the Young's modulus of quartz plate if 5.5 mm thick quartz is used to produce an ultrasonic waves of frequency 0.4999 MHz. The density of the quartz is $2.65 \times 10^3 \text{ kg/m}^3$.

- C) Explain with diagrams different types of polarization in dielectrics.

CO1 6

CO1 6

CO6 6

Q.2 Solve any two of the following

- A) In case of wedge shaped film, prove that $\beta = \lambda / 2\theta$.

CO2 6

- B) Explain the principle and working of He-Ne Laser.

CO2 6

- C) i. A 20 cm long glass tube filled with a sugar solution of 15 gm of cane sugar in 100 cc of water is kept in the path of polarized light. Calculate the angle of rotation of cane sugar, specific rotation of cane sugar is 66° .

CO3 3

ii. Calculate the refractive index of core and cladding of an optical fiber such that the numerical aperture of fiber is 0.27 and relative refractive index is 0.015.

CO3 3

Q.3 Solve any two of the following

- A) With neat diagram explain the construction and working of G.M. Counter.

CO3 6

- B) What is Heisenberg's Uncertainty Principle?

CO3 6

If the uncertainty in position of an electron is $4 \times 10^{-10} \text{ m}$. Calculate the uncertainty in its momentum

- C) Derive Schrodinger's time independant wave equation

CO3 6

Q.4 Solve any two of the following.

- A) Deduce the relation between interplaner spacing d and lattice constant a. Calculate the interplaner spacing for a (311) plane in a simple cubic lattice whose lattice constant is $2.109 \times 10^{-10} \text{ m}$.

CO4 6

- B) State and prove Moseley's law. What is its importance?

CO4 6

- C) Derive an expression for electromagnetic wave in free space and find the value of velocity of light in free space.

CO6 6

Q.5 Solve the following.

- A) What are magnetic domain and domain wall? Explain the B-H curve based on domain theory.
- B) Derive an expression for conductivity of a conductor in terms of relaxation time of electron.

CO5 6

CO3 6

End

	DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE End Semester Examination – Winter 2019 Course: B. Tech Subject: Engineering Physics (PHY1202) Date: 13/12/2019	Sem: I Marks: 60M Duration: 3 Hr.	
	<p>Instructions to the Students:</p> <ol style="list-style-type: none"> 1. All the questions are compulsory. 2. The level question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question. 3. Use of non-programmable scientific calculators is allowed. 4. Assume suitable data wherever necessary and mention it clearly. 		
		(Level/CO)	Marks
Q. 1	Solve Any Two of the following.		
A)	What are forced oscillations? Obtain the differential equation of forced oscillations.	(Synthesis)	06
B)	Explain the production of ultrasonic waves using magnetostriction effect. Calculate the length of Ni rod needed to produce ultrasonic waves of frequency 40 KHz. Density of rod is 8.9 gm/cm^3 and Young's modulus of rod is $20.8 \times 10^{10} \text{ N/m}^2$.	(Knowledge /Remember)	06
C)	Explain the effect of frequency and temperature on polarization in dielectric.	(Knowledge /Remember)	06
Q.2	Solve Any Two of the following.		
A)	Prove that in Newton's Rings by reflected light, the diameters of bright rings are proportional to square root of odd natural numbers.	(Evaluation)	06
B)	Explain the construction and working of Ruby laser with neat diagram.	(Comprehension/Understand)	06
C)	Define acceptance angle and numerical aperture. Refractive index of core is 1.48 and that of cladding is 1.47 in an optical fiber. Calculate critical angle, numerical aperture and acceptance angle.	(Analysis)	06
Q. 3	Solve Any Two of the following.		
A)	Explain the principle and working of Bainbridge Mass Spectrograph with neat diagram.	(Comprehension/Understand)	06

B)	What is uncertainty principle? Using this principle prove that electron cannot exist in the nucleus.	(Synthesis)	06
C)	Explain the construction and working of G.M. counter.	(Comprehension/ Understand)	06
Q.4	Solve Any Two of the following.		
A)	Show that shortest wavelength of continuous X-rays is inversely proportional to the potential difference applied.	(Synthesis)	06
B)	Derive the relation between lattice constant and density of the cubic crystal. Copper has FCC structure and its atomic radius is 1.278×10^{-10} m. Calculate density of Cu. Given atomic weight of Cu = 63.5.	(Application)	06
C)	Derive an expression for electromagnetic wave in free space and hence calculate the velocity of light in free space.	(Synthesis)	06
Q. 5	Solve the following.		
A)	Differentiate Type I and Type II superconductors.	(Application)	06
B)	What is Hall effect? Derive an expression for Hall voltage and Hall coefficient.	(Analysis)	06
	***Paper End ***		

	DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE End Semester Examination – Winter 2019 Course: B. Tech Subject: Engineering Physics (PHY1202) Date: 13/12/2019	Sem: I Marks: 60M Duration: 3 Hr.	
	Instructions to the Students: <ol style="list-style-type: none"> 1. All the questions are compulsory. 2. The level question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question. 3. Use of non-programmable scientific calculators is allowed. 4. Assume suitable data wherever necessary and mention it clearly. 		
		(Level/CO)	Marks
Q. 1	Solve Any Two of the following.		
A)	What are forced oscillations? Obtain the differential equation of forced oscillations.	(Synthesis)	06
B)	Explain the production of ultrasonic waves using magnetostriction effect. Calculate the length of Ni rod needed to produce ultrasonic waves of frequency 40 KHz. Density of rod is 8.9 gm/cm^3 and Young's modulus of rod is $20.8 \times 10^{10} \text{ N/m}^2$.	(Knowledge /Remember)	06
C)	Explain the effect of frequency and temperature on polarization in dielectric.	(Knowledge /Remember)	06
Q.2	Solve Any Two of the following.		
A)	Prove that in Newton's Rings by reflected light, the diameters of bright rings are proportional to square root of odd natural numbers.	(Evaluation)	06
B)	Explain the construction and working of Ruby laser with neat diagram.	(Comprehension/Understand)	06
C)	Define acceptance angle and numerical aperture. Refractive index of core is 1.48 and that of cladding is 1.47 in an optical fiber. Calculate critical angle, numerical aperture and acceptance angle.	(Analysis)	06
Q. 3	Solve Any Two of the following.		
A)	Explain the principle and working of Bainbridge Mass Spectrograph with neat diagram.	(Comprehension/Understand)	06

B)	What is uncertainty principle? Using this principle prove that electron cannot exist in the nucleus.	(Synthesis)	06
C)	Explain the construction and working of G.M. counter.	(Comprehension/ Understand)	06
Q.4	Solve Any Two of the following.		
A)	Show that shortest wavelength of continuous X-rays is inversely proportional to the potential difference applied.	(Synthesis)	06
B)	Derive the relation between lattice constant and density of the cubic crystal. Copper has FCC structure and its atomic radius is 1.278×10^{-10} m. Calculate density of Cu. Given atomic weight of Cu = 63.5.	(Application)	06
C)	Derive an expression for electromagnetic wave in free space and hence calculate the velocity of light in free space.	(Synthesis)	06
Q. 5	Solve the following.		
A)	Differentiate Type I and Type II superconductors.	(Application)	06
B)	What is Hall effect? Derive an expression for Hall voltage and Hall coefficient.	(Analysis)	06
	***Paper End ***		

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE
End Semester Examination – Summer 2019

Course: B. Tech

Subject Name: Engineering Physics

Max Marks: 60

Date: 15/05/2019

Sem: I & II

Subject Code: PHY1202

Duration: 3 Hr.

Instructions to the Students:

1. All the questions are compulsory.
2. The level question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

(Level/CO)	Marks
------------	-------

Q. 1 Solve Any Two of the following

- A) Which are the forces acting in the Damped Oscillations? Obtain the differential equation of Damped Oscillations. (CO1) 06
- B) Discuss the effect of temperature and frequency dependence on polarization in dielectrics. (CO6) 06
- C) What is piezoelectric effect? Describe piezoelectric method for generating ultrasonic waves. (CO1) 06

Q.2 Solve Any Two of the following

- A) Prove that for Newton's rings in reflected light, the diameter of dark ring is proportional to the square root of natural numbers. (CO2) 06
- B) Explain construction and working of Ruby laser with neat diagram. (CO2) 06
- C) Obtain mathematical expression for acceptance angle and numerical aperture. (CO2) 06

Q. 3 Solve Any Two of the following

- A) Explain with diagram principle and working of Bainbridge mass spectrograph. (CO3) 06
- B) i) Show that electron does not exists inside the nucleus, with the help of Heisenberg's uncertainty principle.
ii) A bullet of mass 0.05 kg is moving with a velocity of 800 m/s, the speed of bullet measured an accuracy of 0.01%. Calculate the accuracy with which the position of a bullet can be located. (CO3) 03
- C) Derive Schrodinger's time dependent wave equation. (CO3) 06

Q.4 Solve Any Two of the following.

- A) Define primitive and non-primitive unit cells.
Calculate the lattice constant of iron which has BCC structure.
Given $\rho = 7.86 \text{ gm/cc}$ $M = 55.85$ (CO4) 06
- B) Explain continuous X-ray spectrum with neat diagram. An X-ray is operated at 18 kV.
Calculate the minimum velocity of electron bombarded at the anode. (CO4) 06

P.T.O.

- C) What is displacement current? Write Maxwell's equations in integral and differential form. (CO3) 06

Q. 5 Solve the following.

- A) i. Write formula of Ferrites and Garnets. (CO5) 06
ii. Explain Meissner effect in superconductors. (CO6)
- B) What is Hall Effect? Derive an expression for Hall voltage V_H and Hall coefficient R_H . (CO5) 06

***** End *****

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL
UNIVERSITY, LONERE**

Supplementary Examination – Nov 2019

Brach: B. Tech.

Subject: Engineering Physics (PHY103/PHY203)

Date: 13/12/2019

Semester –I/II

Marks: 60

Time:3 Hrs

Instructions to the students:

1. All questions are compulsory and each question carries 10 marks
2. Illustrate your answers with neat sketches, diagrams etc. wherever necessary.
3. Necessary data is given in the respective questions. If such data is not given, it means that the knowledge of the part is part of examination.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly

Que. 1 Attempt the following. (10)

- a) Obtain the differential equation of free oscillation and find its general solution. (8)
- b) Calculate the fundamental frequency of quartz crystal 1 mm thick. (2)

Given: density of quartz is 2650 kg/m^3 and Young's modulus is $8 \times 10^{10} \text{ N/m}^2$

Que. 2 Attempt the following. (10)

- a) Discuss interference of light in thin film for reflected rays. (8)
- b) A wedge shaped film is illuminated by light of wavelength 4650 \AA . The angle of wedge is 40° . Calculate the fringe separation between two consecutive fringes. (2)

OR

Que. 2 Attempt the following. (10)

- a) Explain the principle and working of Ruby Laser. (8)
- b) Calculate the numerical aperture of an optical fibre whose core and cladding are made of materials of refractive indices 1.6 and 1.5 respectively. (2)

Que. 3 Attempt the following. (10)

- a) Describe Millikan's oil drop method for determination of electronic charge. (8)
b) Find the lowest energy of a neutron confined to a nucleus of size 10^{-14} m. (2)

Que. 4 **Attempt the following.** (10)

- a) Derive the relation between lattice constant and density of the cubic crystal. (8)
b) Lead has a FCC crystal structure with an atomic radius of 1.746 \AA . Calculate the spacing between (200) and (220) planes. (2)

Que. 5 **Attempt the following.** (10)

- a) What is Hysteresis Curve? Explain retentivity, coercivity. Explain B-H curve on the basis of domain theory. (8)
b) The magnetic susceptibility of a medium is 940×10^{-4} . Calculate its absolute and relative permeability. (2)

Que. 6 **Attempt any two the following.** (10)

- a) Write Maxwell equations in differential and integral form and write its physical significance (5)
b) What is Hall effect? Derive an expression for Hall Coefficient and mobility of charge carriers. (5)
c) What is electric polarization? Explain with diagrams different types of polarizations in dielectric (5)

Paper End



Seat No.	
----------	--

F.E. (Part – I) (New CBCS) Examination, 2018
ENGINEERING PHYSICS

Day and Date : Wednesday 12-12-2018

Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :**
- 1) Make suitable assumptions, if **necessary**.
 - 2) Figures to the **right** indicate **full marks**.
 - 3) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
 - 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

- Constants :**
- 1) Avogadro's no., $N = 6.02 \times 10^{26}/\text{k.mol.}$
 - 2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec.}$
 - 3) Charge of electron, $e = 1.6 \times 10^{-19} \text{ C.}$

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : 14
 - 1) The number of atoms in a primitive cell is
 - a) 1
 - b) 3
 - c) 2
 - d) 4
 - 2) Ultrasonic waves have frequency
 - a) As that of audible range
 - b) Above audible range
 - c) Below audible range
 - d) Below as well as above audible range
 - 3) Void space =
 - a) $(1 + APF) \times 100$
 - b) $(1 - APF) \times 100$
 - c) $(1 + APF)/100$
 - d) $(1 - APF)/100$
 - 4) At 0K, in semiconducting material
 - a) Conduction band is full
 - b) Conduction band is partially filled
 - c) Valence band is empty
 - d) Conduction band is empty

P.T.O.



- 5) When a body of rest mass 10 kg moves with velocity of light, its mass becomes
a) 0 b) 20 kg c) ∞ d) 100 kg
- 6) In conductor, current flows due to
a) Holes b) Both holes and electrons
c) Protons d) Electrons
- 7) The absorption coefficient is measured in
a) WOU b) m/s² c) OWU d) m²
- 8) The resolving power of grating having N slits in nth order will be
a) (n + N) b) (n - N) c) n N d) n/N
- 9) Optically active substances are those substance which
a) Produce polarized light
b) Rotate the plane of polarization of polarized light
c) Produce double refraction
d) Convert a plane polarized light into circularly polarized light
- 10) For He-Ne laser, typical value of divergence is
a) 10^5 radian b) 10^{-5} radian c) 10^3 radian d) 10^{-3} radian
- 11) The value of fractional refractive index change is always
a) >1 b) <1 c) =1 d) = 0
- 12) If the multiplication factor is greater than unity in a nuclear fission reaction involving neutron capture, then
a) An explosion may result
b) Explosion cannot occur
c) Process will stop after sometime
d) There will be no chance for explosion
- 13) Coolant is used in nuclear reactor
a) To slow down the fast neutrons
b) To absorb excess neutrons
c) To increase speed of neutrons
d) To transfer the energy from core to heat exchanger
- 14) The tubes whose mirror images are similar as the original structure are
a) Chiral tubes b) Achiral tubes
c) Carbon tubes d) None of these



Seat No.	
----------	--

F.E. (Part – I) (New CBCS) Examination, 2018
ENGINEERING PHYSICS

Day and Date : Wednesday 12-12-2018

Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :** 1) Make suitable assumptions, if necessary.
 2) Figures to the right indicate full marks.

- Constants :** 1) Avogadro's no., $N = 6.02 \times 10^{26}/\text{k.mol.}$
 2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec.}$
 3) Charge of electron, $e = 1.6 \times 10^{-19} \text{ C.}$

SECTION – I

2. Attempt **any five** of the following 15
- Define atomic packing factor. Calculate atomic packing factor for SC and BCC.
 - What are valence band, conduction band and energy gap ? Show with neat diagram.
 - Explain : Length contraction.
 - The volume of room is 1600 m^3 . The wall area of the room is 270 m^2 , the floor area is 150 m^2 and ceiling area is 140 m^2 . The average sound absorption coefficient for wall is 0.03, for the ceiling is 0.8 and for the floor is 0.06. Calculate the average absorption coefficient and the reverberation time.
 - State the acoustic requirements of a good auditorium.
 - Find the Miller indices of a set of parallel planes, which makes intercepts in the ratio $3a : 4b$ on the x and y axes and are parallel to z-axis where a, b and c being primitive vectors of the lattice.
 - Explain : Seven crystal systems.
3. Deduce an expression for Lorentz transformation equation and its inverse. 5

OR

Explain Hall effect. Derive the relation for Hall voltage V_H and Hall coefficient R_H in detail.

Set P



4. Attempt **any two** of the following 8
- Explain effect of impurity concentration on the position of Fermi level in P type semiconductor.
 - Explain : Plane of symmetry.
 - Describe various methods used for detection of ultrasonic.
 - Deduce Einstein's expression ($E = mc^2$) for mass-energy equivalence.

SECTION – II

5. Attempt **any five** of the following : 15
- Write characteristics of LASER beam.
 - Explain the terms : optically activity and specific rotation.
 - Explain : principle of fiber optics.
 - Explain : Classification of optical fiber.
 - Give application of nanotechnology in different fields.
 - Calculate power output of reactor, which consumes 2kg of U-235 per day. Assume 7% reactor efficiency. Energy released per fission is 200 MeV.
 - A parallel beam of monochromatic light is incident normally on plane transmission grating having 15000 lines per inch. The first order spectrum is observed to be deviated through an angle 21.7° from normal. Calculate the wavelength of light used.
6. What is LASER ? Why semiconductor laser is called injection laser ? Explain with energy and emission diagram, construction and working of semiconductor laser. 5

OR

Deduce the expression for acceptance angle and numerical aperture of optical fiber and explain how it can be calculated with the help of fractional refractive index change.

7. Attempt **any two** of the following : 8
- What is resolving power ? Explain Rayleigh's criterion of resolution.
 - Describe Laurent's half shade Polarimeter for the determination of specific rotation of the substance.
 - Explain essentials of nuclear reactor.
 - Explain : Holography.



Seat No.	
----------	--

F.E. (Part – I) (New CBCS) Examination, 2018 ENGINEERING PHYSICS

Day and Date : Wednesday 12-12-2018
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Make suitable assumptions, if necessary.
 - 2) Figures to the right indicate full marks.
 - 3) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
 - 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

- Constants :**
- 1) Avogadro's no., $N = 6.02 \times 10^{26}/\text{k.mol.}$
 - 2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec.}$
 - 3) Charge of electron, $e = 1.6 \times 10^{-19} \text{ C.}$

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : 14
 - 1) The resolving power of grating having N slits in n^{th} order will be
 - a) $(n + N)$
 - b) $(n - N)$
 - c) $n N$
 - d) n/N
 - 2) Optically active substances are those substance which
 - a) Produce polarized light
 - b) Rotate the plane of polarization of polarized light
 - c) Produce double refraction
 - d) Convert a plane polarized light into circularly polarized light
 - 3) For He-Ne laser, typical value of divergence is
 - a) 10^5 radian
 - b) 10^{-5} radian
 - c) 10^3 radian
 - d) 10^{-3} radian
 - 4) The value of fractional refractive index change is always
 - a) >1
 - b) <1
 - c) $=1$
 - d) $= 0$
 - 5) If the multiplication factor is greater than unity in a nuclear fission reaction involving neutron capture, then
 - a) An explosion may result
 - b) Explosion cannot occur
 - c) Process will stop after sometime
 - d) There will be no chance for explosion

P.T.O.



- 6) Coolant is used in nuclear reactor

 - To slow down the fast neutrons
 - To absorb excess neutrons
 - To increase speed of neutrons
 - To transfer the energy from core to heat exchanger

7) The tubes whose mirror images are similar as the original structure are

 - Chiral tubes
 - Achiral tubes
 - Carbon tubes
 - None of these

8) The number of atoms in a primitive cell is

 - 1
 - 3
 - 2
 - 4

9) Ultrasonic waves have frequency

 - As that of audible range
 - Above audible range
 - Below audible range
 - Below as well as above audible range

10) Void space =

 - $(1 + APF) \times 100$
 - $(1 - APF) \times 100$
 - $(1 + APF)/100$
 - $(1 - APF)/100$

11) At 0K, in semiconducting material

 - Conduction band is full
 - Conduction band is partially filled
 - Valence band is empty
 - Conduction band is empty

12) When a body of rest mass 10 kg moves with velocity of light, its mass becomes

 - 0
 - 20 kg
 - ∞
 - 100 kg

13) In conductor, current flows due to

 - Holes
 - Both holes and electrons
 - Protons
 - Electrons

14) The absorption coefficient is measured in

 - WOU
 - m/s^2
 - OWU
 - m^2



Seat No.	
----------	--

F.E. (Part – I) (New CBCS) Examination, 2018
ENGINEERING PHYSICS

Day and Date : Wednesday 12-12-2018

Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :** 1) Make suitable assumptions, if necessary.
2) Figures to the right indicate full marks.

- Constants :** 1) Avogadro's no., $N = 6.02 \times 10^{26}/\text{k.mol.}$
2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec.}$
3) Charge of electron, $e = 1.6 \times 10^{-19} \text{ C.}$

SECTION – I

2. Attempt **any five** of the following 15
- Define atomic packing factor. Calculate atomic packing factor for SC and BCC.
 - What are valence band, conduction band and energy gap ? Show with neat diagram.
 - Explain : Length contraction.
 - The volume of room is 1600 m^3 . The wall area of the room is 270 m^2 , the floor area is 150 m^2 and ceiling area is 140 m^2 . The average sound absorption coefficient for wall is 0.03, for the ceiling is 0.8 and for the floor is 0.06. Calculate the average absorption coefficient and the reverberation time.
 - State the acoustic requirements of a good auditorium.
 - Find the Miller indices of a set of parallel planes, which makes intercepts in the ratio $3a : 4b$ on the x and y axes and are parallel to z-axis where a, b and c being primitive vectors of the lattice.
 - Explain : Seven crystal systems.
3. Deduce an expression for Lorentz transformation equation and its inverse. 5

OR

Explain Hall effect. Derive the relation for Hall voltage V_H and Hall coefficient R_H in detail.

Set Q



4. Attempt **any two** of the following 8
- Explain effect of impurity concentration on the position of Fermi level in P type semiconductor.
 - Explain : Plane of symmetry.
 - Describe various methods used for detection of ultrasonic.
 - Deduce Einstein's expression ($E = mc^2$) for mass-energy equivalence.

SECTION – II

5. Attempt **any five** of the following : 15
- Write characteristics of LASER beam.
 - Explain the terms : optically activity and specific rotation.
 - Explain : principle of fiber optics.
 - Explain : Classification of optical fiber.
 - Give application of nanotechnology in different fields.
 - Calculate power output of reactor, which consumes 2kg of U-235 per day. Assume 7% reactor efficiency. Energy released per fission is 200 MeV.
 - A parallel beam of monochromatic light is incident normally on plane transmission grating having 15000 lines per inch. The first order spectrum is observed to be deviated through an angle 21.7° from normal. Calculate the wavelength of light used.
6. What is LASER ? Why semiconductor laser is called injection laser ? Explain with energy and emission diagram, construction and working of semiconductor laser. 5

OR

Deduce the expression for acceptance angle and numerical aperture of optical fiber and explain how it can be calculated with the help of fractional refractive index change.

7. Attempt **any two** of the following : 8
- What is resolving power ? Explain Rayleigh's criterion of resolution.
 - Describe Laurent's half shade Polarimeter for the determination of specific rotation of the substance.
 - Explain essentials of nuclear reactor.
 - Explain : Holography.



Seat No.	
----------	--

F.E. (Part – I) (New CBCS) Examination, 2018 ENGINEERING PHYSICS

Day and Date : Wednesday 12-12-2018

Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :**
- 1) Make suitable assumptions, if **necessary**.
 - 2) Figures to the **right** indicate **full marks**.
 - 3) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
 - 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

- Constants :**
- 1) Avogadro's no., $N = 6.02 \times 10^{26}/\text{k.mol}$.
 - 2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec}$.
 - 3) Charge of electron, $e = 1.6 \times 10^{-19} \text{ C}$.

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : 14
- 1) When a body of rest mass 10 kg moves with velocity of light, its mass becomes
 - a) 0
 - b) 20 kg
 - c) ∞
 - d) 100 kg
- 2) In conductor, current flows due to
 - a) Holes
 - b) Both holes and electrons
 - c) Protons
 - d) Electrons
- 3) The absorption coefficient is measured in
 - a) WOU
 - b) m/s^2
 - c) OWU
 - d) m^2
- 4) The resolving power of grating having N slits in n^{th} order will be
 - a) $(n + N)$
 - b) $(n - N)$
 - c) $n N$
 - d) n/N
- 5) Optically active substances are those substance which
 - a) Produce polarized light
 - b) Rotate the plane of polarization of polarized light
 - c) Produce double refraction
 - d) Convert a plane polarized light into circularly polarized light

P.T.O.



- 6) For He-Ne laser, typical value of divergence is
a) 10^5 radian b) 10^{-5} radian c) 10^3 radian d) 10^{-3} radian
- 7) The value of fractional refractive index change is always
a) >1 b) <1 c) $=1$ d) $=0$
- 8) If the multiplication factor is greater than unity in a nuclear fission reaction involving neutron capture, then
a) An explosion may result
b) Explosion cannot occur
c) Process will stop after sometime
d) There will be no chance for explosion
- 9) Coolant is used in nuclear reactor
a) To slow down the fast neutrons
b) To absorb excess neutrons
c) To increase speed of neutrons
d) To transfer the energy from core to heat exchanger
- 10) The tubes whose mirror images are similar as the original structure are
a) Chiral tubes b) Achiral tubes
c) Carbon tubes d) None of these
- 11) The number of atoms in a primitive cell is
a) 1 b) 3 c) 2 d) 4
- 12) Ultrasonic waves have frequency
a) As that of audible range
b) Above audible range
c) Below audible range
d) Below as well as above audible range
- 13) Void space =
a) $(1 + APF) \times 100$ b) $(1 - APF) \times 100$
c) $(1 + APF)/100$ d) $(1 - APF)/100$
- 14) At 0K, in semiconducting material
a) Conduction band is full
b) Conduction band is partially filled
c) Valence band is empty
d) Conduction band is empty



Seat No.	
----------	--

**F.E. (Part – I) (New CBCS) Examination, 2018
ENGINEERING PHYSICS**

Day and Date : Wednesday 12-12-2018

Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :** 1) Make suitable assumptions, if necessary.
2) Figures to the right indicate full marks.

- Constants :** 1) Avogadro's no., $N = 6.02 \times 10^{26}/\text{k.mol.}$
2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec.}$
3) Charge of electron, $e = 1.6 \times 10^{-19} \text{ C.}$

SECTION – I

2. Attempt **any five** of the following 15
- Define atomic packing factor. Calculate atomic packing factor for SC and BCC.
 - What are valence band, conduction band and energy gap ? Show with neat diagram.
 - Explain : Length contraction.
 - The volume of room is 1600 m^3 . The wall area of the room is 270 m^2 , the floor area is 150 m^2 and ceiling area is 140 m^2 . The average sound absorption coefficient for wall is 0.03, for the ceiling is 0.8 and for the floor is 0.06. Calculate the average absorption coefficient and the reverberation time.
 - State the acoustic requirements of a good auditorium.
 - Find the Miller indices of a set of parallel planes, which makes intercepts in the ratio $3a : 4b$ on the x and y axes and are parallel to z-axis where a, b and c being primitive vectors of the lattice.
 - Explain : Seven crystal systems.
3. Deduce an expression for Lorentz transformation equation and its inverse. 5

OR

Explain Hall effect. Derive the relation for Hall voltage V_H and Hall coefficient R_H in detail.

Set R



4. Attempt **any two** of the following 8
- Explain effect of impurity concentration on the position of Fermi level in P type semiconductor.
 - Explain : Plane of symmetry.
 - Describe various methods used for detection of ultrasonic.
 - Deduce Einstein's expression ($E = mc^2$) for mass-energy equivalence.

SECTION – II

5. Attempt **any five** of the following : 15
- Write characteristics of LASER beam.
 - Explain the terms : optically activity and specific rotation.
 - Explain : principle of fiber optics.
 - Explain : Classification of optical fiber.
 - Give application of nanotechnology in different fields.
 - Calculate power output of reactor, which consumes 2kg of U-235 per day. Assume 7% reactor efficiency. Energy released per fission is 200 MeV.
 - A parallel beam of monochromatic light is incident normally on plane transmission grating having 15000 lines per inch. The first order spectrum is observed to be deviated through an angle 21.7° from normal. Calculate the wavelength of light used.
6. What is LASER ? Why semiconductor laser is called injection laser ? Explain with energy and emission diagram, construction and working of semiconductor laser. 5

OR

Deduce the expression for acceptance angle and numerical aperture of optical fiber and explain how it can be calculated with the help of fractional refractive index change.

7. Attempt **any two** of the following : 8
- What is resolving power ? Explain Rayleigh's criterion of resolution.
 - Describe Laurent's half shade Polarimeter for the determination of specific rotation of the substance.
 - Explain essentials of nuclear reactor.
 - Explain : Holography.



Seat No.	
----------	--

**F.E. (Part – I) (New CBCS) Examination, 2018
ENGINEERING PHYSICS**

Day and Date : Wednesday 12-12-2018

Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :**
- 1) Make suitable assumptions, if **necessary**.
 - 2) Figures to the **right** indicate **full marks**.
 - 3) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
 - 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

- Constants :**
- 1) Avogadro's no., $N = 6.02 \times 10^{26}/\text{k.mol}$.
 - 2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec}$.
 - 3) Charge of electron, $e = 1.6 \times 10^{-19} \text{ C}$.

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **14**
 - 1) For He-Ne laser, typical value of divergence is
 - a) 10^5 radian
 - b) 10^{-5} radian
 - c) 10^3 radian
 - d) 10^{-3} radian
 - 2) The value of fractional refractive index change is always
 - a) >1
 - b) <1
 - c) $=1$
 - d) $=0$
 - 3) If the multiplication factor is greater than unity in a nuclear fission reaction involving neutron capture, then
 - a) An explosion may result
 - b) Explosion cannot occur
 - c) Process will stop after sometime
 - d) There will be no chance for explosion
 - 4) Coolant is used in nuclear reactor
 - a) To slow down the fast neutrons
 - b) To absorb excess neutrons
 - c) To increase speed of neutrons
 - d) To transfer the energy from core to heat exchanger

P.T.O.



- 5) The tubes whose mirror images are similar as the original structure are
 - a) Chiral tubes
 - b) Achiral tubes
 - c) Carbon tubes
 - d) None of these
- 6) The number of atoms in a primitive cell is
 - a) 1
 - b) 3
 - c) 2
 - d) 4
- 7) Ultrasonic waves have frequency
 - a) As that of audible range
 - b) Above audible range
 - c) Below audible range
 - d) Below as well as above audible range
- 8) Void space =
 - a) $(1 + APF) \times 100$
 - b) $(1 - APF) \times 100$
 - c) $(1 + APF)/100$
 - d) $(1 - APF)/100$
- 9) At 0K, in semiconducting material
 - a) Conduction band is full
 - b) Conduction band is partially filled
 - c) Valence band is empty
 - d) Conduction band is empty
- 10) When a body of rest mass 10 kg moves with velocity of light, its mass becomes
 - a) 0
 - b) 20 kg
 - c) ∞
 - d) 100 kg
- 11) In conductor, current flows due to
 - a) Holes
 - b) Both holes and electrons
 - c) Protons
 - d) Electrons
- 12) The absorption coefficient is measured in
 - a) WOU
 - b) m/s^2
 - c) OWU
 - d) m^2
- 13) The resolving power of grating having N slits in n^{th} order will be
 - a) $(n + N)$
 - b) $(n - N)$
 - c) $n N$
 - d) n/N
- 14) Optically active substances are those substance which
 - a) Produce polarized light
 - b) Rotate the plane of polarization of polarized light
 - c) Produce double refraction
 - d) Convert a plane polarized light into circularly polarized light



Seat No.	
----------	--

F.E. (Part – I) (New CBCS) Examination, 2018
ENGINEERING PHYSICS

Day and Date : Wednesday 12-12-2018

Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :** 1) Make suitable assumptions, if necessary.
2) Figures to the right indicate full marks.

- Constants :** 1) Avogadro's no., $N = 6.02 \times 10^{26}/\text{k.mol.}$
2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec.}$
3) Charge of electron, $e = 1.6 \times 10^{-19} \text{ C.}$

SECTION – I

2. Attempt **any five** of the following 15
- Define atomic packing factor. Calculate atomic packing factor for SC and BCC.
 - What are valence band, conduction band and energy gap ? Show with neat diagram.
 - Explain : Length contraction.
 - The volume of room is 1600 m^3 . The wall area of the room is 270 m^2 , the floor area is 150 m^2 and ceiling area is 140 m^2 . The average sound absorption coefficient for wall is 0.03, for the ceiling is 0.8 and for the floor is 0.06. Calculate the average absorption coefficient and the reverberation time.
 - State the acoustic requirements of a good auditorium.
 - Find the Miller indices of a set of parallel planes, which makes intercepts in the ratio $3a : 4b$ on the x and y axes and are parallel to z-axis where a, b and c being primitive vectors of the lattice.
 - Explain : Seven crystal systems.
3. Deduce an expression for Lorentz transformation equation and its inverse. 5

OR

Explain Hall effect. Derive the relation for Hall voltage V_H and Hall coefficient R_H in detail.

Set S



4. Attempt **any two** of the following 8
- Explain effect of impurity concentration on the position of Fermi level in P type semiconductor.
 - Explain : Plane of symmetry.
 - Describe various methods used for detection of ultrasonic.
 - Deduce Einstein's expression ($E = mc^2$) for mass-energy equivalence.

SECTION – II

5. Attempt **any five** of the following : 15
- Write characteristics of LASER beam.
 - Explain the terms : optically activity and specific rotation.
 - Explain : principle of fiber optics.
 - Explain : Classification of optical fiber.
 - Give application of nanotechnology in different fields.
 - Calculate power output of reactor, which consumes 2kg of U-235 per day. Assume 7% reactor efficiency. Energy released per fission is 200 MeV.
 - A parallel beam of monochromatic light is incident normally on plane transmission grating having 15000 lines per inch. The first order spectrum is observed to be deviated through an angle 21.7° from normal. Calculate the wavelength of light used.
6. What is LASER ? Why semiconductor laser is called injection laser ? Explain with energy and emission diagram, construction and working of semiconductor laser. 5

OR

Deduce the expression for acceptance angle and numerical aperture of optical fiber and explain how it can be calculated with the help of fractional refractive index change.

7. Attempt **any two** of the following : 8
- What is resolving power ? Explain Rayleigh's criterion of resolution.
 - Describe Laurent's half shade Polarimeter for the determination of specific rotation of the substance.
 - Explain essentials of nuclear reactor.
 - Explain : Holography.



Seat No.	
----------	--

F.E. (Part – I) (New CBCS) Examination, 2018
ENGINEERING PHYSICS

Day and Date : Wednesday 12-12-2018

Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :**
- 1) Make suitable assumptions, if **necessary**.
 - 2) Figures to the **right** indicate **full marks**.
 - 3) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
 - 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

- Constants :**
- 1) Avogadro's no., $N = 6.02 \times 10^{26}/\text{k.mol}$.
 - 2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec}$.
 - 3) Charge of electron, $e = 1.6 \times 10^{-19} \text{ C}$.

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : 14
 - 1) The number of atoms in a primitive cell is
 - a) 1
 - b) 3
 - c) 2
 - d) 4
 - 2) Ultrasonic waves have frequency
 - a) As that of audible range
 - b) Above audible range
 - c) Below audible range
 - d) Below as well as above audible range
 - 3) Void space =
 - a) $(1 + APF) \times 100$
 - b) $(1 - APF) \times 100$
 - c) $(1 + APF)/100$
 - d) $(1 - APF)/100$
 - 4) At 0K, in semiconducting material
 - a) Conduction band is full
 - b) Conduction band is partially filled
 - c) Valence band is empty
 - d) Conduction band is empty

P.T.O.



- 5) When a body of rest mass 10 kg moves with velocity of light, its mass becomes
a) 0 b) 20 kg c) ∞ d) 100 kg
- 6) In conductor, current flows due to
a) Holes b) Both holes and electrons
c) Protons d) Electrons
- 7) The absorption coefficient is measured in
a) WOU b) m/s² c) OWU d) m²
- 8) The resolving power of grating having N slits in nth order will be
a) (n + N) b) (n - N) c) n N d) n/N
- 9) Optically active substances are those substance which
a) Produce polarized light
b) Rotate the plane of polarization of polarized light
c) Produce double refraction
d) Convert a plane polarized light into circularly polarized light
- 10) For He-Ne laser, typical value of divergence is
a) 10^5 radian b) 10^{-5} radian c) 10^3 radian d) 10^{-3} radian
- 11) The value of fractional refractive index change is always
a) >1 b) <1 c) =1 d) = 0
- 12) If the multiplication factor is greater than unity in a nuclear fission reaction involving neutron capture, then
a) An explosion may result
b) Explosion cannot occur
c) Process will stop after sometime
d) There will be no chance for explosion
- 13) Coolant is used in nuclear reactor
a) To slow down the fast neutrons
b) To absorb excess neutrons
c) To increase speed of neutrons
d) To transfer the energy from core to heat exchanger
- 14) The tubes whose mirror images are similar as the original structure are
a) Chiral tubes b) Achiral tubes
c) Carbon tubes d) None of these



Seat No.	
----------	--

F.E. (Part – I) (New CBCS) Examination, 2018
ENGINEERING PHYSICS

Day and Date : Wednesday 12-12-2018

Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :** 1) Make suitable assumptions, if necessary.
2) Figures to the right indicate full marks.

- Constants :** 1) Avogadro's no., $N = 6.02 \times 10^{26}/\text{k.mol.}$
2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec.}$
3) Charge of electron, $e = 1.6 \times 10^{-19} \text{ C.}$

SECTION – I

2. Attempt **any five** of the following 15
- Define atomic packing factor. Calculate atomic packing factor for SC and BCC.
 - What are valence band, conduction band and energy gap ? Show with neat diagram.
 - Explain : Length contraction.
 - The volume of room is 1600 m^3 . The wall area of the room is 270 m^2 , the floor area is 150 m^2 and ceiling area is 140 m^2 . The average sound absorption coefficient for wall is 0.03, for the ceiling is 0.8 and for the floor is 0.06. Calculate the average absorption coefficient and the reverberation time.
 - State the acoustic requirements of a good auditorium.
 - Find the Miller indices of a set of parallel planes, which makes intercepts in the ratio $3a : 4b$ on the x and y axes and are parallel to z-axis where a, b and c being primitive vectors of the lattice.
 - Explain : Seven crystal systems.
3. Deduce an expression for Lorentz transformation equation and its inverse. 5

OR

Explain Hall effect. Derive the relation for Hall voltage V_H and Hall coefficient R_H in detail.

Set P



4. Attempt **any two** of the following 8
- Explain effect of impurity concentration on the position of Fermi level in P type semiconductor.
 - Explain : Plane of symmetry.
 - Describe various methods used for detection of ultrasonic.
 - Deduce Einstein's expression ($E = mc^2$) for mass-energy equivalence.

SECTION – II

5. Attempt **any five** of the following : 15
- Write characteristics of LASER beam.
 - Explain the terms : optically activity and specific rotation.
 - Explain : principle of fiber optics.
 - Explain : Classification of optical fiber.
 - Give application of nanotechnology in different fields.
 - Calculate power output of reactor, which consumes 2kg of U-235 per day. Assume 7% reactor efficiency. Energy released per fission is 200 MeV.
 - A parallel beam of monochromatic light is incident normally on plane transmission grating having 15000 lines per inch. The first order spectrum is observed to be deviated through an angle 21.7° from normal. Calculate the wavelength of light used.
6. What is LASER ? Why semiconductor laser is called injection laser ? Explain with energy and emission diagram, construction and working of semiconductor laser. 5

OR

Deduce the expression for acceptance angle and numerical aperture of optical fiber and explain how it can be calculated with the help of fractional refractive index change.

7. Attempt **any two** of the following : 8
- What is resolving power ? Explain Rayleigh's criterion of resolution.
 - Describe Laurent's half shade Polarimeter for the determination of specific rotation of the substance.
 - Explain essentials of nuclear reactor.
 - Explain : Holography.



Seat No.	
----------	--

F.E. (Part – I) (New CBCS) Examination, 2018 ENGINEERING PHYSICS

Day and Date : Wednesday 12-12-2018
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Make suitable assumptions, if necessary.
 - 2) Figures to the right indicate full marks.
 - 3) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
 - 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

- Constants :**
- 1) Avogadro's no., $N = 6.02 \times 10^{26}/\text{k.mol.}$
 - 2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec.}$
 - 3) Charge of electron, $e = 1.6 \times 10^{-19} \text{ C.}$

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : 14
 - 1) The resolving power of grating having N slits in n^{th} order will be
 - a) $(n + N)$
 - b) $(n - N)$
 - c) $n N$
 - d) n/N
 - 2) Optically active substances are those substance which
 - a) Produce polarized light
 - b) Rotate the plane of polarization of polarized light
 - c) Produce double refraction
 - d) Convert a plane polarized light into circularly polarized light
 - 3) For He-Ne laser, typical value of divergence is
 - a) 10^5 radian
 - b) 10^{-5} radian
 - c) 10^3 radian
 - d) 10^{-3} radian
 - 4) The value of fractional refractive index change is always
 - a) >1
 - b) <1
 - c) $=1$
 - d) $= 0$
 - 5) If the multiplication factor is greater than unity in a nuclear fission reaction involving neutron capture, then
 - a) An explosion may result
 - b) Explosion cannot occur
 - c) Process will stop after sometime
 - d) There will be no chance for explosion

P.T.O.



- 6) Coolant is used in nuclear reactor
- To slow down the fast neutrons
 - To absorb excess neutrons
 - To increase speed of neutrons
 - To transfer the energy from core to heat exchanger
- 7) The tubes whose mirror images are similar as the original structure are
- Chiral tubes
 - Achiral tubes
 - Carbon tubes
 - None of these
- 8) The number of atoms in a primitive cell is
- 1
 - 3
 - 2
 - 4
- 9) Ultrasonic waves have frequency
- As that of audible range
 - Above audible range
 - Below audible range
 - Below as well as above audible range
- 10) Void space =
- $(1 + APF) \times 100$
 - $(1 - APF) \times 100$
 - $(1 + APF)/100$
 - $(1 - APF)/100$
- 11) At 0K, in semiconducting material
- Conduction band is full
 - Conduction band is partially filled
 - Valence band is empty
 - Conduction band is empty
- 12) When a body of rest mass 10 kg moves with velocity of light, its mass becomes
- 0
 - 20 kg
 - ∞
 - 100 kg
- 13) In conductor, current flows due to
- Holes
 - Both holes and electrons
 - Protons
 - Electrons
- 14) The absorption coefficient is measured in
- WOU
 - m/s^2
 - OWU
 - m^2



Seat No.	
---------------------	--

F.E. (Part – I) (New CBCS) Examination, 2018
ENGINEERING PHYSICS

Day and Date : Wednesday 12-12-2018

Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :** 1) Make suitable assumptions, if necessary.
 2) Figures to the right indicate full marks.

- Constants :** 1) Avogadro's no., $N = 6.02 \times 10^{26}/\text{k.mol.}$
 2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec.}$
 3) Charge of electron, $e = 1.6 \times 10^{-19} \text{ C.}$

SECTION – I

2. Attempt **any five** of the following 15
- Define atomic packing factor. Calculate atomic packing factor for SC and BCC.
 - What are valence band, conduction band and energy gap ? Show with neat diagram.
 - Explain : Length contraction.
 - The volume of room is 1600 m^3 . The wall area of the room is 270 m^2 , the floor area is 150 m^2 and ceiling area is 140 m^2 . The average sound absorption coefficient for wall is 0.03, for the ceiling is 0.8 and for the floor is 0.06. Calculate the average absorption coefficient and the reverberation time.
 - State the acoustic requirements of a good auditorium.
 - Find the Miller indices of a set of parallel planes, which makes intercepts in the ratio $3a : 4b$ on the x and y axes and are parallel to z-axis where a, b and c being primitive vectors of the lattice.
 - Explain : Seven crystal systems.
3. Deduce an expression for Lorentz transformation equation and its inverse. 5

OR

Explain Hall effect. Derive the relation for Hall voltage V_H and Hall coefficient R_H in detail.

Set Q



4. Attempt **any two** of the following 8
- Explain effect of impurity concentration on the position of Fermi level in P type semiconductor.
 - Explain : Plane of symmetry.
 - Describe various methods used for detection of ultrasonic.
 - Deduce Einstein's expression ($E = mc^2$) for mass-energy equivalence.

SECTION – II

5. Attempt **any five** of the following : 15
- Write characteristics of LASER beam.
 - Explain the terms : optically activity and specific rotation.
 - Explain : principle of fiber optics.
 - Explain : Classification of optical fiber.
 - Give application of nanotechnology in different fields.
 - Calculate power output of reactor, which consumes 2kg of U-235 per day. Assume 7% reactor efficiency. Energy released per fission is 200 MeV.
 - A parallel beam of monochromatic light is incident normally on plane transmission grating having 15000 lines per inch. The first order spectrum is observed to be deviated through an angle 21.7° from normal. Calculate the wavelength of light used.
6. What is LASER ? Why semiconductor laser is called injection laser ? Explain with energy and emission diagram, construction and working of semiconductor laser. 5

OR

Deduce the expression for acceptance angle and numerical aperture of optical fiber and explain how it can be calculated with the help of fractional refractive index change.

7. Attempt **any two** of the following : 8
- What is resolving power ? Explain Rayleigh's criterion of resolution.
 - Describe Laurent's half shade Polarimeter for the determination of specific rotation of the substance.
 - Explain essentials of nuclear reactor.
 - Explain : Holography.



Seat No.	
----------	--

F.E. (Part – I) (New CBCS) Examination, 2018 ENGINEERING PHYSICS

Day and Date : Wednesday 12-12-2018

Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :**
- 1) Make suitable assumptions, if **necessary**.
 - 2) Figures to the **right** indicate **full marks**.
 - 3) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
 - 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

- Constants :**
- 1) Avogadro's no., $N = 6.02 \times 10^{26}/\text{k.mol}$.
 - 2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec}$.
 - 3) Charge of electron, $e = 1.6 \times 10^{-19} \text{ C}$.

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : 14
- 1) When a body of rest mass 10 kg moves with velocity of light, its mass becomes
 - a) 0
 - b) 20 kg
 - c) ∞
 - d) 100 kg
- 2) In conductor, current flows due to
 - a) Holes
 - b) Both holes and electrons
 - c) Protons
 - d) Electrons
- 3) The absorption coefficient is measured in
 - a) WOU
 - b) m/s^2
 - c) OWU
 - d) m^2
- 4) The resolving power of grating having N slits in n^{th} order will be
 - a) $(n + N)$
 - b) $(n - N)$
 - c) $n N$
 - d) n/N
- 5) Optically active substances are those substance which
 - a) Produce polarized light
 - b) Rotate the plane of polarization of polarized light
 - c) Produce double refraction
 - d) Convert a plane polarized light into circularly polarized light

P.T.O.



- 6) For He-Ne laser, typical value of divergence is
a) 10^5 radian b) 10^{-5} radian c) 10^3 radian d) 10^{-3} radian
- 7) The value of fractional refractive index change is always
a) >1 b) <1 c) $=1$ d) $=0$
- 8) If the multiplication factor is greater than unity in a nuclear fission reaction involving neutron capture, then
a) An explosion may result
b) Explosion cannot occur
c) Process will stop after sometime
d) There will be no chance for explosion
- 9) Coolant is used in nuclear reactor
a) To slow down the fast neutrons
b) To absorb excess neutrons
c) To increase speed of neutrons
d) To transfer the energy from core to heat exchanger
- 10) The tubes whose mirror images are similar as the original structure are
a) Chiral tubes b) Achiral tubes
c) Carbon tubes d) None of these
- 11) The number of atoms in a primitive cell is
a) 1 b) 3 c) 2 d) 4
- 12) Ultrasonic waves have frequency
a) As that of audible range
b) Above audible range
c) Below audible range
d) Below as well as above audible range
- 13) Void space =
a) $(1 + APF) \times 100$ b) $(1 - APF) \times 100$
c) $(1 + APF)/100$ d) $(1 - APF)/100$
- 14) At 0K, in semiconducting material
a) Conduction band is full
b) Conduction band is partially filled
c) Valence band is empty
d) Conduction band is empty



Seat No.	
----------	--

F.E. (Part – I) (New CBCS) Examination, 2018
ENGINEERING PHYSICS

Day and Date : Wednesday 12-12-2018

Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :** 1) Make suitable assumptions, if necessary.
2) Figures to the right indicate full marks.

- Constants :** 1) Avogadro's no., $N = 6.02 \times 10^{26}/\text{k.mol.}$
2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec.}$
3) Charge of electron, $e = 1.6 \times 10^{-19} \text{ C.}$

SECTION – I

2. Attempt **any five** of the following 15
- Define atomic packing factor. Calculate atomic packing factor for SC and BCC.
 - What are valence band, conduction band and energy gap ? Show with neat diagram.
 - Explain : Length contraction.
 - The volume of room is 1600 m^3 . The wall area of the room is 270 m^2 , the floor area is 150 m^2 and ceiling area is 140 m^2 . The average sound absorption coefficient for wall is 0.03, for the ceiling is 0.8 and for the floor is 0.06. Calculate the average absorption coefficient and the reverberation time.
 - State the acoustic requirements of a good auditorium.
 - Find the Miller indices of a set of parallel planes, which makes intercepts in the ratio $3a : 4b$ on the x and y axes and are parallel to z-axis where a, b and c being primitive vectors of the lattice.
 - Explain : Seven crystal systems.
3. Deduce an expression for Lorentz transformation equation and its inverse. 5

OR

Explain Hall effect. Derive the relation for Hall voltage V_H and Hall coefficient R_H in detail.

Set R



4. Attempt **any two** of the following 8
- Explain effect of impurity concentration on the position of Fermi level in P type semiconductor.
 - Explain : Plane of symmetry.
 - Describe various methods used for detection of ultrasonic.
 - Deduce Einstein's expression ($E = mc^2$) for mass-energy equivalence.

SECTION – II

5. Attempt **any five** of the following : 15
- Write characteristics of LASER beam.
 - Explain the terms : optically activity and specific rotation.
 - Explain : principle of fiber optics.
 - Explain : Classification of optical fiber.
 - Give application of nanotechnology in different fields.
 - Calculate power output of reactor, which consumes 2kg of U-235 per day. Assume 7% reactor efficiency. Energy released per fission is 200 MeV.
 - A parallel beam of monochromatic light is incident normally on plane transmission grating having 15000 lines per inch. The first order spectrum is observed to be deviated through an angle 21.7° from normal. Calculate the wavelength of light used.
6. What is LASER ? Why semiconductor laser is called injection laser ? Explain with energy and emission diagram, construction and working of semiconductor laser. 5

OR

Deduce the expression for acceptance angle and numerical aperture of optical fiber and explain how it can be calculated with the help of fractional refractive index change.

7. Attempt **any two** of the following : 8
- What is resolving power ? Explain Rayleigh's criterion of resolution.
 - Describe Laurent's half shade Polarimeter for the determination of specific rotation of the substance.
 - Explain essentials of nuclear reactor.
 - Explain : Holography.



Seat No.	
----------	--

**F.E. (Part – I) (New CBCS) Examination, 2018
ENGINEERING PHYSICS**

Day and Date : Wednesday 12-12-2018

Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :**
- 1) Make suitable assumptions, if **necessary**.
 - 2) Figures to the **right** indicate **full marks**.
 - 3) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
 - 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

- Constants :**
- 1) Avogadro's no., $N = 6.02 \times 10^{26}/\text{k.mol}$.
 - 2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec}$.
 - 3) Charge of electron, $e = 1.6 \times 10^{-19} \text{ C}$.

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **14**
 - 1) For He-Ne laser, typical value of divergence is
 - a) 10^5 radian
 - b) 10^{-5} radian
 - c) 10^3 radian
 - d) 10^{-3} radian
 - 2) The value of fractional refractive index change is always
 - a) >1
 - b) <1
 - c) $=1$
 - d) $=0$
 - 3) If the multiplication factor is greater than unity in a nuclear fission reaction involving neutron capture, then
 - a) An explosion may result
 - b) Explosion cannot occur
 - c) Process will stop after sometime
 - d) There will be no chance for explosion
 - 4) Coolant is used in nuclear reactor
 - a) To slow down the fast neutrons
 - b) To absorb excess neutrons
 - c) To increase speed of neutrons
 - d) To transfer the energy from core to heat exchanger

P.T.O.



- 5) The tubes whose mirror images are similar as the original structure are
 - a) Chiral tubes
 - b) Achiral tubes
 - c) Carbon tubes
 - d) None of these
- 6) The number of atoms in a primitive cell is
 - a) 1
 - b) 3
 - c) 2
 - d) 4
- 7) Ultrasonic waves have frequency
 - a) As that of audible range
 - b) Above audible range
 - c) Below audible range
 - d) Below as well as above audible range
- 8) Void space =
 - a) $(1 + APF) \times 100$
 - b) $(1 - APF) \times 100$
 - c) $(1 + APF)/100$
 - d) $(1 - APF)/100$
- 9) At 0K, in semiconducting material
 - a) Conduction band is full
 - b) Conduction band is partially filled
 - c) Valence band is empty
 - d) Conduction band is empty
- 10) When a body of rest mass 10 kg moves with velocity of light, its mass becomes
 - a) 0
 - b) 20 kg
 - c) ∞
 - d) 100 kg
- 11) In conductor, current flows due to
 - a) Holes
 - b) Both holes and electrons
 - c) Protons
 - d) Electrons
- 12) The absorption coefficient is measured in
 - a) WOU
 - b) m/s^2
 - c) OWU
 - d) m^2
- 13) The resolving power of grating having N slits in n^{th} order will be
 - a) $(n + N)$
 - b) $(n - N)$
 - c) $n N$
 - d) n/N
- 14) Optically active substances are those substance which
 - a) Produce polarized light
 - b) Rotate the plane of polarization of polarized light
 - c) Produce double refraction
 - d) Convert a plane polarized light into circularly polarized light



Seat No.	
----------	--

F.E. (Part – I) (New CBCS) Examination, 2018
ENGINEERING PHYSICS

Day and Date : Wednesday 12-12-2018

Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :** 1) Make suitable assumptions, if necessary.
2) Figures to the right indicate full marks.

- Constants :** 1) Avogadro's no., $N = 6.02 \times 10^{26}/\text{k.mol.}$
2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec.}$
3) Charge of electron, $e = 1.6 \times 10^{-19} \text{ C.}$

SECTION – I

2. Attempt **any five** of the following 15
- Define atomic packing factor. Calculate atomic packing factor for SC and BCC.
 - What are valence band, conduction band and energy gap ? Show with neat diagram.
 - Explain : Length contraction.
 - The volume of room is 1600 m^3 . The wall area of the room is 270 m^2 , the floor area is 150 m^2 and ceiling area is 140 m^2 . The average sound absorption coefficient for wall is 0.03, for the ceiling is 0.8 and for the floor is 0.06. Calculate the average absorption coefficient and the reverberation time.
 - State the acoustic requirements of a good auditorium.
 - Find the Miller indices of a set of parallel planes, which makes intercepts in the ratio $3a : 4b$ on the x and y axes and are parallel to z-axis where a, b and c being primitive vectors of the lattice.
 - Explain : Seven crystal systems.
3. Deduce an expression for Lorentz transformation equation and its inverse. 5

OR

Explain Hall effect. Derive the relation for Hall voltage V_H and Hall coefficient R_H in detail.

Set S



4. Attempt **any two** of the following 8
- Explain effect of impurity concentration on the position of Fermi level in P type semiconductor.
 - Explain : Plane of symmetry.
 - Describe various methods used for detection of ultrasonic.
 - Deduce Einstein's expression ($E = mc^2$) for mass-energy equivalence.

SECTION – II

5. Attempt **any five** of the following : 15
- Write characteristics of LASER beam.
 - Explain the terms : optically activity and specific rotation.
 - Explain : principle of fiber optics.
 - Explain : Classification of optical fiber.
 - Give application of nanotechnology in different fields.
 - Calculate power output of reactor, which consumes 2kg of U-235 per day. Assume 7% reactor efficiency. Energy released per fission is 200 MeV.
 - A parallel beam of monochromatic light is incident normally on plane transmission grating having 15000 lines per inch. The first order spectrum is observed to be deviated through an angle 21.7° from normal. Calculate the wavelength of light used.
6. What is LASER ? Why semiconductor laser is called injection laser ? Explain with energy and emission diagram, construction and working of semiconductor laser. 5

OR

Deduce the expression for acceptance angle and numerical aperture of optical fiber and explain how it can be calculated with the help of fractional refractive index change.

7. Attempt **any two** of the following : 8
- What is resolving power ? Explain Rayleigh's criterion of resolution.
 - Describe Laurent's half shade Polarimeter for the determination of specific rotation of the substance.
 - Explain essentials of nuclear reactor.
 - Explain : Holography.

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE.
End Semester Examination – Winter 2018.

Course : B. Tech
Subject Name : Engineering Physics
Max. Marks : 60 **Date 13/12/2018**

Sem. I
Subject Code : PHY1202
Duration: 3 Hrs.

Instructions:

1. All the questions are compulsory.
2. The level question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

Level/CO Marks

Q.1 Solve any two of the following

- A) In case of forced vibration, prove that

$$A = \frac{f}{\sqrt{(\omega^2 - P^2)^2 + 4b^2 p^2}}$$

- B) Explain Pizoelectric effect and Magnetostriction effect.

What will be the Young's modulus of quartz plate if 5.5 mm thick quartz is used to produce an ultrasonic waves of frequency 0.4999 MHz. The density of the quartz is $2.65 \times 10^3 \text{ kg/m}^3$.

- C) Explain with diagrams different types of polarization in dielectrics.

CO1 6

CO1 6

CO6 6

Q.2 Solve any two of the following

- A) In case of wedge shaped film, prove that $\beta = \lambda / 2\theta$.

CO2 6

- B) Explain the principle and working of He-Ne Laser.

CO2 6

- C) i. A 20 cm long glass tube filled with a sugar solution of 15 gm of cane sugar in 100 cc of water is kept in the path of polarized light. Calculate the angle of rotation of cane sugar, specific rotation of cane sugar is 66° .

CO3 3

ii. Calculate the refractive index of core and cladding of an optical fiber such that the numerical aperture of fiber is 0.27 and relative refractive index is 0.015.

CO3 3

Q.3 Solve any two of the following

- A) With neat diagram explain the construction and working of G.M. Counter.

CO3 6

- B) What is Heisenberg's Uncertainty Principle?

CO3 6

If the uncertainty in position of an electron is $4 \times 10^{-10} \text{ m}$. Calculate the uncertainty in its momentum

- C) Derive Schrodinger's time independant wave equation

CO3 6

Q.4 Solve any two of the following.

- A) Deduce the relation between interplaner spacing d and lattice constant a. Calculate the interplaner spacing for a (311) plane in a simple cubic lattice whose lattice constant is $2.109 \times 10^{-10} \text{ m}$.

CO4 6

- B) State and prove Moseley's law. What is its importance?

CO4 6

- C) Derive an expression for electromagnetic wave in free space and find the value of velocity of light in free space.

CO6 6

Q.5 Solve the following.

- A) What are magnetic domain and domain wall? Explain the B-H curve based on domain theory.
- B) Derive an expression for conductivity of a conductor in terms of relaxation time of electron.

CO5 6

CO3 6

End

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE.
End Semester Examination – Winter 2018.

Course : B. Tech
Subject Name : Engineering Physics
Max. Marks : 60 **Date 13/12/2018**

Sem. I
Subject Code : PHY1202
Duration: 3 Hrs.

Instructions:

1. All the questions are compulsory.
2. The level question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

Level/CO Marks

Q.1 Solve any two of the following

- A) In case of forced vibration, prove that

$$A = \frac{f}{\sqrt{(\omega^2 - P^2)^2 + 4b^2 p^2}}$$

- B) Explain Pizoelectric effect and Magnetostriction effect.

What will be the Young's modulus of quartz plate if 5.5 mm thick quartz is used to produce an ultrasonic waves of frequency 0.4999 MHz. The density of the quartz is $2.65 \times 10^3 \text{ kg/m}^3$.

- C) Explain with diagrams different types of polarization in dielectrics.

CO1 6

CO1 6

CO6 6

Q.2 Solve any two of the following

- A) In case of wedge shaped film, prove that $\beta = \lambda / 2\theta$.

CO2 6

- B) Explain the principle and working of He-Ne Laser.

CO2 6

- C) i. A 20 cm long glass tube filled with a sugar solution of 15 gm of cane sugar in 100 cc of water is kept in the path of polarized light. Calculate the angle of rotation of cane sugar, specific rotation of cane sugar is 66° .

CO3 3

ii. Calculate the refractive index of core and cladding of an optical fiber such that the numerical aperture of fiber is 0.27 and relative refractive index is 0.015.

CO3 3

Q.3 Solve any two of the following

- A) With neat diagram explain the construction and working of G.M. Counter.

CO3 6

- B) What is Heisenberg's Uncertainty Principle?

CO3 6

If the uncertainty in position of an electron is $4 \times 10^{-10} \text{ m}$. Calculate the uncertainty in its momentum

- C) Derive Schrodinger's time independant wave equation

CO3 6

Q.4 Solve any two of the following.

- A) Deduce the relation between interplaner spacing d and lattice constant a. Calculate the interplaner spacing for a (311) plane in a simple cubic lattice whose lattice constant is $2.109 \times 10^{-10} \text{ m}$.

CO4 6

- B) State and prove Moseley's law. What is its importance?

CO4 6

- C) Derive an expression for electromagnetic wave in free space and find the value of velocity of light in free space.

CO6 6

Q.5 Solve the following.

- A) What are magnetic domain and domain wall? Explain the B-H curve based on domain theory.
- B) Derive an expression for conductivity of a conductor in terms of relaxation time of electron.

CO5 6

CO3 6

End

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE.
End Semester Examination – Winter 2018.

Course : B. Tech
Subject Name : Engineering Physics
Max. Marks : 60 **Date 13/12/2018**

Sem. I
Subject Code : PHY1202
Duration: 3 Hrs.

Instructions:

1. All the questions are compulsory.
2. The level question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

Level/CO Marks

Q.1 Solve any two of the following

- A) In case of forced vibration, prove that

$$A = \frac{f}{\sqrt{(\omega^2 - P^2)^2 + 4b^2 p^2}}$$

- B) Explain Pizoelectric effect and Magnetostriction effect.

What will be the Young's modulus of quartz plate if 5.5 mm thick quartz is used to produce an ultrasonic waves of frequency 0.4999 MHz. The density of the quartz is $2.65 \times 10^3 \text{ kg/m}^3$.

- C) Explain with diagrams different types of polarization in dielectrics.

CO1 6

CO1 6

CO6 6

Q.2 Solve any two of the following

- A) In case of wedge shaped film, prove that $\beta = \lambda / 2\theta$.

CO2 6

- B) Explain the principle and working of He-Ne Laser.

CO2 6

- C) i. A 20 cm long glass tube filled with a sugar solution of 15 gm of cane sugar in 100 cc of water is kept in the path of polarized light. Calculate the angle of rotation of cane sugar, specific rotation of cane sugar is 66° .

CO3 3

ii. Calculate the refractive index of core and cladding of an optical fiber such that the numerical aperture of fiber is 0.27 and relative refractive index is 0.015.

CO3 3

Q.3 Solve any two of the following

- A) With neat diagram explain the construction and working of G.M. Counter.

CO3 6

- B) What is Heisenberg's Uncertainty Principle?

CO3 6

If the uncertainty in position of an electron is $4 \times 10^{-10} \text{ m}$. Calculate the uncertainty in its momentum

- C) Derive Schrodinger's time independant wave equation

CO3 6

Q.4 Solve any two of the following.

- A) Deduce the relation between interplaner spacing d and lattice constant a. Calculate the interplaner spacing for a (311) plane in a simple cubic lattice whose lattice constant is $2.109 \times 10^{-10} \text{ m}$.

CO4 6

- B) State and prove Moseley's law. What is its importance?

CO4 6

- C) Derive an expression for electromagnetic wave in free space and find the value of velocity of light in free space.

CO6 6

Q.5 Solve the following.

- A) What are magnetic domain and domain wall? Explain the B-H curve based on domain theory.
- B) Derive an expression for conductivity of a conductor in terms of relaxation time of electron.

CO5 6

CO3 6

End

Dr. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE- RAIKAD
End Semester Examination Dec 2018 (Supplementary)

Course: B. Tech (All Branches)

Semester: I/II

Subject Name with Subject Code: Engineering Physics (PHY103/ PHY203)

Date: 04/12/2018

Marks: 60

Time: 3 Hrs

Instructions to the Student:

1. Each question carries 12 marks.
2. Attempt any five questions of the following.
3. Illustrate your answer with neat sketches, diagrams, etc. Wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

Q. 1 Attempt the following

- A What is free vibration? Derive an expression for differential equation of free vibration. (6)
- B What is Piezoelectric effect? Explain production of ultrasonic waves using piezoelectric oscillator. (6)

Q. 2 Attempt any two of the following.

- A. In case of Newton's rings, prove $D_n \propto \sqrt{n}$, where D_n is diameter of n^{th} dark ring. (6)
- B. Explain Double refraction using Huygen's wave theory of light. (6)
- C. Explain the construction and working of Ruby laser with neat diagram. (6)

Q. 3 Attempt the following

- A. Discuss Thomson's method for determination of e/m of an electron. (6)
- B. Derive time independant Schrodinger's wave equation. (6)

Q. 4 Attempt the following

- A. What is primitive and nonprimitive unit cells? Find the number of atoms per unit cell in SC, BCC, FCC lattices. (6)

OR

- A. Define atomic radius. Find the atomic radius in SC, BCC, FCC lattices. (6)
- B. State and Derive Bragg's law of X-ray diffraction. An X-ray is operated at 20 kV. Calculate the minimum wavelength of X-rays emitting from it. (6)

Q. 5 Attempt the following

- A. What are Ferrites and Garnets? Write their general formula. Determine the magnetization and flux density of the diamagnetic, if its magnetic susceptibility is -0.4×10^{-5} and magnetic field in it is 10^4 A/m . (6)

OR

A. Prove Bohr Magnetron $\mu_B = e\hbar / 2m$. Differentiate between hard and soft magnetic materials. (6)

B. What is Superconductivity? Explain Meissner effect in superconductor. (6)

Q. 6 Attempt any two of the following

A. What is Hall effect? Derive an expression for Hall coefficient of p and n type semiconductor.

B. Explain the effect of frequency and temperature on Dielectric material. (6)

C. What is Displacement current? Write Maxwell's equations in differential and integral form. (6)

*** End ***

Dr. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE- RAIKAD
End Semester Examination Dec 2018 (Supplementary)

Course: B. Tech (All Branches)

Semester: I/II

Subject Name with Subject Code: Engineering Physics (PHY103/ PHY203)

Date: 04/12/2018

Marks: 60

Time: 3 Hrs

Instructions to the Student:

1. Each question carries 12 marks.
2. Attempt any five questions of the following.
3. Illustrate your answer with neat sketches, diagrams, etc. Wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

Q. 1 Attempt the following

- A What is free vibration? Derive an expression for differential equation of free vibration. (6)
- B What is Piezoelectric effect? Explain production of ultrasonic waves using piezoelectric oscillator. (6)

Q. 2 Attempt any two of the following.

- A. In case of Newton's rings, prove $D_n \propto \sqrt{n}$, where D_n is diameter of n^{th} dark ring. (6)
- B. Explain Double refraction using Huygen's wave theory of light. (6)
- C. Explain the construction and working of Ruby laser with neat diagram. (6)

Q. 3 Attempt the following

- A. Discuss Thomson's method for determination of e/m of an electron. (6)
- B. Derive time independant Schrodinger's wave equation. (6)

Q. 4 Attempt the following

- A. What is primitive and nonprimitive unit cells? Find the number of atoms per unit cell in SC, BCC, FCC lattices. (6)

OR

- A. Define atomic radius. Find the atomic radius in SC, BCC, FCC lattices. (6)
- B. State and Derive Bragg's law of X-ray diffraction. An X-ray is operated at 20 kV. Calculate the minimum wavelength of X-rays emitting from it. (6)

Q. 5 Attempt the following

- A. What are Ferrites and Garnets? Write their general formula. Determine the magnetization and flux density of the diamagnetic, if its magnetic susceptibility is -0.4×10^{-5} and magnetic field in it is 10^4 A/m . (6)

OR

A. Prove Bohr Magnetron $\mu_B = e\hbar / 2m$. Differentiate between hard and soft magnetic materials. (6)

B. What is Superconductivity? Explain Meissner effect in superconductor. (6)

Q. 6 Attempt any two of the following

A. What is Hall effect? Derive an expression for Hall coefficient of p and n type semiconductor. (6)

B. Explain the effect of frequency and temperature on Dielectric material. (6)

C. What is Displacement current? Write Maxwell's equations in differential and integral form. (6)

*** End ***

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY,
LONERE – RAIGAD - 402103
End Semester Examination, May 2018**

Branch: F.Y. B.Tech.

Semester: II

Subject: Engineering Physics (PHY 203)

Marks: 60

Date: 18 / 05 / 2018

Time: 3 Hrs

Instructions to the Students:

1. Each question carry 12 marks
2. Attempt any five questions of the following
3. Illustrate your answers with neat sketches, diagrams etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

Q. No.1 Attempt the following.

- a. Which are the forces involved in Forced Oscillations? Obtain the differential equation of forced oscillations. 06
- b. What are ultrasonic waves? Describe magnetostriction method for generating ultrasonic waves. 06

Q. No. 2 Attempt any two of the following.

- a. In case of Newton's rings in reflected light show that diameter of bright rings is proportional to the square root of odd natural numbers.
In Newton's rings, the diameter of a certain bright ring is 0.65 cm and that of tenth ring is 0.95 cm. If $\lambda = 6000 \text{ A}^0$, calculate the radius of curvature of a convex lens. 06
- b. Give the diagrammatic representation of polarized and unpolarized light.
Explain the method of producing plane polarized light by reflection. 06
- c. Explain the construction and working of He-Ne laser with neat diagram. 06

Q. No. 3 Attempt the following.

- a. What is Q-value of nuclear reaction? Calculate the Q-value of given reaction and state whether reaction is exothermic or endothermic. 06



Given Mass of Li = 7.01822

Mass of H = 1.00814

Mass of He = 4.00387,

b. State Heisenberg's Uncertainty Principle and prove that electron cannot exists in the nucleus.

06

Q. No. 4 Attempt the following.

a. Define Packing Density. Find the packing density in SC, BCC, and FCC lattices.

OR

a. Derive the relation between crystal density ' ρ ' and lattice parameter 'a'.

The density of copper is 8980 Kg/ m³ and unit cell dimension is 3.61 Å⁰. Atomic weight of copper is 63.54. Determine crystal structure.

06

06

b. State and Derive Moseley's law for characteristics X-ray spectrum.

06

Q. No. 5 Attempt the following.

a. Discuss the different types of magnetic materials interms of magnetic moments.

OR

a. Prove Bohr magneton $\mu_B = e\hbar / 2m$. Differnetiate between hard and soft magnetic materials.

06

b. What is Microscopic Ohm's Law? Differentiate between Type I and Type II superconductors.

06

Q. No. 6 Attempt any two of the following.

a. Derive an expression for conductivity in an intrinsic and extrinsic semiconductor. Calculate conductivity of pure silicon when the concentration of carriers is $1.6 \times 10^{10} / \text{cm}^3$, and $\mu_e = 1500 \text{ cm}^2/\text{V-s}$, $\mu_h = 500 \text{ cm}^2/\text{V-s}$.

06

b. Explain the terms

- i. Dielectric constant
- ii. Electric Displacement
- iii. Polarizability

06

c. What is displacement current? Write Maxwell's equations in differnetial and integral form.

06



Seat No.	
----------	--

**F.E. (Part – I) (CGPA) (Old) Examination, 2018
ENGINEERING PHYSICS**

Day and Date : Wednesday, 12-12-2018

Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :**
- 1) Make suitable assumptions, **if necessary**.
 - 2) Figures to the **right** indicate **full marks**.
 - 3) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. Each question carries **one mark**.
 - 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

- Constants :**
- 1) Avogadro's no., $N = 6.02 \times 10^{26} / \text{k.mol}$.
 - 2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec}$.
 - 3) Charge of electron, $e = 1.6 \times 10^{-19} \text{ C}$.

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

SECTION – I

1. Choose the correct answer : **(14x1=14)**
 - 1) Acceptor type semiconductor is formed by adding impurity of valency
a) 3 b) 4 c) 5 d) 2
 - 2) The number of died axes symmetry elements that are present in a cubic crystal are
a) 4 b) 6 c) 8 d) 10
 - 3) The Miller indices of the plane parallel to y and z axes are
a) (0 0 1) b) (0 1 0) c) (1 0 0) d) (1 1 1)
 - 4) The audible range of frequency is
a) 20 KHz to 20 MHz b) 200 KHz to 200 MHz
c) 200 Hz to 200 MHz d) 20 Hz to 20 KHz
 - 5) Reverberation time is _____ to/of volume of the hall.
a) directly proportional b) inversely proportional
c) independent d) none of these
 - 6) The inertial frame of reference is _____ frame of reference
a) An accelerated b) Non-accelerated
c) A rotating d) None of these

P.T.O.



7) The Lorentz transformation equation for x' co-ordinate from s to s'

- | | |
|---|---|
| a) $x' = (x + vt) / \sqrt{1 - v^2/c^2}$ | b) $x' = (x - ct) / \sqrt{1 - v^2/c^2}$ |
| c) $x' = (x - vt) / \sqrt{1 - v^2/c^2}$ | d) $x' = x - vt (\sqrt{1 - v^2/c^2})$ |

SECTION – II

8) The resolving power of a grating having N slits in n^{th} order will be

- | | | | |
|------------|--------------|----------|----------|
| a) $(n+N)$ | b) $(n - N)$ | c) n/N | d) $n.N$ |
|------------|--------------|----------|----------|

9) The substances that rotate the plane of polarization are said to be

- | | |
|---------------------|-----------------------|
| a) opaque | b) optically inactive |
| c) optically active | d) polaroid |

10) Stimulated emission process is represented by equation

- | | |
|---|--|
| a) $A^* + h\gamma \rightarrow A + 2h\gamma$ | b) $A + h\gamma \rightarrow A^*$ |
| c) $A^* \rightarrow A + h\gamma$ | d) $A^* + h\gamma \rightarrow A + h\gamma$ |

11) The hologram records _____ of the object.

- | |
|--|
| a) Only intensity variation |
| b) Only phase distribution |
| c) Both intensity variation and phase distribution |
| d) None of these |

12) In total internal reflection phenomenon the light ray incident from

- | | |
|---------------------|--------------------|
| a) Rarer to denser | b) Rarer to rarer |
| c) Denser to denser | d) Denser to rarer |

13) Energy released per fission of a $_{92}^{235}\text{U}$ nucleus is nearly

- | | |
|------------|-----------|
| a) 200 eV | b) 20 eV |
| c) 200 MeV | d) 20 MeV |

14) The chirality of armchair CNT is

- | | | | |
|-----------|-----------|-----------|-----------|
| a) (a, b) | b) (a, 0) | c) (a, a) | d) (0, b) |
|-----------|-----------|-----------|-----------|
-



Seat No.	
----------	--

F.E. (Part – I) (CGPA) (Old) Examination, 2018
ENGINEERING PHYSICS

Day and Date : Wednesday, 12-12-2018

Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :** 1) Make suitable assumptions, **if necessary**.
2) Figures to the **right** indicate **full** marks.

SECTION – I

2. Attempt **any five** of the following : 15

- Describe in brief the formation of energy bands in solids.
- Calculate no. of atoms per unit cell for SC, BCC and FCC crystal.
- Explain the various requirements of a good auditorium.
- Deduce an expression for length contraction.
- Obtain the relativistic formula for the addition of velocities.
- A hall with volume of 1000 m^3 has a sound-absorbing surface of area 400 m^2 . If the average absorption coefficient of the hall is 0.2 sabines, what is the reverberation time of the hall ?
- A rocket ship is 100 meter long on the ground. When it is in flight, its length is 99 meters to an observer on the ground. What is its speed ?

3. a) What is Hall effect ? Obtain an expression for Hall voltage and Hall coefficient. 5

OR

- Discuss the various types of symmetry elements and symmetry operations present in a cubic crystal.

4. Attempt **any two** of the following : 8

- Explain effect of impurity on Fermi level in p-type and n-type semiconductor.
- Define atomic radius and obtain its values for SC, BCC and FCC crystals.
- Explain acoustic diffraction method for determination of wavelength of ultrasonic waves.
- Deduce the expression for relativistic mass variation, to show $m = m_0/(1 - v^2/c^2)^{1/2}$.

Set P



SECTION – II

5. Attempt **any five** of the following : 15

- a) Distinguish between Fresnel and Fraunhofer class of diffraction.
- b) Define :
 - i) Spontaneous emission
 - ii) Stimulated emission
 - iii) Stimulated absorption
- c) Explain with neat diagram basic concept and structure of optical fiber.
- d) Explain with diagram types of carbon nano tubes.
- e) Explain Proton - Proton cycle.
- f) A fiber cable has an acceptance angle of 30° and core index of refraction 1.4. Calculate the cladding index of refraction.
- g) Calculate power output of a nuclear reactor. Which consumes 20.4 Kg of U 235 in 1000 hours of operations. Assume that energy released per fission of U 235 is 200 MeV.

6. a) Define optical activity. Explain construction and working of Laurent's half shade polarimeter. 5

OR

- b) Describe He-Ne laser with its construction and working.

7. Attempt **any two** of the following : 8

- a) Derive an expression for the resolving power of a plane diffraction grating.
- b) Explain the construction and reconstruction of hologram with neat diagram.
- c) Explain the fiber optics communication system with block diagram.
- d) Write a note on: Classification of nuclear reactor.



Seat No.	
----------	--

**F.E. (Part – I) (CGPA) (Old) Examination, 2018
ENGINEERING PHYSICS**

Day and Date : Wednesday, 12-12-2018

Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :**
- 1) Make suitable assumptions, *if necessary*.
 - 2) Figures to the **right** indicate **full marks**.
 - 3) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each question carries one mark**.
 - 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

- Constants :**
- 1) Avogadro's no., $N = 6.02 \times 10^{26} / \text{k.mol.}$
 - 2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec.}$
 - 3) Charge of electron, $e = 1.6 \times 10^{-19} \text{ C.}$

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

SECTION – I1. Choose the correct answer : **(14x1=14)**

- 1) The Miller indices of the plane parallel to y and z axes are
 - a) (0 0 1)
 - b) (0 1 0)
 - c) (1 0 0)
 - d) (1 1 1)
- 2) The audible range of frequency is
 - a) 20 KHz to 20 MHz
 - b) 200 KHz to 200 MHz
 - c) 200 Hz to 200 MHz
 - d) 20 Hz to 20 KHz
- 3) Reverberation time is _____ to/of volume of the hall.
 - a) directly proportional
 - b) inversely proportional
 - c) independent
 - d) none of these
- 4) The inertial frame of reference is _____ frame of reference
 - a) An accelerated
 - b) Non-accelerated
 - c) A rotating
 - d) None of these
- 5) The Lorentz transformation equation for x' co-ordinate from s to s'
 - a) $x' = (x + vt) / \sqrt{1 - v^2/c^2}$
 - b) $x' = (x - ct) / \sqrt{1 - v^2/c^2}$
 - c) $x' = (x - vt) / \sqrt{1 - v^2/c^2}$
 - d) $x' = x - vt (\sqrt{1 - v^2/c^2})$
- 6) Acceptor type semiconductor is formed by adding impurity of valency
 - a) 3
 - b) 4
 - c) 5
 - d) 2

P.T.O.



- 7) The number of died axes symmetry elements that are present in a cubic crystal are
a) 4 b) 6 c) 8 d) 10

SECTION – II

- 8) Stimulated emission process is represented by equation

 - a) $A^* + h\gamma \rightarrow A + 2h\gamma$
 - b) $A + h\gamma \rightarrow A^*$
 - c) $A^* \rightarrow A + h\gamma$
 - d) $A^* + h\gamma \rightarrow A + h\gamma$

9) The hologram records _____ of the object.

 - a) Only intensity variation
 - b) Only phase distribution
 - c) Both intensity variation and phase distribution
 - d) None of these

10) In total internal reflection phenomenon the light ray incident from

 - a) Rarer to denser
 - b) Rarer to rarer
 - c) Denser to denser
 - d) Denser to rarer

11) Energy released per fission of a $_{92}U^{235}$ nucleus is nearly

 - a) 200 eV
 - b) 20 eV
 - c) 200 MeV
 - d) 20 MeV

12) The chirality of armchair CNT is

 - a) (a, b)
 - b) (a, 0)
 - c) (a, a)
 - d) (0, b)

13) The resolving power of a grating having N slits in n^{th} order will be

 - a) $(n+N)$
 - b) $(n - N)$
 - c) n/N
 - d) $n.N$

14) The substances that rotate the plane of polarization are said to be

 - a) opaque
 - b) optically inactive
 - c) optically active
 - d) polaroid



Seat No.	
----------	--

F.E. (Part – I) (CGPA) (Old) Examination, 2018
ENGINEERING PHYSICS

Day and Date : Wednesday, 12-12-2018

Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :** 1) Make suitable assumptions, **if necessary**.
2) Figures to the **right** indicate **full** marks.

SECTION – I

2. Attempt **any five** of the following : 15

- Describe in brief the formation of energy bands in solids.
- Calculate no. of atoms per unit cell for SC, BCC and FCC crystal.
- Explain the various requirements of a good auditorium.
- Deduce an expression for length contraction.
- Obtain the relativistic formula for the addition of velocities.
- A hall with volume of 1000 m^3 has a sound-absorbing surface of area 400 m^2 . If the average absorption coefficient of the hall is 0.2 sabines, what is the reverberation time of the hall ?
- A rocket ship is 100 meter long on the ground. When it is in flight, its length is 99 meters to an observer on the ground. What is its speed ?

3. a) What is Hall effect ? Obtain an expression for Hall voltage and Hall coefficient. 5

OR

- Discuss the various types of symmetry elements and symmetry operations present in a cubic crystal.

4. Attempt **any two** of the following : 8

- Explain effect of impurity on Fermi level in p-type and n-type semiconductor.
- Define atomic radius and obtain its values for SC, BCC and FCC crystals.
- Explain acoustic diffraction method for determination of wavelength of ultrasonic waves.
- Deduce the expression for relativistic mass variation, to show $m = m_0/(1 - v^2/c^2)^{1/2}$.

Set Q



SECTION – II

5. Attempt **any five** of the following : 15
- a) Distinguish between Fresnel and Fraunhofer class of diffraction.
 - b) Define :
 - i) Spontaneous emission
 - ii) Stimulated emission
 - iii) Stimulated absorption
 - c) Explain with neat diagram basic concept and structure of optical fiber.
 - d) Explain with diagram types of carbon nano tubes.
 - e) Explain Proton - Proton cycle.
 - f) A fiber cable has an acceptance angle of 30° and core index of refraction 1.4. Calculate the cladding index of refraction.
 - g) Calculate power output of a nuclear reactor. Which consumes 20.4 Kg of U 235 in 1000 hours of operations. Assume that energy released per fission of U 235 is 200 MeV.

6. a) Define optical activity. Explain construction and working of Laurent's half shade polarimeter. 5

OR

- b) Describe He-Ne laser with its construction and working.

7. Attempt **any two** of the following : 8
- a) Derive an expression for the resolving power of a plane diffraction grating.
 - b) Explain the construction and reconstruction of hologram with neat diagram.
 - c) Explain the fiber optics communication system with block diagram.
 - d) Write a note on: Classification of nuclear reactor.



Seat No.	
----------	--

**F.E. (Part – I) (CGPA) (Old) Examination, 2018
ENGINEERING PHYSICS**

Day and Date : Wednesday, 12-12-2018

Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :**
- 1) Make suitable assumptions, **if necessary**.
 - 2) Figures to the **right** indicate **full marks**.
 - 3) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each question carries one mark**.
 - 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

- Constants :**
- 1) Avogadro's no., $N = 6.02 \times 10^{26} / \text{k.mol.}$
 - 2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec.}$
 - 3) Charge of electron, $e = 1.6 \times 10^{-19} \text{ C.}$

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

SECTION – I1. Choose the correct answer : **(14x1=14)**

- 1) Reverberation time is _____ to/of volume of the hall.
a) directly proportional b) inversely proportional
c) independent d) none of these
- 2) The inertial frame of reference is _____ frame of reference
a) An accelerated b) Non-accelerated
c) A rotating d) None of these
- 3) The Lorentz transformation equation for x' co-ordinate from s to s'
a) $x' = (x + vt) / \sqrt{1 - v^2/c^2}$ b) $x' = (x - ct) / \sqrt{1 - v^2/c^2}$
c) $x' = (x - vt) / \sqrt{1 - v^2/c^2}$ d) $x' = x - vt (\sqrt{1 - v^2/c^2})$
- 4) Acceptor type semiconductor is formed by adding impurity of valency
a) 3 b) 4 c) 5 d) 2
- 5) The number of died axes symmetry elements that are present in a cubic crystal are
a) 4 b) 6 c) 8 d) 10
- 6) The Miller indices of the plane parallel to y and z axes are
a) (0 0 1) b) (0 1 0) c) (1 0 0) d) (1 1 1)

P.T.O.



- 7) The audible range of frequency is
- a) 20 KHz to 20 MHz
 - b) 200 KHz to 200 MHz
 - c) 200 Hz to 200 MHz
 - d) 20 Hz to 20 KHz

SECTION – II

- 8) In total internal reflection phenomenon the light ray incident from
- a) Rarer to denser
 - b) Rarer to rarer
 - c) Denser to denser
 - d) Denser to rarer
- 9) Energy released per fission of a $_{92}U^{235}$ nucleus is nearly
- a) 200 eV
 - b) 20 eV
 - c) 200 MeV
 - d) 20 MeV
- 11) The chirality of armchair CNT is
- a) (a, b)
 - b) (a, 0)
 - c) (a, a)
 - d) (0, b)
- 11) The resolving power of a grating having N slits in n^{th} order will be
- a) $(n+N)$
 - b) $(n - N)$
 - c) n/N
 - d) $n.N$
- 12) The substances that rotate the plane of polarization are said to be
- a) opaque
 - b) optically inactive
 - c) optically active
 - d) polaroid
- 13) Stimulated emission process is represented by equation
- a) $A^* + h\gamma \rightarrow A + 2h\gamma$
 - b) $A + h\gamma \rightarrow A^*$
 - c) $A^* \rightarrow A + h\gamma$
 - d) $A^* + h\gamma \rightarrow A + h\gamma$
- 14) The hologram records _____ of the object.
- a) Only intensity variation
 - b) Only phase distribution
 - c) Both intensity variation and phase distribution
 - d) None of these
-



Seat No.	
----------	--

F.E. (Part – I) (CGPA) (Old) Examination, 2018
ENGINEERING PHYSICS

Day and Date : Wednesday, 12-12-2018

Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :** 1) Make suitable assumptions, **if necessary**.
2) Figures to the **right** indicate **full** marks.

SECTION – I

2. Attempt **any five** of the following : 15

- Describe in brief the formation of energy bands in solids.
- Calculate no. of atoms per unit cell for SC, BCC and FCC crystal.
- Explain the various requirements of a good auditorium.
- Deduce an expression for length contraction.
- Obtain the relativistic formula for the addition of velocities.
- A hall with volume of 1000 m^3 has a sound-absorbing surface of area 400 m^2 . If the average absorption coefficient of the hall is 0.2 sabines, what is the reverberation time of the hall ?
- A rocket ship is 100 meter long on the ground. When it is in flight, its length is 99 meters to an observer on the ground. What is its speed ?

3. a) What is Hall effect ? Obtain an expression for Hall voltage and Hall coefficient. 5

OR

- Discuss the various types of symmetry elements and symmetry operations present in a cubic crystal.

4. Attempt **any two** of the following : 8

- Explain effect of impurity on Fermi level in p-type and n-type semiconductor.
- Define atomic radius and obtain its values for SC, BCC and FCC crystals.
- Explain acoustic diffraction method for determination of wavelength of ultrasonic waves.
- Deduce the expression for relativistic mass variation, to show $m = m_0/(1 - v^2/c^2)^{1/2}$.

Set R



SECTION – II

5. Attempt **any five** of the following : 15
- a) Distinguish between Fresnel and Fraunhofer class of diffraction.
 - b) Define :
 - i) Spontaneous emission
 - ii) Stimulated emission
 - iii) Stimulated absorption
 - c) Explain with neat diagram basic concept and structure of optical fiber.
 - d) Explain with diagram types of carbon nano tubes.
 - e) Explain Proton - Proton cycle.
 - f) A fiber cable has an acceptance angle of 30° and core index of refraction 1.4. Calculate the cladding index of refraction.
 - g) Calculate power output of a nuclear reactor. Which consumes 20.4 Kg of U 235 in 1000 hours of operations. Assume that energy released per fission of U 235 is 200 MeV.

6. a) Define optical activity. Explain construction and working of Laurent's half shade polarimeter. 5

OR

- b) Describe He-Ne laser with its construction and working.

7. Attempt **any two** of the following : 8
- a) Derive an expression for the resolving power of a plane diffraction grating.
 - b) Explain the construction and reconstruction of hologram with neat diagram.
 - c) Explain the fiber optics communication system with block diagram.
 - d) Write a note on: Classification of nuclear reactor.



Seat No.	
----------	--

**F.E. (Part – I) (CGPA) (Old) Examination, 2018
ENGINEERING PHYSICS**

Day and Date : Wednesday, 12-12-2018

Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :**
- 1) Make suitable assumptions, **if necessary**.
 - 2) Figures to the **right** indicate **full marks**.
 - 3) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each question carries one mark**.
 - 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

- Constants :**
- 1) Avogadro's no., $N = 6.02 \times 10^{26} / \text{k.mol.}$
 - 2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec.}$
 - 3) Charge of electron, $e = 1.6 \times 10^{-19} \text{ C.}$

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

SECTION – I

1. Choose the correct answer : **(14x1=14)**
 - 1) The audible range of frequency is
 - a) 20 KHz to 20 MHz
 - b) 200 KHz to 200 MHz
 - c) 200 Hz to 200 MHz
 - d) 20 Hz to 20 KHz
 - 2) Reverberation time is _____ to/of volume of the hall.
 - a) directly proportional
 - b) inversely proportional
 - c) independent
 - d) none of these
 - 3) The inertial frame of reference is _____ frame of reference
 - a) An accelerated
 - b) Non-accelerated
 - c) A rotating
 - d) None of these
 - 4) The Lorentz transformation equation for x' co-ordinate from s to s'
 - a) $x' = (x + vt) / \sqrt{1 - v^2/c^2}$
 - b) $x' = (x - ct) / \sqrt{1 - v^2/c^2}$
 - c) $x' = (x - vt) / \sqrt{1 - v^2/c^2}$
 - d) $x' = x - vt (\sqrt{1 - v^2/c^2})$
 - 5) Acceptor type semiconductor is formed by adding impurity of valency
 - a) 3
 - b) 4
 - c) 5
 - d) 2



- 6) The number of died axes symmetry elements that are present in a cubic crystal are
a) 4 b) 6 c) 8 d) 10

7) The Miller indices of the plane parallel to y and z axes are
a) (0 0 1) b) (0 1 0) c) (1 0 0) d) (1 1 1)

SECTION – III

- 8) The hologram records _____ of the object.

 - Only intensity variation
 - Only phase distribution
 - Both intensity variation and phase distribution
 - None of these

9) In total internal reflection phenomenon the light ray incident from

 - Rarer to denser
 - Rarer to rarer
 - Denser to denser
 - Denser to rarer

10) Energy released per fission of a $_{92}U^{235}$ nucleus is nearly

 - 200 eV
 - 20 eV
 - 200 MeV
 - 20 MeV

11) The chirality of armchair CNT is

 - (a, b)
 - (a, 0)
 - (a, a)
 - (0, b)

12) The resolving power of a grating having N slits in n^{th} order will be

 - (n+N)
 - (n - N)
 - n/N
 - n.N

13) The substances that rotate the plane of polarization are said to be

 - opaque
 - optically inactive
 - optically active
 - polaroid

14) Stimulated emission process is represented by equation

 - $A^* + h\gamma \rightarrow A + 2h\gamma$
 - $A + h\gamma \rightarrow A^*$
 - $A^* \rightarrow A + h\gamma$
 - $A^* + h\gamma \rightarrow A + h\gamma$



Seat No.	
----------	--

F.E. (Part – I) (CGPA) (Old) Examination, 2018
ENGINEERING PHYSICS

Day and Date : Wednesday, 12-12-2018

Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :** 1) Make suitable assumptions, **if necessary**.
2) Figures to the **right** indicate **full** marks.

SECTION – I

2. Attempt **any five** of the following : 15

- a) Describe in brief the formation of energy bands in solids.
- b) Calculate no. of atoms per unit cell for SC, BCC and FCC crystal.
- c) Explain the various requirements of a good auditorium.
- d) Deduce an expression for length contraction.
- e) Obtain the relativistic formula for the addition of velocities.
- f) A hall with volume of 1000 m^3 has a sound-absorbing surface of area 400 m^2 . If the average absorption coefficient of the hall is 0.2 sabines, what is the reverberation time of the hall ?
- g) A rocket ship is 100 meter long on the ground. When it is in flight, its length is 99 meters to an observer on the ground. What is its speed ?

3. a) What is Hall effect ? Obtain an expression for Hall voltage and Hall coefficient. 5

OR

- b) Discuss the various types of symmetry elements and symmetry operations present in a cubic crystal.

4. Attempt **any two** of the following : 8

- a) Explain effect of impurity on Fermi level in p-type and n-type semiconductor.
- b) Define atomic radius and obtain its values for SC, BCC and FCC crystals.
- c) Explain acoustic diffraction method for determination of wavelength of ultrasonic waves.
- d) Deduce the expression for relativistic mass variation, to show $m = m_0/(1 - v^2/c^2)^{1/2}$.

Set S



SECTION – II

5. Attempt **any five** of the following : 15
- a) Distinguish between Fresnel and Fraunhofer class of diffraction.
 - b) Define :
 - i) Spontaneous emission
 - ii) Stimulated emission
 - iii) Stimulated absorption
 - c) Explain with neat diagram basic concept and structure of optical fiber.
 - d) Explain with diagram types of carbon nano tubes.
 - e) Explain Proton - Proton cycle.
 - f) A fiber cable has an acceptance angle of 30° and core index of refraction 1.4. Calculate the cladding index of refraction.
 - g) Calculate power output of a nuclear reactor. Which consumes 20.4 Kg of U 235 in 1000 hours of operations. Assume that energy released per fission of U 235 is 200 MeV.

6. a) Define optical activity. Explain construction and working of Laurent's half shade polarimeter. 5

OR

- b) Describe He-Ne laser with its construction and working.

7. Attempt **any two** of the following : 8
- a) Derive an expression for the resolving power of a plane diffraction grating.
 - b) Explain the construction and reconstruction of hologram with neat diagram.
 - c) Explain the fiber optics communication system with block diagram.
 - d) Write a note on: Classification of nuclear reactor.

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL
UNIVERSITY, LONERE**

Supplementary Examination – Nov 2019

Brach: B. Tech.

Subject: Engineering Physics (PHY103/PHY203)

Date: 13/12/2019

Semester –I/II

Marks: 60

Time:3 Hrs

Instructions to the students:

1. All questions are compulsory and each question carries 10 marks
2. Illustrate your answers with neat sketches, diagrams etc. wherever necessary.
3. Necessary data is given in the respective questions. If such data is not given, it means that the knowledge of the part is part of examination.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly

Que. 1 Attempt the following. (10)

- a) Obtain the differential equation of free oscillation and find its general solution. (8)
- b) Calculate the fundamental frequency of quartz crystal 1 mm thick. (2)

Given: density of quartz is 2650 kg/m^3 and Young's modulus is $8 \times 10^{10} \text{ N/m}^2$

Que. 2 Attempt the following. (10)

- a) Discuss interference of light in thin film for reflected rays. (8)
- b) A wedge shaped film is illuminated by light of wavelength 4650 \AA . The angle of wedge is 40° . Calculate the fringe separation between two consecutive fringes. (2)

OR

Que. 2 Attempt the following. (10)

- a) Explain the principle and working of Ruby Laser. (8)
- b) Calculate the numerical aperture of an optical fibre whose core and cladding are made of materials of refractive indices 1.6 and 1.5 respectively. (2)

Que. 3 Attempt the following. (10)

- a) Describe Millikan's oil drop method for determination of electronic charge. (8)
b) Find the lowest energy of a neutron confined to a nucleus of size 10^{-14} m. (2)

Que. 4 **Attempt the following.** (10)

- a) Derive the relation between lattice constant and density of the cubic crystal. (8)
b) Lead has a FCC crystal structure with an atomic radius of 1.746 Å. (2)
Calculate the spacing between (200) and (220) planes.

Que. 5 **Attempt the following.** (10)

- a) What is Hysteresis Curve? Explain retentivity, coercivity. Explain B-H curve on the basis of domain theory. (8)
b) The magnetic susceptibility of a medium is 940×10^{-4} . Calculate its absolute and relative permeability. (2)

Que. 6 **Attempt any two the following.** (10)

- a) Write Maxwell equations in differential and integral form and write its physical significance (5)
b) What is Hall effect? Derive an expression for Hall Coefficient and mobility of charge carriers. (5)
c) What is electric polarization? Explain with diagrams different types of polarizations in dielectric (5)

Paper End

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE
End Semester Examination – Summer 2019

Course: B. Tech

Subject Name: Engineering Physics

Max Marks: 60

Date: 15/05/2019

Sem: I & II

Subject Code: PHY1202

Duration: 3 Hr.

Instructions to the Students:

1. All the questions are compulsory.
2. The level question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

(Level/CO)	Marks
------------	-------

Q. 1 Solve Any Two of the following

- A) Which are the forces acting in the Damped Oscillations? Obtain the differential equation of Damped Oscillations. (CO1) 06
- B) Discuss the effect of temperature and frequency dependence on polarization in dielectrics. (CO6) 06
- C) What is piezoelectric effect? Describe piezoelectric method for generating ultrasonic waves. (CO1) 06

Q.2 Solve Any Two of the following

- A) Prove that for Newton's rings in reflected light, the diameter of dark ring is proportional to the square root of natural numbers. (CO2) 06
- B) Explain construction and working of Ruby laser with neat diagram. (CO2) 06
- C) Obtain mathematical expression for acceptance angle and numerical aperture. (CO2) 06

Q. 3 Solve Any Two of the following

- A) Explain with diagram principle and working of Bainbridge mass spectrograph. (CO3) 06
- B) i) Show that electron does not exists inside the nucleus, with the help of Heisenberg's uncertainty principle.
ii) A bullet of mass 0.05 kg is moving with a velocity of 800 m/s, the speed of bullet measured an accuracy of 0.01%. Calculate the accuracy with which the position of a bullet can be located. (CO3) 03
- C) Derive Schrodinger's time dependent wave equation. (CO3) 06

Q.4 Solve Any Two of the following.

- A) Define primitive and non-primitive unit cells.
Calculate the lattice constant of iron which has BCC structure.
Given $\rho = 7.86 \text{ gm/cc}$ $M = 55.85$ (CO4) 06
- B) Explain continuous X-ray spectrum with neat diagram. An X-ray is operated at 18 kV.
Calculate the minimum velocity of electron bombarded at the anode. (CO4) 06

P.T.O.

- C) What is displacement current? Write Maxwell's equations in integral and differential form. (CO3) 06

Q. 5 Solve the following.

- A) i. Write formula of Ferrites and Garnets. (CO5) 06
ii. Explain Meissner effect in superconductors. (CO6)
- B) What is Hall Effect? Derive an expression for Hall voltage V_H and Hall coefficient R_H . (CO5) 06

***** End *****

	DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE End Semester Examination – Winter 2019 Course: B. Tech Subject: Engineering Physics (PHY1202) Date: 13/12/2019	Sem: I Marks: 60M Duration: 3 Hr.	
	<p>Instructions to the Students:</p> <ol style="list-style-type: none"> 1. All the questions are compulsory. 2. The level question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question. 3. Use of non-programmable scientific calculators is allowed. 4. Assume suitable data wherever necessary and mention it clearly. 		
		(Level/CO)	Marks
Q. 1	Solve Any Two of the following.		
A)	What are forced oscillations? Obtain the differential equation of forced oscillations.	(Synthesis)	06
B)	Explain the production of ultrasonic waves using magnetostriction effect. Calculate the length of Ni rod needed to produce ultrasonic waves of frequency 40 KHz. Density of rod is 8.9 gm/cm^3 and Young's modulus of rod is $20.8 \times 10^{10} \text{ N/m}^2$.	(Knowledge /Remember)	06
C)	Explain the effect of frequency and temperature on polarization in dielectric.	(Knowledge /Remember)	06
Q.2	Solve Any Two of the following.		
A)	Prove that in Newton's Rings by reflected light, the diameters of bright rings are proportional to square root of odd natural numbers.	(Evaluation)	06
B)	Explain the construction and working of Ruby laser with neat diagram.	(Comprehension/Understand)	06
C)	Define acceptance angle and numerical aperture. Refractive index of core is 1.48 and that of cladding is 1.47 in an optical fiber. Calculate critical angle, numerical aperture and acceptance angle.	(Analysis)	06
Q. 3	Solve Any Two of the following.		
A)	Explain the principle and working of Bainbridge Mass Spectrograph with neat diagram.	(Comprehension/Understand)	06

B)	What is uncertainty principle? Using this principle prove that electron cannot exist in the nucleus.	(Synthesis)	06
C)	Explain the construction and working of G.M. counter.	(Comprehension/ Understand)	06
Q.4	Solve Any Two of the following.		
A)	Show that shortest wavelength of continuous X-rays is inversely proportional to the potential difference applied.	(Synthesis)	06
B)	Derive the relation between lattice constant and density of the cubic crystal. Copper has FCC structure and its atomic radius is 1.278×10^{-10} m. Calculate density of Cu. Given atomic weight of Cu = 63.5.	(Application)	06
C)	Derive an expression for electromagnetic wave in free space and hence calculate the velocity of light in free space.	(Synthesis)	06
Q. 5	Solve the following.		
A)	Differentiate Type I and Type II superconductors.	(Application)	06
B)	What is Hall effect? Derive an expression for Hall voltage and Hall coefficient.	(Analysis)	06
	***Paper End ***		

	DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE End Semester Examination – Winter 2019 Course: B. Tech Subject: Engineering Physics (PHY1202) Date: 13/12/2019	Sem: I Marks: 60M Duration: 3 Hr.	
	Instructions to the Students: <ol style="list-style-type: none"> 1. All the questions are compulsory. 2. The level question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question. 3. Use of non-programmable scientific calculators is allowed. 4. Assume suitable data wherever necessary and mention it clearly. 		
		(Level/CO)	Marks
Q. 1	Solve Any Two of the following.		
A)	What are forced oscillations? Obtain the differential equation of forced oscillations.	(Synthesis)	06
B)	Explain the production of ultrasonic waves using magnetostriction effect. Calculate the length of Ni rod needed to produce ultrasonic waves of frequency 40 KHz. Density of rod is 8.9 gm/cm^3 and Young's modulus of rod is $20.8 \times 10^{10} \text{ N/m}^2$.	(Knowledge /Remember)	06
C)	Explain the effect of frequency and temperature on polarization in dielectric.	(Knowledge /Remember)	06
Q.2	Solve Any Two of the following.		
A)	Prove that in Newton's Rings by reflected light, the diameters of bright rings are proportional to square root of odd natural numbers.	(Evaluation)	06
B)	Explain the construction and working of Ruby laser with neat diagram.	(Comprehension/Understand)	06
C)	Define acceptance angle and numerical aperture. Refractive index of core is 1.48 and that of cladding is 1.47 in an optical fiber. Calculate critical angle, numerical aperture and acceptance angle.	(Analysis)	06
Q. 3	Solve Any Two of the following.		
A)	Explain the principle and working of Bainbridge Mass Spectrograph with neat diagram.	(Comprehension/Understand)	06

B)	What is uncertainty principle? Using this principle prove that electron cannot exist in the nucleus.	(Synthesis)	06
C)	Explain the construction and working of G.M. counter.	(Comprehension/ Understand)	06
Q.4	Solve Any Two of the following.		
A)	Show that shortest wavelength of continuous X-rays is inversely proportional to the potential difference applied.	(Synthesis)	06
B)	Derive the relation between lattice constant and density of the cubic crystal. Copper has FCC structure and its atomic radius is 1.278×10^{-10} m. Calculate density of Cu. Given atomic weight of Cu = 63.5.	(Application)	06
C)	Derive an expression for electromagnetic wave in free space and hence calculate the velocity of light in free space.	(Synthesis)	06
Q. 5	Solve the following.		
A)	Differentiate Type I and Type II superconductors.	(Application)	06
B)	What is Hall effect? Derive an expression for Hall voltage and Hall coefficient.	(Analysis)	06
	***Paper End ***		

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE.
End Semester Examination (Supplementary)

Course: F. Y. B. Tech

Subject Name: Engineering Physics

Max. Marks: 60

Date: 03/06/2019

Sem. I & II

Subject Code: PHY103/203

Duration: 3 Hrs.

Instructions to the Students:

1. Each question carries 12 marks.
2. Attempt any five questions of the following.
3. Illustrate your answer with neat sketches, diagrams, etc. Wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and mention it clearly.

Q. No.	Questions	Marks
Q. No. 1 Attempt the following.		
A	State the Condition of resonance. With the help of figure explain the sharpness of resonance.	6
B	Explain Piezoelectric and Magnetostriction Effect. Calculate the fundamental frequency of quartz crystal of 1mm thick having density 2650 kg/m^3 . Given $Y = 8 \times 10^8 \text{ N/m}^2$.	6
Q. No. 2 Attempt any two of the following.		
A	Discuss the interference of light in thin film due to reflected ray.	6
B	What is angle of polarization? State and prove Brewster's Law.	6
C	Differentiate between spontaneous and stimulated emission of radiation. Calculate the numerical aperture of an optical fibre whose core and cladding are made of materials with refractive index 1.6 and 1.5 respectively.	6
Q. No. 3 Attempt the following		
A	What is Heisenberg's Uncertainty Principle? Using this prove that electron cannot exist in the nucleus.	6
B	Derive time dependent Schrodinger's wave equation.	6
Q. No. 4 Attempt the following		
A	Derive the relation between lattice constant 'a' and density 'p' of the cubic crystal. Calculate the number of atoms per cell for a metal with lattice parameter 2.9 \AA . Given : $M=55.385$ $\rho = 7.87 \text{ gm/cm}^3$	6
OR		
A	Explain different type of lattices in cubic system. Find the packing density for SC, BCC and FCC lattices	6
B	State and prove Moseley's Law.	6

Q.5 Attempt the following

- A Explain ferrimagnetic material with examples.

A magnetic field of 1000 A/m produces a magnetic flux of 2×10^{-5} Wb in a bar of iron of 0.2 cm^2 cross section. Calculate permeability and susceptibility of bar.

OR

- A Derive an expression for resistivity of conducting materials in terms of relaxation time of an electron.

- B What is superconductivity? Explain Type-I and Type-II superconductors.

Q.6. Attempt any two of the following

- A Derive relation for conductivity of intrinsic and extrinsic semiconductors.

- B Explain various types of polarization in dielectric materials.

- C Derive an expression for electromagnetic wave in free space.

END

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL
UNIVERSITY, LONERE**
Winter Examination – Dec. 2019

Brach: B. Tech.

Subject: Engineering Physics (PHY103/PHY203)

Date: 13/12/2019

Semester –I/II

Marks: 60

Time:3 Hrs

Instructions to the students:

1. All questions are compulsory and each question carries 10 marks
2. Illustrate your answers with neat sketches, diagrams etc. wherever necessary.
3. Necessary data is given in the respective questions. If such data is not given, it means that the knowledge of the part is part of examination.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly

Que. 1 Attempt the following. (10)

- a) Obtain the differential equation of free oscillation and find its general (8) solution.
- b) Calculate the fundamental frequency of quartz crystal 1 mm thick. (2)

Given: density of quartz is 2650 kg/m^3 and Young's modulus is $8 \times 10^{10} \text{ N/m}^2$

Que. 2 Attempt the following. (10)

- a) Discuss interference of light in thin film for reflected rays. (8)
- b) A wedge shaped film is illuminated by light of wavelength 4650 \AA . The (2) angle of wedge is 40° . Calculate the fringe separation between two consecutive fringes.

OR

Que. 2 Attempt the following. (10)

- a) Explain the principle and working of Ruby Laser. (8)
- b) Calculate the numerical aperture of an optical fibre whose core and (2) cladding are made of materials of refractive indices 1.6 and 1.5 respectively.

Que. 3 Attempt the following. (10)

- a) Describe Millikan's oil drop method for determination of electronic charge. (8)
- b) Find the lowest energy of a neutron confined to a nucleus of size 10^{-14} m . (2)

Que. 4 Attempt the following.**(10)**

- a) Derive the relation between lattice constant and density of the cubic crystal. (8)
- b) Lead has a FCC crystal structure with an atomic radius of 1.746 Å. (2)
Calculate the spacing between (200) and (220) planes.

Que. 5 Attempt the following.**(10)**

- a) What is Hysteresis Curve? Explain retentivity, coercivity. Explain B-H (8) curve on the basis of domain theory.
- b) The magnetic susceptibility of a medium is 940×10^{-4} . Calculate its (2) absolute and relative permeability.

Que. 6 Attempt any two the following.**(10)**

- a) Write Maxwell equations in differential and integral form and write its (5) physical significance
- b) What is Hall effect? Derive an expression for Hall Coefficient and mobility (5) of charge carriers.
- c) What is electric polarization? Explain with diagrams different types of (5) polarizations in dielectric

Paper End

	<p>DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE Mid SEM. Test Examination Course: B. Tech in Mech/Civil Subject Name: Engineering Physics Max Marks: 20 Date:- 03/10/2019 Sem: I Subject Code: BTBS102 Duration:- 1 Hr.</p>	
	<p>Instructions to the student: 1. All questions are compulsory. 2. Figures to right indicate full marks</p>	
		(Level/CO)
Q. 1	Attempt the following	Marks
	<p>1. Ultra sonic waves are A. Electromagnetic wave. B. Elastic wave C. Matter wave D. None of these</p>	Remember
	<p>2. The sound is heard in a organ pipe. The phenomenon used here is A. Oscillatory motion B. Resonance C. Periodic Motion D Both A & C</p>	Remember
	<p>3. When the particle is subjected to an oscillatory motion with the help of external periodic force ,the oscillations are called A. Free oscillation B. Forced oscillation C. Damped oscillation D. None of these</p>	Remember
	<p>4. Light waves are transverse in nature, can be demonstrated by observing the phenomenon of A. Dispersion B. Interference C. Polarization D. Diffraction</p>	Remember
	<p>5. A system in which population inversion is achieved is called..... A. Parallel system B. Active system. C. Metastable state D. pumping</p>	Remember
	<p>6. Optical fibre works on the principle of A. Photo-electric effect B. Laser Effect C. Total internal reflection D. Refraction</p>	Remember

Q.2	Solve Any Two of the following.		3 X 2
(A)	Explain Production of ultrasonic wave with the help of Magnetostriiction effect.	Understanding	
(B)	The refractive index of core and cladding material of a step index fibre are 1.48 & 1.45 respectively. Calculate: i)Numerical aperature ii)Acceptance angle	Applying	
(C)	Explain interference of light in thin film.	Understanding	
Q. 3	Solve Any One of the following.	Applying	8
(A)	i) Define Free Oscillation. Obtain the differential equation & find general solution. ii) Discuss the effect of temperature & frequency dependence of polarization in dielectrics.		
(B)	i) Explain construction & working of ruby Laser ii) Distinguish between Positive crystal & Negative crystal	Understanding	
	*** End ***		

<https://www.batuonline.com>

Whatsapp @ 9300930012

Send your old paper & get 10/-

अपने पुराने पेपर्स भेजे और 10 रुपये पायें,

Paytm or Google Pay से

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular End Semester Examination – Summer 2022

Course: B. Tech. **Branch: All branches (Group B)**

Semester: II

Subject Code & Name: BTBSP202 Engineering Physics

Max Marks: 60

Date:20/08/2022

Duration: 3.45 Hr.

Instructions to the Students:

1. All the questions are compulsory.
2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

(Level/CO) Marks

Q. 1 Solve Any Two of the following.

A) In case of Forced vibrations, prove that

$$A = \frac{f}{\sqrt{(\omega^2 - p^2)^2 + 4b^2p^2}}$$

(CO1) 6

(Understand)

B) Explain the construction and working for production of ultrasonic waves using Piezoelectric Oscillator.

(CO1) 6

(Understand)

C) Write any two applications of ultrasonic waves.

Calculate the thickness of quartz plate which is used to produce ultrasonic waves of 2 MHz. Density of quartz is $2.65 \times 10^3 \text{ kg/m}^3$ and Young's modulus is $8 \times 10^{10} \text{ N/m}^2$

(CO1) 6

(Remember &

Understand)

Q.2 Solve Any Two of the following.

A) Derive an expression for diameter of Newton's bright and dark rings.

(CO2) 6

(Understand)

B) Explain the construction and working of Ruby Laser.

(CO2) 6

(Understand)

C) State and explain Brewster's law.

(CO2) 6

(Remember &

Understand)

With a slab of flint glass, the angle of polarization is found to be $62^\circ 24'$. Calculate the refractive index of the flint glass.

Q. 3 Solve Any Two of the following.

A) With neat diagram, explain the construction and working of Bainbridge Mass Spectrograph.

(CO3) 6

(Understand)

B) Explain the construction and working of Geiger Muller Counter.

(CO3) 6

(Understand)

C) Derive Schrodinger's time independent wave equation.

(CO3) 6

(Understand)

Q.4 Solve the following questions.

A) Calculate atomic radii in SC, BCC and FCC lattices with suitable diagrams.

(CO4) 6

(Understand)

B) Explain characteristics and continuous X-ray spectra.

(CO4) 6

(Understand)

Q. 5 Solve Any Two of the following.

A) Explain B-H curve for ferromagnetic materials. Define the terms Coercivity and Retentivity.

(Understand) 6

B) Distinguish between Type I and Type II superconductors.

(Understand) 6

C) What is Hall effect? Derive an expression for Hall Voltage and Hall Coefficient.

(Understand) 6

(Remember &

Understand)

***** End *****

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular End Semester Examination – Summer 2022

Course: B. Tech. **Branch: All branches (Group B)**

Semester: II

Subject Code & Name: BTBSP202 Engineering Physics

Max Marks: 60

Date:20/08/2022

Duration: 3.45 Hr.

Instructions to the Students:

1. All the questions are compulsory.
2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

(Level/CO) Marks

Q. 1 Solve Any Two of the following.

A) In case of Forced vibrations, prove that

$$A = \frac{f}{\sqrt{(\omega^2 - p^2)^2 + 4b^2p^2}}$$

(CO1) 6

(Understand)

B) Explain the construction and working for production of ultrasonic waves using Piezoelectric Oscillator.

(CO1) 6

(Understand)

C) Write any two applications of ultrasonic waves.

Calculate the thickness of quartz plate which is used to produce ultrasonic waves of 2 MHz. Density of quartz is $2.65 \times 10^3 \text{ kg/m}^3$ and Young's modulus is $8 \times 10^{10} \text{ N/m}^2$

(CO1) 6

(Remember &

Understand)

Q.2 Solve Any Two of the following.

A) Derive an expression for diameter of Newton's bright and dark rings.

(CO2) 6

(Understand)

B) Explain the construction and working of Ruby Laser.

(CO2) 6

(Understand)

C) State and explain Brewster's law.

(CO2) 6

(Remember &

Understand)

With a slab of flint glass, the angle of polarization is found to be $62^\circ 24'$. Calculate the refractive index of the flint glass.

Q. 3 Solve Any Two of the following.

A) With neat diagram, explain the construction and working of Bainbridge Mass Spectrograph.

(CO3) 6

(Understand)

B) Explain the construction and working of Geiger Muller Counter.

(CO3) 6

(Understand)

C) Derive Schrodinger's time independent wave equation.

(CO3) 6

(Understand)

Q.4 Solve the following questions.

A) Calculate atomic radii in SC, BCC and FCC lattices with suitable diagrams.

(CO4) 6

(Understand)

B) Explain characteristics and continuous X-ray spectra.

(CO4) 6

(Understand)

Q. 5 Solve Any Two of the following.

A) Explain B-H curve for ferromagnetic materials. Define the terms Coercivity and Retentivity.

6

(Understand)

B) Distinguish between Type I and Type II superconductors.

6

(Understand)

C) What is Hall effect? Derive an expression for Hall Voltage and Hall Coefficient.

6

(Remember &

Understand)

***** End *****

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular End Semester Examination - Summer 2023

Course: B. Tech.

Branch: All

Semester: II

Subject Code & Name: BTBS202P (Engineering Physics)

Max Marks: 60

Date: 14/07/2023

Duration: 3 Hr.

Instructions to the Students:

1. All the questions are compulsory.
2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

		(Level/CO)	Marks
Q. 1	Solve Any Two of the following.		
A)	Define Damped Vibrations. Set up differential equation for damped vibrations.	(CO1) (Remember & Understand)	6
B)	Explain the construction, working for production of ultrasonic waves using Piezoelectric oscillator.	(CO1) (Understand)	6
C)	State any two applications of ultrasonic waves. Calculate the length of iron rod which can be used to produce ultrasonic waves of 20 KHz. Density of iron is $7.23 \times 10^3 \text{ kg/m}^3$. Young's modulus is $11.6 \times 10^{10} \text{ N/m}^2$	(CO1) (Remember & Understand)	6
Q. 2	Solve Any Two of the following.		
A)	In Newton's rings, derive an expression for diameter of n^{th} bright ring and dark ring.	(CO2) (Understand)	6
B)	Explain the construction & working of Ruby laser.	(CO2) (Understand)	6
C)	Explain the structure of optical fiber with suitable diagram. Calculate the numerical aperture of a optical fiber with core index $n_1=1.61$ and cladding index $n_2=1.55$	(CO2) (Remember & Understand)	6
Q. 3	Solve Any Two of the following.		
A)	With neat diagram, explain the construction & working of Bainbridge mass spectrograph.	(CO3) (Understand)	6
B)	Write short note on Geiger Muller Counter.	(CO3) (Understand)	6
C)	State Heisenberg's Uncertainty Principle with formula.	(CO3)	6

If the uncertainty in position of an electron is 4×10^{-10} m, Calculate the uncertainty in its momentum. ($\hbar = 6.62 \times 10^{-34}$ J Sec) (Understand)

Q.4 Solve the following questions.

- A) Calculate Atomic Packing Fraction for SC, BCC and FCC lattices. (CO4) 6
(Understand)

- B) Explain Continuous X-ray spectra. (CO4) 6
Calculate the wavelength of X-rays when a potential difference of 30 KV is applied between filament and anode. (Understand)

Q. 5 Solve Any Two of the following.

- A) Explain Diamagnetic, Paramagnetic and Ferromagnetic materials with examples and diagram. (Understand) 6
- B) Distinguish between Type I and Type II superconductors. (Understand) 6
- C) Derive an expression for conductivity of Intrinsic and extrinsic (P Type & N Type) Semiconductors. (Understand) 6

*** End ***

<https://www.batuonline.com>

Whatsapp @ 9300930012

Send your old paper & get 10/-

अपने पुराने पेपर स भेजे और 10 रुपये पायें,

Paytm or Google Pay से

	<p>DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE Winter Examination – 2022</p> <p>Course: B. Tech. Branch : All Semester : I</p> <p>Subject Code & Name: Engineering Physics (BTBS102P)</p> <p>Max Marks: 60 Date:23/03/23 Duration: 3 Hr.</p>	
	<p>Instructions to the Students:</p> <ol style="list-style-type: none"> 1. All the questions are compulsory. 2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question. 3. Use of non-programmable scientific calculators is allowed. 4. Assume suitable data wherever necessary and mention it clearly. 	
		(Level/CO) Marks
Q. 1	Solve Any Two of the following:	12
A)	Describe the construction and working for producing ultrasonic waves using magnetostriiction method.	CO1 6
B)	Define free oscillation. Set up a differential equation for free oscillations and find it's solution.	CO1 6
C)	Define ultrasonic waves. List their applications in various fields. Give the details of any one application with labeled diagram.	CO1 6
Q.2	Solve Any Two of the following. https://www.batuonline.com	12
A)	Derive an expression for darkness due to reflected light for thin film interference.	CO2 6
B)	Explain the production of polarization due to birefringence (Double refraction) with neat diagram.	CO2 6
C)	Explain the construction and working of He-Ne laser with neat and labeled diagram.	CO2 6
Q. 3	Solve Any Two of the following.	12
A)	Derive Schrodinger's time independent wave equation.	CO3 6
B)	With neat diagram, explain the construction & working of Geiger-Muller Counter.	CO3 6
C)	Explain with neat diagram, how isotopes can be separated with the help of Bainbridge mass spectrograph.	CO3 6
Q.4	Solve the following.	12
A)	Describe the production of characteristic X-rays. Calculate the minimum wavelength of X-rays, if the X-ray is operated	CO4 6

	at 20 kV.		
B)	Calculate the relation between atomic radius and lattice constant for BCC and FCC.	CO4	6
Q. 5	Solve Any Two of the following.		12
A)	Differentiate between conductor, semiconductor and insulator on the basis of energy band diagram and discuss their properties.		6
B) ✓	Explain Meissner effect in superconductors. State any two applications of superconductors.		6
C)	Explain B-H curve for ferromagnetic materials. Write the significance of B-H curve.		6
	*** End ***		

<https://www.batuonline.com>

Whatsapp @ 9300930012

Send your old paper & get 10/-

अपने पुराने पेपर्स भेजे और 10 रुपये पायें,

Paytm or Google Pay से

	<p>DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE</p> <p>Regular and Supplementary Summer 2024</p> <p>Course: B. Tech. Branch: All Semester: II</p> <p>Subject Code & Name: BTBS202P Engineering Physics</p> <p>Max Marks: 60. Date: 14/06/2024 Duration: 3 Hr.</p>					
Instructions to the Students:						
<ol style="list-style-type: none"> 1. All the questions are compulsory 2. The level of question expected answer as per OBF or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question 3. Use of non-programmable scientific calculator is allowed 4. Assume suitable data wherever necessary and mention it clearly 						
		(Level CO)	Marks			
Q. 1	Solve Any Two of the following.		12			
A)	Define Damped oscillations. Derive an expression for differential equation of Damped oscillations.	(CO1) (Remember & Understand)	6			
B)	Define i) Magnetostriction Effect ii) Piezoelectric Effect iii) Resonance. Calculate the natural frequency of the ultrasonic waves generated by a quartz crystal having thickness of 5.5 mm. [Given $Y = 8 \times 10^{10} \text{ N/m}^2$, ρ (density) = 2650 Kg/m^3]	(CO1) (Remember & Understand)	6			
C)	Derive differential equation of wave motion.	(CO1) (Understand)	6			
Q. 2	Solve Any Two of the following.		12			
A)	Derive an expression for diameter of n th bright and dark Newton's ring.	(CO2) (Understand)	6			
B)	Explain the construction & working of Helium Neon Laser with neat, labeled diagram.	(CO2) (Understand)	6			
C)	State any six applications of optical fiber. Numerical aperture of a fiber is 0.5 and core refractive index is 1.48. Find cladding refractive index.	(CO2) (Remember & Understand)	6			
Q. 3	Solve Any Two of the following.		12			
A)	Explain the construction & working of Bainbridge mass spectograph with neat & labeled diagram.	(CO3) (Understand)	6			
B)	Explain the construction & working of Geiger Muller Counter.	(CO3) (Understand)	6			

C)	Derive Schrodinger's time independent wave equation.	(CO3) (Understand) 6
Q.4	Solve the following questions.	12
A)	Calculate atomic radii for Simple cubic, Body centered, and face centered cubic structure.	(CO4) 6 (Understand)
B)	Explain Continuous X-ray spectra. Prove that, $\lambda_{\min} = \frac{12400}{V} \text{ Å}^0$	(CO4) 6 (Understand)
Q. 5	Solve Any Two of the following.	12
A)	Explain B-H Curve for ferromagnetic materials. Define the terms Retentivity & Coercivity.	(Understand) 6
B)	Explain Type-I & Type II superconductors.	(Understand) 6
C)	Explain Conductor, Semiconductor, and Insulator on the basis of band theory of Solids.	(Understand) 6
	*** End ***	

<https://www.batuonline.com>

Whatsapp @ 9300930012

Send your old paper & get 10/-

अपने पुराने पेपर्स भेजे और 10 रुपये पायें,

Paytm or Google Pay से

	<p>DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE Supplementary End Semester Examination – Winter 2023 Course: B. Tech. Branch: All Semester: II Subject Code & Name: Engineering Physics (BTBS202P) Max Marks: 60 Date: 17/01/2024 Duration: 3 Hr.</p>	
	<p>Instructions to the Students:</p> <ol style="list-style-type: none"> 1. All the questions are compulsory. 2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question. 3. Use of non-programmable scientific calculators is allowed. 4. Assume suitable data wherever necessary and mention it clearly. 	
		(Level/CO) Marks
Q. 1	Solve Any Two of the following.	12
A)	Define forced Vibrations. Derive differential equation for forced vibrations.	(CO1) (Remember & understand) 6
B)	Explain the construction, working for production of ultrasonic waves using Piezoelectric oscillator.	(CO1) (Understand) 6
C)	Derive differential equation for wave motion.	(CO1) (Understand) 6
Q.2	Solve Any Two of the following.	12
A)	In Newton's rings, derive an expression for diameter of n^{th} bright ring and dark ring.	(CO2) (Understand) 6
B)	Explain the terms 1) Absorption 2) Spontaneous emission 3) Stimulated Emission 4) Population Inversion https://www.batuonline.com	(CO2) (Understand) 6
C)	Explain Huygen's theory of double refraction. A glass plate is to be used as a polarizer. Find the angle of polarization for it. Also find the angle of refraction. ($\mu = 1.54$)	(CO2) (Understand) 6
Q. 3	Solve Any Two of the following.	12
A)	Explain the motion of electron in parallel and perpendicular magnetic field.	(CO3) (Understand) 6
B)	Write short note on Geiger Muller Counter.	(CO3) (Understand) 6

C)	Derive Schrodinger's time dependent wave equation.	(CO3) (Understand)	6
Q.4	Solve the following questions.		12
A)	Define Atomic Radius, Coordination Number and Atomic Packing Fraction. Derive the relation between lattice parameter 'a' and crystal density 'ρ'.	(CO4) (Understand)	6
B)	Explain Characteristics X-ray spectra. Calculate the wavelength of X-rays when a potential difference of 20 KV is applied between filament and anode.	(CO4) (Understand)	6
Q. 5	Solve Any Two of the following.		12
A)	Explain Diamagnetic, Paramagnetic and Ferromagnetic materials with examples and diagram.	(Understand)	6
B)	Distinguish between Type I and Type II superconductors.	(Understand)	6
C)	Derive an expression for conductivity of Intrinsic and extrinsic (P Type & N Type) Semiconductors.	(Understand)	6
	*** End ***		

<https://www.batuonline.com>

Whatsapp @ 9300930012

Send your old paper & get 10/-

अपने पुराने पेपर्स भेजे और 10 रुपये पायें,

Paytm or Google Pay से

	DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE Regular & Supplementary Examination – Winter 2023			
	Course: B. Tech.	Branch: All	Semester: I	
	Subject Code & Name: BTBS102P (Engineering Physics)			
	Max Marks: 60	Date: 03-01-24	Duration: 3 Hr.	
	Instructions to the Students:			
	<ol style="list-style-type: none"> 1. All the questions are compulsory. 2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question. 3. Use of non-programmable scientific calculators is allowed. 4. Assume suitable data wherever necessary and mention it clearly. 			
		(Level/CO)	Marks	
Q. 1	Solve Any Two of the following.		12	
A)	Define free oscillations. Derive an expression for differential equation of free oscillations.	(CO1) (Remember & Understand)	6	
B)	Explain the construction, working for production of ultrasonic waves using Magnetostriction method.	(CO1) (Understand)	6	
C)	State properties of ultrasonic waves. A quartz crystal having 03 mm thickness is vibrating at resonance. Calculate the fundamental frequency of vibrations for which ultrasonic waves are generated. Given for quartz, Young's Modulus is 7.9×10^{10} N/m ² , Density is 2650 Kg/m ³	(CO1) (Remember & Understand)	6	
Q.2	Solve Any Two of the following.		12	
A)	Derive an expression for the optical path difference for the reflected rays in a thin film of constant thickness and hence find the conditions for maxima and minima.	(CO2) (Understand)	6	
B)	Explain the construction & working of Helium-Neon Laser with neat & labeled diagram.	(CO2) (Understand)	6	
C)	Explain the structure of optical fiber with suitable diagram. Refractive index of the core is 1.48 and that of cladding is 1.47 in an optical fiber. Calculate numerical aperture.	(CO2) (Remember & understand)	6	
Q. 3	Solve Any Two of the following. https://www.batuonline.com		12	
A)	With neat diagram, explain the construction & working of Bainbridge mass spectrograph.	(CO3) (Understand)	6	
B)	With graph and suitable diagram explain the construction & working of Geiger Muller Counter.	(CO3) (Understand)	6	
C)	Derive Schrodinger's time independent wave equation.	(CO3) (Understand)	6	
Q.4	Solve the following questions.		12	
A)	Calculate Atomic Packing Fraction for SC, BCC and FCC structures.	(CO4) (Understand)	6	

B)	Explain Characteristics X-ray spectra. Calculate the wavelength of X-rays when a potential difference of 20 KV is applied between filament and anode.	(CO4) (Understand)	6
Q. 5	Solve Any Two of the following.		12
A)	Explain B-H curve for ferromagnetic materials.	(Remember & Understand)	6
B)	What is Superconductivity? Explain Meissner effect in Superconductors.	(Remember & Understand)	6
C)	What is Hall effect? Derive an expression for Hall Voltage and Hall coefficient.	(Remember & Understand)	6
	*** End ***		

<https://www.batuonline.com>

Whatsapp @ 9300930012

Send your old paper & get 10/-

अपने पुराने पेपर्स भेजे और 10 रुपये पायें,

Paytm or Google Pay से

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular Winter Examination – 2024

Course: F. Y. B. Tech

Branch: Common To All Branches

Semester: I

Subject Code & Name: 24AF2PHYBS102, Engineering Physics

Max Marks: 60

Date: 08/02/2025

Duration: 3 Hr.

Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and include objective-type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6.
4. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
5. Use of non-programmable scientific calculators is allowed.
6. Assume suitable data wherever necessary and mention it clearly.

					(Level/CO)	Marks
Q. 1	Objective type questions. (Compulsory Question)					12
1	The speed of propagation of ultrasonic waves increases with increase in a. Wavelength b. Frequency c. Amplitude d. Intensity				Remember (CO1)	1
2	Dielectric materials are generally a. Insulating Materials b. Ferri Electric Materials c. Ferro Electric Materials d. Superconducting Materials				Remember (CO1)	1
3	In Newton's ring shape of interference pattern is a. Straight fringes b Circular fringes c. Elliptical fringes. d. Straight & Equidistant lines				Remember (CO2)	1
4	The substance which rotates the plane of polarization to left is called as Dextrorotatory b. Levorotatory c. Oscillatory d. None of these				Remember (CO2)	1
5	The principle of Laser is a. Spontaneous emission b. Stimulated emission c. Thermionic emission d. All of these				Remember (CO2)	1
6	Numerical aperture is also called as a. Reflecting angle b. Sine of Acceptance angle c. Scattering angle d. Recoiling angle				Remember (CO2)	1
7	According to Heisenberg's principle, certainty in position involves a. Uncertainty in momentum b. certainty in momentum c. uncertainty in position d. certainty in position				Remember (CO3)	1
8	What is the fundamental unit of information in quantum computing				Remember	1

	a. Bit	b. Qubit	c. Byte	d. Quantum Byte	(CO3)	
9	Geiger Muller Counter is used to measure a. α particles	b. β and γ particles	c. α, β & γ particles	d. None of these	Remember (CO4)	1
10	Number of atoms per unit cell for Face centered Cubic structure is a. 1	b. 4	c. 2	d. 6	Remember (CO4)	1
11	The temperature at which normal material turns into superconductor is a. Absolute Temperature	b. Critical Temperature	c. Mean Temperature	d. Crystallization Temperature	Remember (CO5)	1
12	1 Nanometer = _____ m a. 10^9	b. 10^{-10}	c. 10^9	d. 10^{10}	Remember (CO5)	1
Q. 2	Solve the following.					12
A)	What is Piezoelectric effect? Describe the production of ultrasonic waves by using Piezoelectric method.				Remember/ Understand (CO1)	6
B)	Explain any three factors affecting architectural acoustics of a building. A cinema hall has a volume of 7500 m^3 . It is required to have reverberation time of 1.5 sec. What should be the total absorption in the hall?				Understand (CO1)	6
Q. 3	Solve the following.					12
A)	Derive an expression for diameter of n^{th} bright and dark Newton's rings.				Understand (CO2)	6
B)	Explain the construction and working of Helium Neon laser.				Understand (CO2)	6
Q. 4	Solve Any Two of the following.					12
A)	What is Heisenberg's uncertainty principle? If the uncertainty in position of an electron is $4 \times 10^{-10} \text{ m}$. Calculate the uncertainty in its momentum.				Remember/ Understand (CO3)	6
B)	Derive time independent Schrodinger wave equation.				Understand (CO3)	6

C)	Derive time dependent Schrodinger wave equation.	Understand (CO3)	6
Q.5	Solve Any Two of the following.		12
A)	Define atomic packing fraction. Calculate the atomic packing fraction in SC, BCC, FCC lattices.	Remember/ Understand (CO4)	6
B)	Derive the relation between lattice parameter 'a' and crystal density 'ρ' Copper has FCC structure and its atomic radius is 1.278 Å . Calculate density of Cu. Given atomic weight of Cu=63.5.	Understand (CO4)	6
C)	With neat diagram explain the construction & working of Geiger Muller Counter.	Understand (CO4)	6
Q. 6	Solve Any Two of the following.		12
A)	Explain the B-H curve for ferromagnetic materials. Define Coercivity and retentivity	Understand (CO5)	6
B)	Define superconductivity and distinguish between Type I & Type II superconductors.	Understand (CO5)	6
C)	What is nanomaterial? Explain top-down and bottom-up approach for synthesis of nanomaterial	Understand (CO5)	6

*** End ***

51702595

51702595

51702595

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Bachelor of Technology (Civil Engineering) SEMESTER - 2 Summer 2025 (Regular)

Course : Bachelor of Technology (Civil Engineering) Branch : Engineering and Technology

Semester : SEMESTER - 2

Subject Code & Name: 24AF1PHYBS202 - ENGINEERING PHYSICS

Time : 3 Hours]

[Total Marks : 60

Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and include objective-type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6
4. Use of non-programmable scientific calculators is allowed.
5. Assume suitable data wherever necessary and mention it clearly.

Q1. Objective type questions. (Compulsory Question)

12

- 1 O.W.U. is the unit of
 - a. Absorption
 - b. Reverberation time
 - c. Loudness
 - d. Absorption coefficient
- 2 How does ionic polarization occur?
 - a. Splitting of ions
 - b. Passing magnetic field
 - c. Displacement of cations and anions
 - d. Never occurs
- 3 In the Newton's rings experiment, if the radius of curvature of the lens increases, the diameter of the rings will
 - a. Increase
 - b. decrease
 - c. Remain the same
 - d. Become zero
- 4 If the light is made incident on any transparent medium at the polarizing angle, the reflected light is
 - a. unpolarised
 - b. Plane polarised
 - c. partially Polarised
 - d. none of these
- 5 What is the life time of electron in metastable state?
 - a. 10^{-3} sec
 - b. 10^{-5} Sec
 - c. 10^{-8} sec
 - d. 10^{-7} sec
- 6 What is the term for the maximum angle at which light can enter an optical fiber and still be guided through it?
 - a. Refraction angle
 - b. Critical angle
 - c. Acceptance angle
 - d. Numerical aperture
- 7 The concept of matter wave was suggested by
 - a. Heisenberg
 - b. De- Broglie
 - c. Schrodinger
 - d. Laplace
- 8 What is the fundamental unit of information in quantum computing?
 - a. Qubit
 - b. Bit
 - c. Byte
 - d. Quantum Byte
- 9 Which of the following acts as quenching in Geiger Muller counter?
 - a. Alcohol
 - b. Argon
 - c. Krypton
 - d. Hydrogen
- 10 What is the smallest repeating unit in a crystal lattice that, when repeated in three dimensions, generates the entire crystal structure?
 - a. Unit Cell
 - b. Space lattice
 - c. Basis
 - d. Miller indices

11. What is the typical size range for nanomaterials (in at least one dimension)?
 a. 1-10 micrometers b. 10- 1000 nanometer c. 1-100 nanometers d. 0.1-1 nanometer
12. The magnetic lines of force cannot penetrate the body of a superconductor, a phenomenon is known as
 a. Isotopic effect b. BCS Theory c. Meissner effect d. London theory
- Q2. Solve the following.
- A) What is Magnetostriction effect? Describe the production of ultrasonic waves by using Magnetostriction method. 6
- B) Explain the types of dielectric polarization. 6
- The volume of an auditorium is 12000 m^3 . Its reverberation time is 1.5 sec. If the average absorption coefficient of interior surface is $0.4 \text{ Sabine m}^{-2}$. Find the area of interior surface. 6
- Q3. Solve the following.
- A) Explain the construction and working of semiconductor diode laser. 6
- B) Explain the phenomenon of interference in thin films in reflected light. 6
- Q4. Solve Any Two of the following.
- A) State Heisenberg's Uncertainty Principle. Using this principle, if uncertainty in the location of a particle is equal to its De-Broglie wavelength. Show that the uncertainty in its velocity is equal to its velocity. 6
- B) Derive Schrodinger's time dependent wave equation. 6
- C) Write a note on quantum computing. What is difference between bits and qubits? 6
- Q5. Solve Any Two of the following.
- A) Define atomic radius. Derive an expression for atomic radii for SC, BCC and FCC. 6
- B) What are Miller Indices? Explain procedure for find Miller Indices. Find the miller Indices of a set of parallel planes which makes intercepts in the ration $3a:4b$ on X and Y axis and are parallel to Z axes. 6
- C) State different properties of α , β and γ rays. 6
- Q6. Solve Any Two of the following.
- A) Distinguish between Type -I and Type -II superconductors along with examples. 6
- B) Derive an expression for Hall voltage and Hall coefficient with neat labeled diagram. 6
- C) What is nanomaterial? Explain top-down and Bottom-up approach. 6

*** End ***