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First - Mid Term Examination, 2016-17

B.Tech. I-Year, I Semester

AHP-1101: Engineering Physics

Time: 1 ½ Hrs **M. M: 20**

Section-A

Note: Attempt all five questions. **1× 5 =5**

I. Why two independent sources of light of same wavelength cannot show interference?

II. In a biprism experiment, if the monochromatic source of light is replaced by white light source, what would be the color of central fringe?

III. Distinguish between Fresnel and Fraunhofer classes of diffraction.

IV. Which optical phenomenon explains the transverse nature of light?

V. Explain the difference between ordinary and Extra-ordinary rays as produced by the double refracting crystal.

Section B

Note: Attempt any three questions. **2×3=6**

I. Two coherent waves having amplitudes 4 units and 2 units superimposed on each other with zero phase difference. Calculate the resultant intensity.

II. A monochromatic light of wavelength 5000Å from a narrow slit is incident on a double slit. If the overall separation of 20 fringes on a screen placed at 1.0 m away from the slit is 5.0cm, find the double slit separation.

III. In Fresnel's bi-prism experiment, the obtuse angle of the bi-prism is 178° and μ= 1.5. Interference fringes are found with source of wavelength 6000 Å located 10cm from the bi-prism and source to screen distance is 100cm. Find the maximum number of fringes that can be observed.

IV. A 20 cm long tube containing $100cm^3$ of sugar solution rotates the plane of polarization by 10° .If the specific rotation of sugar is 60 deg $(dm)^{-1}$ $(gm/cc)^{-1}$ calculate the mass of sugar in solution.

Section C

Note: Attempt any three questions from section C. **3×3= 9**

I. Why the center of Newton's rings is found dark? Derive the expression for the diameter of the nth bright ring in reflected light.

II. Define the fringe width as observed in the Young's double slit experiment. Obtain the relevant formula for determining the fringe-width.

III. Derive an expression for the Intensity distribution due to Fraunhofer diffraction at single slit and find the directions of minima.

IV. Discuss theoretically the superposition of two linearly polarized light waves whose optical vectors are mutually perpendicular.

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Second Mid-Term Examination, 2016-17

B.Tech. I-Year, I Semester

AHP-1101: Engineering Physics

Time: 1 ½ Hrs. **M. M: 20**

Note:- Answer all five questions from Section A, Any three from Section B and Any three from Section C.

Section A $1 \times 5 = 5$ Marks

I. State Ampere's circuital law.

II. Where does Fermi energy level lie in an intrinsic semiconductor?

III. Define superconductor type I.

IV. Write the relation between D, E and P applicable in dielectric solids.

V. What are the different kinds of single walled nanotube.

Section B $2 \times 3 = 6$ Marks

I. Find the electrical conductivity and resistivity of germanium doped with phosphorus atoms at room temperature with the following data: $n_e = 5 \times 10^{22} m^{-3}$, $n_h = 2 \times 10^{16} m^{-3}$, $\mu_e = 0.40\ m^2/(v\text{-}s)$ and $\mu_h = 0.20\ m^2/(v\text{-}s)$

II. Calculate the current produced in a small germanium plate of area $1 cm^2$ and of thickness 0.5mm, when a potential difference of 2 volt is applied across the faces. Given concentration of free

electrons in germanium is $10^{19} m^{-3}$ and mobilities of electrons and holes are 0.5 m^2 / (v-s) and 0.2m^2 /(v-s) respectively.

III. An electric field of 200 volt / m is applied to a sample of n-type semiconductor whose Hall coefficient is $-0.01 m^2 coulomb^{-1}$. Calculate the current density in the sample assuming mobility of electrons equals to 0.40 $m^2 V^{-1} s^{-1}$.

IV. A parallel plate capacitor with plate area of 4 cm^2 and plate separation of 2 mm has a voltage of 40 sin $10^3 t$ applied to its plates. Calculate the displacement current assuming $\varepsilon = 2\varepsilon_0$, ($\varepsilon_0 = 8.85 \times 10^{-12} C^2/N\text{-}m^2$).

Section C $3 \times 3 = 9$ Marks

I. Derive an expression for the temperature dependent conductivity of an intrinsic semiconductor and show its behavior with temperature.

II. What is Hall effect? Find the expression of Hall coefficient and give the significance of this measurement.

III. Write the Maxwell's equations with their physical significances and derive the Maxwell's fourth equation based on Ampere's modified law valid for time varying currents.

IV. What does Poynting vector signify? Deduce the Poynting theorem for the flow of energy in electromagnetic field.

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B.Tech. I Year, II Semester, I Mid. Term Examination, 2016-17

Engineering Physics (AHP 1101)

Time : 1 Hour 30 minutes **Total Marks : 20**

Section A

Note: Attempt all questions. **(1×5=5 Marks)**

1. What is the important condition of coherent sources?
2. Due to which phenomenon the soapy water or thin films of oil show their brilliant colours?
3. In Young's double slit experiment the separation between the slits is halved, what would happen to the fringe width?
4. What should be the size of obstacle to get the best diffraction pattern?
5. Which optical phenomenon predicts the transverse nature of light?

Section B

Note: Attempt any three questions. **(2×3=6 Marks)**

1. In Young's double slit experiment the slits are 0.5mm apart and interference is observed on a screen placed at a distance of 100cm from the slits. It is found that 9th bright fringe is at a distance of 8.835mm from second dark fringe from the centre pattern. Find the wavelength of light used.

(P.T.O.)

2. In Newton's rings experiment the diameter of 6^{th} and 10^{th} dark rings are 0.40 cm and 0.80 cm respectively. Deduce the diameter of 20^{th} dark ring.

3. Distinguish between Fresnel and Fraunhofer diffractions. Light of wavelength $5500A^0$ falls normally on a slit of width 22×10^{-5}cm. Calculate the angle of diffraction for second order.

4. What is meant by specific rotation? The plane of polarisation of linearly polarised light is rotated through 6.5^0 in passing through a length of 2.0 dm of sugar solution of 5% concentration. Calculate the specific rotation of sugar solution.

Section C

Note: Attempt any three questions. **(3×3=9 Marks)**

1. Two coherent sources of intensity ratio 9 interfere. Find the value of $(I_{max} - I_{min}) / (I_{max} + I_{min})$.

2. Discuss the young's double slit experiment and obtain the expression for fringe width.

3. Drive the expression for intensity distribution due to Fraunhofer diffraction at a single slit. Find the conditions for maxima and minima

4. Discuss the fresnel's theory of rotatory polarisation and drive the formula for angle of rotation for the plane of vibration.

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I Mid Term Examination

***Odd*-Semester, 2017-18**

Programme: B.Tech I Year **Branch :** All **Year:** First

Subject with Code : Engineering Physics. AHP 1101

Time: 1 Hour **Max. Marks :** 15

Section A

Note: Attempt all questions. **2X3= 6**

1. Why two independent sources of light of same wavelength cannot show interference? Discuss the conditions for sustainable interference.
2. If in an interference pattern, the ratio between maximum and minimum intensities is 49:1, find the ratio between the Amplitudes of the two interfering waves.
3. Light of wavelength 5500 Å falls normally on a slit of width 22.0×10^{-5} cm. Calculate the angular position of the first two minima on either side of the central maximum.

Section B

Note: Attempt all questions. **3X3= 9**

1. In Young's double slit experiment the slits are 0.5 mm apart and interference is observed on a screen placed at a distance of 100 cm. from the slit. It is found that the 9^{th} bright fringe is at a distance of 10 mm from the 2^{nd} dark fringe from the centre pattern. Find the wavelength of light used in the experiment.
2. Drive an expression for resultant intensity of principal maxima in diffraction pattern obtained due to a plane transmission diffraction grating. Also write the conditions for the direction of principal maxima and minimum intensity.
3. Discuss theoretically the superposition of ordinary and extra-ordinary light waves of the same frequency when their optical vectors are mutually perpendicular.

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I Mid Term Examination
***Odd*-Semester, 2018-19**

Programme: B. Tech I Year **Branch:** All **Year:** First

Subject with Code: Engineering Physics (BPHS0001)

Time: 1 Hour **Max. Marks:** 15

Section A

Note: Attempt all questions. **2X3= 6**

1. Two identical waves each of amplitude 3 units having no phase difference superimpose to each other in an interference pattern. Find the resultant intensity.
2. The light of wave length 5000 Å from a narrow slit is incident on a double slit. If the overall separation of 10 fringes on a screen 200 cm away is 2.0 cm. Find the double slit separation.
3. Write the phenomenon of double refraction. How would you distinguish between ordinary and extra ordinary rays?

Section B

Note: Attempt all questions. **3X3= 9**

1. Define the fringe width. Drive the expression for fringe width using the theory of Young's double slit experiment.
2. Show that the resultant intensity as observed in the N-slits diffraction pattern (grating) is proportional to N^2
3. Define specific rotation. A 20 cm long tube containing 48 cm^3 of sugar solution rotates the plane of polarization by 11^0. if the Specific rotation of sugar is 66^0, Calculate the mass of sugar in the solution.

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I Mid Term Examination

Even-Semester, 2018-19

Programme: B. Tech I Year **Branch:** All **Year:** First

Subject with Code: Engineering Physics (BPHS0001)

Time: 1 Hour **Max. Marks:** 15

Section A

Note: Attempt all questions. 2X3= 6

1. What do you understand by sustainable interference? Explain.
2. Two identical coherent waves produced interference pattern. Find the ratio of intensity at the center of a bright fringe to the intensity at a point where these two waves interfere with the path difference of $\lambda/4$.
3. Distinguish between Fresnel and Fraunhofer classes of diffraction. Illustrate each by giving two examples.

Section B

Note: Attempt all questions. 3X3= 9

1. Define the fringe width. Derive the expression of fringe width using the theory of Young's double slit experiment.
2. Describe the newton's rings method for measuring the wave length of monochromatic light and derive the formula for the wave length in terms of the diameters of Newton's rings
3. Define the phenomenon of rotational polarization. 100 gm of impure sugar is dissolved in a litre of water. The solution gives an optical rotation of 9.9^0 when placed in a tube of length 20 cm. If the specific rotation of pure sugar solution is 66^0 dm^{-1} $(gm/cc)^{-1}$, find the purity of the sugar sample.

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Mid Term Examination, *Odd*-Semester, 2019-20

B.Tech. (all branches), I Year, I Semester

Subject Name		Subject Code
Engineering Physics	:	BPHS0001
Engineering Physics-I	:	BPHS0002
Engineering Physics-II	:	BPHS0003

Time: 2 Hours **Max. Marks:** 30

Section A

Note: Attempt all three questions. **3X2= 6**

1. Two identical light waves each of amplitude 3 units superimpose to each other with phase difference of 180° in a double slit experiment. Calculate the intensity of the resultant wave.
2. Write two distinctions between Fresnel and Fraunhofer diffractions.
3. Define specific rotation of an optically active substance.

Section B

Note: Attempt all three questions. **3X3= 9**

1. Two coherent sources of monochromatic light of wave length 6000 A° produce and interference on screen kept at a distance of 1 meter from them. The distance between two consecutive bright fringes on the screen is 0.5 mm. Find the separation between two coherent sources.

2. The plane of polarization of the plane polarized light is rotated through 6.5° in passing through a length of 2.0 decimeter of sugar solution of 5% concentration. Calculate the specific rotation of the sugar solution.
3. If the earth receives two cal min^{-1} cm^{-2} solar energy, what are the amplitudes of electric and magnetic fields of radiation. (Given Data : $\mu_0 = 4\pi \times 10^{-7}$ N/A^2 , $\varepsilon_0 = 8.85 \times 10^{-12}$ C^2/N-m^2)

Section C

Note: Attempt any three questions. **3X5=15**

1. Find the expression for the diameters of dark circular rings as obtained in the Newton's rings experiments. Discuss how these rings can be used to determine the wave length of light.
2. Obtain expression for the intensity of principal maxima due to N-slits diffraction grating. Also find the direction of principal maxima.
3. Explain the phenomenon of double refraction in a calcite crystal. Drive a general equation due to superposition of two plane polarized waves having perpendicular vibrations.
4. Using Maxwell's equations in free space, show that the electro-magnetic waves travel with the speed of light in vacuum.

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Printed Pages: 2 **University Roll No.....**

Mid-Term Examination, Odd Semester 2021-22

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

Subject Code: BPHS0002 **Subject**

Name: Engineering Physics

Time: 2 Hours **Maximum Marks: 30**

Section- A

Note: Attempt All Three Questions. $3 \times 2 = 6$ Marks

I. In an interference pattern, the ratio between the maximum and minimum intensities is 36:1. Calculate the ratio of amplitudes and intensities of interfering waves.

II. Distinguish between Fraunhofer and Fresnel class of diffraction.

III. Explain the phenomenon of double refraction. Also give suitable ray diagram in relation to the phenomenon.

Section – B

Note: Attempt All Three Questions. $3 \times 3 = 9$ Marks

I. What is Fresnel biprism? Giving a suitable ray diagram explain how does it create two coherent virtual sources?

II. What do you understand by optical activity? A sugar solution in a tube of length 20 cm produces an optical rotation of 13^0. The solution is then diluted to one third of its previous concentration. Find the optical rotation produced by 30 cm long tube containing the diluted solution.

III. Differentiate between interference and diffraction. In Fresnel biprism experiment, the angle of prism is $\pi/90$ radian and its refractive index is 1.5. A slit illuminated with monochromatic light is placed 20 cm behind the biprism and width of interference fringes on a screen 80 cm in front of biprism is found to be 8.25×10^{-3} cm. Calculate the wavelength of light used.

Section – C

Note: Attempt Any Three Questions. $3 \times 5 = 15$ Marks

I. Explain the formation of Newton's rings and deduce the expressions for the diameters of nth bright and dark rings formed in reflected light in Newton's ring experiment.

II. Derive the expression for the intensity distribution due to Fraunhofer diffraction at a single slit. Also find the positions of central maximum and minima formed in its diffraction pattern.

III. Define plane, circularly and elliptically polarised lights. Two plane polarised perpendicular vibrations are superposing with each other after emerging from a calcite crystal. Obtain the equation for locus of tip of resultant light vector formed due to their superposition. Also show that circularly polarised light is the special case elliptically polarised light.

IV(a) What are superconductors? Distinguish between Type-I and Type-II superconductors.

IV(b) Explain Meissner effect? Show that superconductors behave like perfect diamagnetic materials in their superconducting state.

Course Name: Engineering Physics

Course Outcomes

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.

Printed Pages: 2 **University Roll No. .....**

Mid Term Examination, Odd Semester 2022-23
Program: B. Tech., Year: I, Semester: I
Subject Code: BPHS0002, Subject: Engineering Physics

Time: 2 Hours **Maximum Marks: 30**

Section – A

Attempt All Questions 3 × 5 = 15 Marks

No.	Detail of Question	Marks	CO	BL	KL
1	Show that the phenomenon of interference follows the law of conservation of energy.	3	1	A	P
2	Two coherent waves of intensity ratio 9:1 interfere. Prove that in the interference, $\frac{I_{max}-I_{min}}{I_{max}+I_{min}}=\frac{3}{5}$.	3	1	A	P
3	Distinguish between interference and diffraction.	3	1	U	C
4	Define specific rotation. A sugar solution in a tube of length 20 cm produces an optical rotation of 13.9^0. The solution is then diluted to one third of its previous concentration. Find the optical rotation produced by 30 cm tube containing the dilute solution.	3	2	A	P
5	A biprism of obtuse angle 176^0 is made of glass of refractive index 1.5. A slit illuminated with monochromatic light is placed 20 cm behind the biprism and width of interference fringes formed on a screen 80 cm in front of biprism is found to be 8.25×10^{-3} cm. Calculate the wavelength of light used.	3	1	A	P

Section – B

Attempt All Questions $5 \times 3 = 15$ Marks

No.	Detail of Question	Marks	CO	BL	KL
6	(i) Deduce the temperature independent expression for conductivity of semiconductors in terms of concentration and mobilities of electrons and holes existing in them. (ii) Explain the following terms: (a) Superconductivity (b) Transition temperature	5	3	A	P
7	Light rays from two coherent sources superpose with each other on a screen placed at some distance from these sources. Derive the expression for the fringe width. Or Deduce the expression for the diameter of nth order dark ring forming in the Newton's ring experiment. Diameter of 4^{th} and 12^{th} dark rings in Newton's ring experiment are 0.400 cm and 0.700 cm respectively. Compute the diameter of 20^{th} dark ring.	5	1	A	P
8	Explain the Fraunhofer diffraction due to a single slit and obtain the expression for resultant intensity at a point in the diffraction pattern. Also find the intensity at central maximum and positions of minima forming in the diffraction pattern.	5	1	A	P

Course Name: Engineering Physics-I

Course Outcomes

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.

Printed Pages: 2 **University Roll No. .....**

Mid Term Examination, Even Semester 2022-23
Program: B. Tech., Year: I, Semester: II
Subject Code: BPHS 0002, Subject: Engineering Physics-I

Time: 2 Hours **Maximum Marks: 30**

Section – A

Attempt All Questions 3 × 5 = 15 Marks

No.	Detail of Question	Marks	CO	BL	KL
1	Two waves of amplitudes a_1 and a_2 having phase difference δ are superposing with each other. Deduce the expression for resultant intensity due to superposition of these waves.	3	1	A	P
2	In an interference pattern the ratio between maximum and minimum intensities is 36:1. Find the ratio between amplitude and intensities of the two interfering waves.	3	1	A	P
3	Distinguish between Fraunhofer and Fresnel class of diffraction.	3	1	U	C
4	Define the following terms: (i) Plane polarized light (ii) Polarisation (iii) Plane of vibration	3	2	R	F
5	Explain transition temperature. Transition temperature of Pb is 7.2 K. The critical magnet field of Pb at 5 K is 3.3×10^4 A/m. Estimate its critical magnetic field at 0 K.	3	3	A	P

Section – B

Attempt All Questions $5 \times 3 = 15$ Marks

No.	Detail of Question	Marks	CO	BL	KL
6	Explain Hall effect. Deduce the expression for Hall coefficient in terms of Hall voltage, thickness of the solid, current flowing in it and magnetic field applied. Hall coefficient of a conductor is 8.0×10^{-9} m^2/Coulomb. Calculate the concentration of electrons in it (Charge of electron(e) $=1.6\times10^{-19}$ Coulomb).	5	3	A	P
7	Obtain the expression for resultant intensity at a point in the diffraction pattern formed due to single a slit. Also find the direction of central maximum. Light rays of wavelength 5.5×10^{-5} cm are falling on a slit of width 22×10^{-5} cm. Compute the angular positions of first minima in the diffraction pattern lying on either side of central maximum. Or (i) Deduce the expression for the diameter of nth order bright ring forming in the Newton's ring experiment in reflected light. (ii) Light containing two wavelengths λ_1 and λ_2 fall normally on a Plano convex lens of radius of curvature R resting on a plane glass plate. If the n^{th} dark ring due to λ_1 coincides with $(n+1)^{th}$ dark ring due to λ_2, then prove that the radius of nth dark ring of wavelength λ_1 is $\sqrt{\frac{\lambda_1\lambda_2 R}{(\lambda_1-\lambda_2)}}$	5	1	A	P
8	Two perpendicular vibrations after emerging from a calcite crystal are superposing with each other. Find the equation of the locus of the resultant light vector forming due to superposition of these vibrations. Using it show that plane and circularly polarized lights are the special case of elliptically polarized light.	5	2	A	P