Printed Pages : 02 **University Roll no.....**

End Term Examination, 2016-17

B.Tech. I-Year, I-Sem.

Engineering Physics (AHP-1101)

Time: 2 ½ hours M.M: 40

Section –A

Attempt all questions. 1×16 = 16

i) What are coherent sources?

ii) What is meant by fringe width?

iii) Why the Newton's rings are circular?

iv) What do you mean by diffraction of light?

v) Define quarter wave plate.

vi) What do you understand by specific rotation?

vii) Compute the amplitude of the resultant wave if the two identical coherent waves each of amplitude 4 unit with phase difference of 2π superimposed.

viii) Define displacement current.

ix) What is skin depth?

x) Write the relation in $\vec{D}$, $\vec{E}$ and $\vec{P}$.

xi) Where Fermi level exists in n-type semiconductor?

xii) What is Meissner effect?

xiii) Write the condition for the normalization of a wave function.

xiv) Calculate the least permitted energy of a particle of mass 10^{-30} Kg moving in a one dimensional potential box of width 10^{-10} m assuming its height infinite.

xv) Write three dimensional time dependent Schrodinger wave equation.

xvi) Calculate the longest wavelength that can be analyzed by a crystal of spacing d = 2Å in second order.

Section-B

Attempt any four questions. $3 \times 4 = 12$

I. The mass of an electron moving at relativistic speed is 11 times of its rest mass. Find its kinetic energy and momentum.

II. Show that two events simultaneous ($t_1 = t_2$) at different positions ($x_1 \neq x_2$) in frame S are not, in general, simultaneous in another frame S′ moving with relative speed v with respect to frame S.

III. A particle of rest mass m_0 has kinetic energy K. Show that its de-Broglie wavelength is given by $\lambda = \frac{hc}{\sqrt{K\left(K + 2m_0c^2\right)}}$. What will be the value of λ if $K << m_0c^2$.

IV. Calculate the smallest possible uncertainty in the position of an electron moving with velocity $v = 3 \times 10^7$ m/sec.

V. X- ray photon of wavelength 0.3Å is scattered through an angle of 60^0 by a free electron. Find wavelength of scattered photon and energy of recoiled electron.

Section-C

Attempt any three questions. $4 \times 3 = 12$

I. Deduce the relativistic velocity addition theorem and show that it is consistent with Einstein's second postulate.

II. What was the objective of Michelson-Morley experiment? Describe the experiment briefly. How is the negative result of experiment interpreted?

III. Show that the phase velocity of de-Broglie wave is greater than the velocity of light, but group velocity is equal to the velocity of particle with which waves are associated.

IV. What is the Compton effect? Deduce the expression for Compton shift.

Physical Constants:

Planck Constant $h = 6.63 \times 10^{-34}$ Joule-sec.
Rest mass of electron $m_0 = 9.1 \times 10^{-31}$ Kg.
Speed of light $c = 3 \times 10^8$ m/sec.

Printed Pages: 02 University Roll No.....

End Term Examination, Even Semester 2016-17
B. Tech., I-Year, II-Semester
AHP 1101 : Engineering Physics

Time: 2½ Hours Max. Marks: 40

SECTION – A

Note : Attempt all questions. (1x16=16)

I. Which phenomenon of light is demonstrated by Young's double-slit experiment?
II. What do you understand by coherent sources of light?
III. Which property of light is confirmed by diffraction?
IV. When white light is incident on a diffraction grating, what colour of light will be deviated most from the central image?
V. Which kind of waves cannot be polarized?
VI. Explain Brewster's law?
VII. Define transition temperature of a superconducting material.
VIII. What are the different kinds of single walled nanotubes?
IX. For a dielectric, define the polarization in terms of induced dipole moment.
X. Write the equation of continuity.
XI. The magnitude of magnetic field in a plane wave is 1Amp/m, calculate the magnitude of electric field in plane wave in free space.
XII. Define the Poynting vector.
XIII. What do you mean by a massless particle?. Give example.
XIV. Explain time dilation with an example.
XV. In Davisson-Germer experiment, if the diffraction angle is 50^0, calculate the value of glancing angle.
XVI. Write the expression for the de- Broglie wavelength λ of a particle in terms of its relativistic kinetic energy K.

SECTION – B

Note : Attempt any four questions. **(3x4=12)**

I. Show explicitly that $x^2 - c^2t^2$ is Lorentz invariant.

II. Calculate the percentage contraction in length 'L' of a rod in a frame of reference moving with velocity 0.6c in the direction of (a) parallel to its length, and (b) at an angle 45^0 with its length.

III. If an excited state of hydrogen atom has a lifetime of $2.5 \times 10^{-14}s$, what is the minimum error with which the energy of this state can be measured?

IV. Derive Bragg's equation for the reflection of X-rays by crystal planes.

V. What is the uncertainty principle? Apply this to find the radius of the Bohr's first orbit.

SECTION – C

Note : Attempt any three questions. **(4x3=12)**

I. What is Compton effect? Derive an expression for the Compton shift.

II. A particle is in motion along a line between $x = 0$ and $x = a$ with zero potential energy. At points for which $x < 0$ and $x > a$, the potential energy is infinite. Setup the Schrödinger wave equation and solve for the normalized eigen functions. Plot the eigen functions along with the eigen values for three states.

III. State Einstein's postulates of special theory of relativity and obtain Lorentz transformation.

IV. Deduce the relativistic velocity addition theorem. Show that it is consistent with Einstein's second postulate.

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End Term Examination, 2017-18 (Odd Semester)

Course: B. Tech (I-Year) **Subject: Engineering Physics(AHP-1101)**

Time: 3 Hours **Total Marks: 50**

Section - A

Note: Attempt all questions. $7 \times 5 = 35$

1. Obtain the expression for the diameters bright Newton's rings in reflected light. In Newton's ring experiment the diameter of 4th and 12th dark rings are 0.500 cm and 0.800 cm respectively. Find the diameter of 16th dark ring.

   or

   Deduce the expression for resultant intensity in the diffraction pattern formed due to Fraunhofer diffraction single at a single slit. Light of wavelength 4.0×10^{-5} cm is falling on a slit of width 16.0×10^{-5} cm. Find the angular position of first minimum and first secondary maximum.

2. Using the assumptions of Fresnel's theory for rotatory polarization show that optical rotation (θ) produced by an optically active substance of thickness 'd' is given by the expression, $\theta = \frac{\pi d(\mu_L - \mu_R)}{\lambda}$ Where the symbols have their usual meaning. A 2.0 dm long polarimeter tube containing optically active solution having specific rotation 50 deg $dm^{-1}(g/cc)^{-1}$ produces an optical rotation of 10^0. What is the concentration of the solution?

3. What are nanomaterials? Write down different types of single walled carbon nanotubes. Mention the properties and uses of carbon nanotubes.

   or

   Find the mathematical form of Poynting theorem using Maxwell equations. Earth receives 1400 Joule sec^{-1} m^{-2} solar energy. Calculate the strength of electric and magnetic fields of radiation.

4. Derive an expression for the conductivity of semiconductors in terms of their temperature and band gap. In pure silicon 2×10^{19} phosphors and 10^{19} boron atoms are added simultaneously. If the mobility of electrons is 0.5 m^2/ volt- sec then determine resistivity of silicon sample.

[P.T.O.]

5. State postulates of special theory of relativity. Using them derive Lorentz transformations. Also show that they reduce to Galilean transformations at non relativistic speeds.
6. Deduce an expression for Compton shift. An x-ray photon is found to have its wavelength doubled on being scattered through 60°. Find the wavelength of the incident photon.
7. Define phase and group velocities. Find the relation between phase velocity and group velocity in a dispersive medium. Also show that group velocity is equal to the velocity of particle with which the waves are associated.

Section-B

Note: Attempt all questions. Marks are indicated against each question.

1. Show that the circle, $x^2 + y^2 = a^2$ in frame S appears to be an ellipse in frame S' which is moving with velocity v relative to S. 2 Marks
2. Two particles come toward each other, each with speed 0.7c, with respect to laboratory frame. What is their relative speed? 2 Marks
3. A microscopic particle having rest mass $m_0 = 1.6 \times 10^{-27}$ kg is moving with the speed of 2.4×10^8 m/sec. Find the wavelength of matter wave associated with it. 2 Marks
4. Define mass less particles and derive Einstein's mass energy relation, $E = mc^2$. 3 Marks
5. State uncertainty principle. Using it show that electron cannot exist inside the nucleus. 3 Marks
6. Derive Schrodinger wave equation in steady state (time independent equation) and explain the physical significance of wave function. 3 Marks

Physical Constants

Speed of light (c) = 3×10^8 m/s
Electronic charge (e) = 1.6×10^{-19} Coulomb
Plank's constant (h) = 6.63×10^{-34} joule – sec.
Permeability of free space(μ_o) = $4\pi \times 10^{-7}$ H/m
Permittivity of free space (ε_o) = 8.85×10^{-12} Coul.^{2}/ Nm^2
Rest mass of electron (m_0) = 9.1×10^{-31} kg

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End Term, Odd Semester, 2018-19

B. Tech., I-Year, I-Semester

BPHS 0001 : Engineering Physics

Time: 3 Hours Max Marks: 50

Section A

Note: Attempt all questions. **(7x5=35)**

I. Define the coherent sources of light and derive the expression of intensity distribution in case of Young's double slit experiment. Also plot this graph.

II. In Young's two slit experiment the intensity ratio of the two slits are 1:4. What is the intensity ratio of minima and maxima in the interference pattern?

III. What is a plane transmission grating? Explain. Deduce the expression for resultant intensity in a diffraction pattern formed due to transmission grating.

OR

Explain superconductivity. Differentiate between Type I and Type II superconductors. Give some examples of typeI and typeII superconductors.

IV. Explain Hall effect and obtain the expression for Hall coefficient. Discuss one application of Hall Effect experiment.

V. Write down the Maxwell's equations in free space and show that the electromagnetic waves travel with the speed of light in free space.

VI. Deduce Einstein's Mass- Energy relation and discuss it. Calculate the relativistic energy of a proton moving with speed of 0.6c.

VII. What is Compton effect? Derive the expression for the change in wave length of a photon when it is scattered by a free electron. Also calculate the value of Compton wave length of an electron.

OR

Explain Heisenberg's uncertainty principle. Using this principle, show that an electron can not reside in the nucleus.

Section B

(I) Attempt all questions. Marks are shown against them.

(a) Two particles approach to each other with a speed of 0.6c with respect to the laboratory fame. What is their relative speed? (2)

(b) Find the expression of time dilation. (2)

(c) What is the de-Broglie wave length of an electron moving through a potential difference of 1keV. (2)

(II) Attempt all questions. Marks are shown against them.

(a) Describe the Bragg's law of diffraction. (3)

(b) Show that the group velocity is equal to the velocity of the particle. (3)

(c) Find the energy of a particle confined in a box of length L and height of infinite potential. (3)

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End Term Examination, Even Semester 2018-19

B. Tech, I-Year, II Semester

Engineering Physics (BPHS 0001)

Time: 3 Hours Total Marks: 50

Section - A

Note: Attempt all questions. $7 \times 5 = 35$

1. State the essential conditions for obtaining the sustainable interference of light. Explain the formation of Newton Rings in reflected monochromatic light and prove that the diameters of dark rings are proportional to the square roots of natural numbers.
2. In Young's double slit experiments, the slits are 0.5 mm apart and interference is observed on a screen placed at a distance of 100 cm from the slits. It is found that the 9^{th} bright fringe is at a distance of 8.5 mm from the 2^{nd} dark fringe from the center pattern. Find the wavelength of light used.
3. Explain the phenomenon of diffraction of light? Show that the intensity of principal maxima obtained due to diffraction grating is proportional to N^2 where N is the number of parallel slits in grating.

Or

What is meant by plane polarized light? Obtain the general equation of polarization of light obtained due to the superposition of two plane polarized light waves travelling in the same direction when their optical vectors are mutually perpendicular.

4. Explain Hall effect and obtain the expression for Hall coefficient. What does Hall coefficient signify?
5. Explain the concept of displacement current. How does Ampere's circuital law is modified in view of displacement current? Determine the conduction current and displacement current densities in a material having conductivity of 10^{-4} siemen / meter

and relative permittivity ε_r=2.25. The electric field in the material is $E=5\times10^{-6}\sin(9\times10^{9}t)$ volt/meter. ($\varepsilon_0=8.85\times10^{-12}$)

6. What do you mean by a massless particle? Explain. Deduce the Einstein mass-energy relation. Calculate the relativistic energy of an electron moving with speed of 0.8c.
7. Discuss Compton Effect and derive appropriate expression for the change in wavelength of a photon when it is scattered by a free electron. Calculate the value of Compton wavelength.

OR

Define Heisenberg's uncertainty principle. Using this principle, find the radius of Bohr's first orbit in an atom

Section-B

Attempt all questions. **2x3=6 Marks**

1. Derive the expression for length contraction.
2. Calculate the de-Broglie wavelength associated with an electron and a proton of 1 MeV energy each.
3. How fast an electron move in order that its mass is equal to the rest mass of the proton?

Attempt all questions. **3x3=9 Marks**

1. Show that the group velocity is equal to the particle velocity associated with matter waves.
2. Define the group velocity and phase velocity of matter wave. Establish a relation between group velocity and phase velocity of the matter wave applicable in a dispersive medium.
3. Drive time independent Schrodinger wave equation. Give the physical interpretation of the wave function used in this equation.

Physical Constants

Plank's constant (h) = 6.63×10^{-34} joule – sec.
Permittivity of free space (ε_o) = 8.85×10^{-12} Coul.^{2}/ Nm^2
Rest mass of electron = 9.1×10^{-31} kg
Rest mass of proton = 1.6×10^{-27} kg

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End Term Examination, Odd Semester 2019-20

B. Tech. (Common to all Branches), I-Year, I-Semester

BPHS 0001 : Engineering Physics

Time: 3 Hours Max Marks: 50

Section- A

Note: Attempt ANY FIVE questions. (5x4=20)

I. Show that the plane polarised and circularly polarised light are the special case of elliptically polarised light obtainable from the superposition of ordinary and extraordinary waves whose optical vectors are perpendicular to each other.

II. Distinguish between Fresnel and Fraunhofer classes of diffraction. A wave of wavelength 5500 A is incident on a slit of width 22.0×10^{-5}cm. Find the angle of diffraction in second order of diffraction pattern.

III. What is Poynting vector? If the earth receives $2\ cal\ min^{-1}\ cm^{-2}$ solar energy, what are the amplitude of electric and magnetic fields of radiation?

IV. What are de- Broglie waves? Calculate the de-Brogie wavelength of 1MeV electron and 1MeV proton.

V. If the total energy of a particle is exactly thrice its rest mass energy. What is the velocity of particle?

VI. What is meant by a massless particle? Calculate the energy and momentum of a proton moving with velocity 0.8c.

Section- B

Note: Attempt ALL questions. **(5x3=15)**

I. With the help of suitable examples, classify the solids on the basis of band theory. Derive the expression of electrical conductivity for Intrinsic semiconductor.

II. Using uncertainty principle, find the radius of Bohr's first orbit of an atom.

III. Discuss Galilean transformation for position, velocity and acceleration.

IV. What is the minimum uncertainty in the frequency of a photon whose life time is about $10^{-8} sec$?

V. A photon of energy 1.02Mev is scattered through 90^0 by a free electron. Calculate the energy of photon after scattering.

Section- C

Note: Attempt ANY THREE questions. **(3x5=15)**

I. Write the Einstein's postulates of special theory of relativity. Derive the mass- energy relation.

II. What is Hall-effect? Obtain the expression for Hall-coefficient and explain its significances.

III. Deduce the relativistic velocity addition theorem. Show that it is consistent with Einstein's second postulate.

IV. Solve the Schrodinger equation for a particle enclose in a one-dimensional rigid box of side *l*. Obtain expression for the total energy in the quantum state (eigen values).

Course Name: Engineering Physics

Course Outcome:

CO1- Understand phenomenon of interference, diffraction of light waves and variation of intensities in these phenomenon.

CO2- Discuss polarization of light wave, double refraction and specific rotation.

CO3- Explain solids, superconductors and conductivity variation with temperature for intrinsic semiconductors.

CO4- Explain special theory of relativity in fields of physics and engineering.

CO5- Understand fundamentals of quantum mechanics, Schrödinger's wave equations to deal with physics problem.

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End Term Examination, Even Semester 2021-22

Program: B. Tech., Year: I, Semester: II

Subject Code: BPHS0002, Subject Name: Engineering Physics -I

Time: 3 Hours **Maximum Marks: 50**

Instruction for students: Attempt all questions. Marks are indicated against each question.

Section – A

Attempt All Questions 4 × 5 = 20 Marks

No.	Detail of Question	Marks	CO	BL	KL
1	Explain the phenomenon of double refraction giving suitable ray diagram and also discuss the salient features of ordinary and extra ordinary rays.	4	CO2	U	C
2	Explain the phenomenon of interference. In a particular two slit interference pattern with wavelength λ = 6000Å, the zero order and 10th order maxima fall at micrometer readings 12.34 mm and 14.73 mm. If wavelength is changed to 5000Å, then compute the positions of zero order and 20th order fringes, other arrangements remaining same.	4	CO1	A	P
3	Deduce the expression for temperature dependent of conductivity of intrinsic semiconductors.	4	CO3	A	P
4	State uncertainty principle. Using it show that electron can not exist inside the nucleus.	4	CO4	A	P
5	Obtain the Schrodinger time independent wave equation for a moving microscopic particle. Also write it for a free particle. Or Derive the Einstien's mass energy relationship.	4	CO5 /CO4	A	P

Section – B

Attempt All Questions — 3 × 5 = 15 Marks

No.	Detail of Question	Marks	CO	BL	KL
1	A rod is moving with velocity 2.4×10^8 m/sec in a direction inclined at 60^0 to its own length. Compute the percentage contraction in the length of the rod.	3	CO4	A	P
2	Show that the wavelength of matter wave associated with a relativistically moving matter particle having rest mass m_0 and kinetic energy k is given by $\lambda = \frac{hc}{\sqrt{k(k+2m_0c^2)}}$, where h is Plank's constant and c is speed of light.	3	CO5	A	P
3	Calculate smallest possible uncertainty in the position of an electron moving with velocity 1.8×10^8 m/sec.	3	CO5	A	P
4	Calculate rest mass, relativistic mass and momentum of a photon having energy 8.0×10^{-19} Joule.	3	CO4	A	P
5	Show that velocity of the wave packet is equal to the velocity of the particle with which it is associated.	3	CO5	A	P

Section – C

Attempt All Questions — 5 × 3 = 15 Marks

No.	Detail of Question	Marks	CO	BL	KL
1	Using the postulates of special theory of relativity deduce the Lorentz transformations.	5	CO4	A	P
2	A particle of mass m is moving in a one dimensional potential box of length L under the potential energy conditions, $V = 0$ when $0 < x < L$, and $V = \infty$ when $x \leq 0$, $x \geq L$. Find the energy eigenvalues and normalized wave function of particle.	5	CO5	A	P
3	Using Lorentz transformations find relativistic velocity transformation equations. Two particles come toward each other, each with speed 0.9c, with respect to a laboratory frame. Find their relative speed.	5	CO4	A	P

Physical Constants: Plank's constant (h) = 6.63×10^{-34} Joule-Sec.
Speed of light (c) = 3×10^8 m/s, Rest mass of electron(m_0) = 9.1×10^{-31} kg

Course Name: Engineering Physics

Course Outcome

CO1 - Understand phenomenon of interference, diffraction of light waves and variation of intensities in this phenomenon

CO2 - Discuss polarization of light wave, double refraction and specific rotation.

CO3 - Explain solids, superconductors and conductivity variation with temperature for intrinsic semiconductors

CO4 - Explain special theory of relativity in fields of physics and engineering.

CO5 - Understand fundamentals of quantum mechanics, Schrodinger's wave equations to deal with physics problems

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End Term Examination, Odd Semester 2022-23
B.Tech , 1st Year, 1st Semester
BPHS 0002, Engineering Physics

Time: 3 Hours **Maximum Marks: 50**

Section – A

Attempt All Questions 4 X 5 = 20 Marks

No.	Detail of Question	Marks	CO	BL	KL
1	Explain the phenomenon of double refraction. Discuss the properties of E-rays and O-rays.	4	2	U	C
2	Obtain the expression of variation of conductivity with temperature for the case of intrinsic semiconductor.	4	3	A	P
3	A superconductor tin has a critical temperature of 3.7 K and it has critical field of 0.0306 Tesla at 0 K. Find the critical field at 2 K.	4	3	E	P
4	Give the concept of wave velocity, phase velocity and group velocity.	4	5	U	C
5	Prove that space time interval, $x^2 + y^2 + z^2 - c^2 t^2$ is invariant under Lorentz transformation. Or Show that the circle, $x^2 + y^2 = a^2$ in frame S appears to be an ellipse in frame S' which is moving with velocity v relative to S.	4	4	A	C

Section – B

Attempt All Questions 3 X 5 = 15 Marks

No.	Detail of Question	Marks	CO	BL	KL
6	Show that electron cannot reside inside the nucleus by using Heisenberg's uncertainty relation.	3	5	A	P
7	Derive the Galilean transformation equation. Also state the postulates of special theory of relativity.	3	4	R	C

8	Explain the concept of dual nature of particle. Calculate the wavelength associated with an electron accelerated to a potential difference having energy of 1.25eV.	3	5	U	P
9	The speed of an electron is measured to be 6×10^3 m/sec to an accuracy of 0.003%. Find the uncertainty in determining the position of electron.	3	5	An	M
10	Define the term length contraction. Find the length of a meter stick moving parallel to its length when its mass is 3/2 times of its rest mass.	3	4	An	P

Section – C

Attempt All Questions 5 X 3 = 15 Marks

No.	Detail of Question	Marks	CO	BL	KL
11	Obtain time independent Schrodinger wave equation. Give physical significance of Ψ.	5	5	A	P
12	Explain the term time dilation and write its formula. If the kinetic energy of a body is thrice its rest mass energy, find its velocity and relativistic mass.	5	4	C	P
13	Derive the formula of Einstein's mass energy equivalence. Explain its physical significance.	5	4	A	M

Standard value of some constants :

Planck's constant (h) : 6.625×10^{-34} Joule- sec
Rest mass of electron (m_e) : 9.1×10^{-31} Kg
Electronic charge (e) : 1.6×10^{-19} Coulomb

Course Name: **Engineering Physics-I**

Course Outcome

CO1: Understand phenomenon of interference, diffraction of light waves and variation of intensities in these phenomenon

CO2: Discuss polarization of light wave, double refraction and specific rotation

CO3: Explain solids, superconductors and conductivity variation with temperature for intrinsic semiconductors

CO4: Explain special theory of relativity in fields of physics and engineering

CO5: Understand fundamentals of quantum mechanics, Schrödinger's wave equations to deal with physics problem.

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End Term Examination, Even Semester 2022-23

B. Tech (CSE), I Year, II Semester

Subject Code & Subject Name- BPHS0002, Engineering Physics-I

Time: 3 Hours **Maximum Marks: 50**

Section – A

Attempt All Questions 4 X 5 = 20 Marks

No.	Detail of Question	Marks	CO	BL	KL
1	Derive the expression of fringe-width in Fresnel Biprism experiment and prove that the fringe width does not depend on the order of the fringe. Interpret what happens when monochromatic source of light in Fresnel Biprism experiment is replaced by white light source.	4	CO1	R	C
2	Explain the term Doubly Refracting Crystals with suitable diagram. A 20 cm long tube containing 48 cm^3 of sugar solution rotates the plane of polarisation by 11°. If the specific rotation of sugar is 66° cm^3/dm gm, calculate the mass of sugar in solution.	4	CO2	A	P
3	Enlist two important properties of semiconductors. Derive the temperature independent expression of electrical conductivity for intrinsic semiconductors in terms of charge carrier concentration and mobility. Plot the graph showing the variation of conductivity with temperature in intrinsic semiconductors.	4	CO3	R	F
4	State the Einstein postulates of Special theory of relativity. Using Einstein postulates, deduce the Lorentz space-time transformation equations.	4	CO4	U	C
5	A particle of rest mass m_0 has a kinetic energy K. Show that its de-Broglie wavelength is given by $\lambda = \frac{hc}{\sqrt{K\left(K+2m_0c^2\right)}}$ What will be the expression of λ if $K << m_0c^2$? Or	4	CO5	E	P

	Illustrate how group velocity is different from phase velocity. Show that the velocity of a group of waves is equal to the velocity of particle.				

Section – B

Attempt All Questions 3 X 5 = 15 Marks

No.	Detail of Question	Marks	CO	BL.	KL
6	State de-Broglie Hypothesis. Calculate de-Broglie wavelength associated a proton moving with the velocity equal to 1/20th of the velocity of light. Given rest mass of proton=$1.67X\ 10^{-27} kg$.	3	CO5	A	C
7	Calculate the rest mass, relativistic mass and momentum of a photon having energy 5 eV.	3	CO4	A	M
8	Discuss how inertial frames are different from non-inertial frames of Reference. Is the earth an inertial frame of reference? Why or why not?	3	CO4	U	F
9	Using the Heisenberg's Uncertainty principle, compute the radius of first Bohr's orbit of an atom.	3	CO5	R	C
10	Write the physical significance of the wave function. Compute the probability of finding a particle trapped in a box of length L in the region from 0.45 L to 0.55 L for the ground state.	3	CO5	An	P

Section – C

Attempt All Questions 5 X 3 = 15 Marks

No.	Detail of Question	Marks	CO	BL.	KL
11	Derive Relativistic velocity addition theorem using Lorentz transformation equations. Prove that Einstein II postulate of Special theory of relativity is consistent with Relativistic velocity addition theorem.	5	CO4	E	C
12	Using the Schrodinger's time independent (steady state) wave equation, find the expression of Eigen wave function and Eigen energy for a particle enclosed in a 1-D potential box having infinitely high potential walls at x = 0 and x = L where L is the width of box?	5	CO5	U	P
13	In brief discuss the proper time. Give an example to prove that Time dilation is a real effect. At what speed should a clock be moved so that it may appear to lose 1 minute in each hour. Or Establish Einstein's mass energy relation. If the Relativistic kinetic energy of body is thrice its rest mass energy, find its velocity.	5	CO4	A	P

- Given Planck's Constant h= $6.63\ X\ 10^{-34}$Js.