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

Course : B. Tech | **Sem. I**
Subject Name : Engineering Physics | **Subject Code : PHY1202**
Max. Marks : 60 | **Date 13/12/2018** | **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 ( ) infront 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 $A = \frac{f}{\sqrt{(\omega^2 - P^2)^2 + 4b^2p^2}}$	CO1	6
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 frquency 0.4999 MHz. The density of the quartz is 2.65 X 10^3 kg/m^3.	CO1	6
C) Explain with diagrams different types of polarization in dielectrics.	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 66^0 .	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 Heseinberg's Uncertainty Principle? If the uncertainty in position of an electron is 4 X 10^{-10} m. Calculate the uncertainty in its momentum	CO3	6
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 (3 1 1) plane in a simple cubic lattice whose lattice constant is 2.109 X 10^{-10} m.	CO4	6
B) State and prove Moseley's law. What is its importance?	CO4	6

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C) Derive an expression for electrmagnetic wave in free space and find the value of velocity of light in free space. CO6 6

Q.5 Solve the following.

A) Whar are magnetic domain and domain wall? Explain the B-H curve based on domain theory. CO5 6

B) Derive an expression for conductivity of a conductor interms of relaxation time of electron. CO3 6

End

Dr. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE- RAIGAD
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 $D_n \alpha \sqrt{n}$, 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 Schrodingers 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 X 10^{-5} and magnetic field in it is 10^4 A/m. (6)

OR

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

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

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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)

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*** End ***

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Mid Semester Examination – Oct 2018

Course: B. Tech in Mechanical and civil Engineering **Sem: I**

Subject Name: Engineering Physics **Subject Code: BTBS102**

Max Marks: 20 **Date:- 09/10/2018** **Duration:- 1 Hr.**

Instructions to the Students:

1. Figure to the right indicate full marks.
2. Illustrate your answers with neat sketches, diagrams etc.

		(Level/CO)	Marks
Q. 1	**Multiple choice Questions.**		**6**
	1. In S.H.M. velocity at equilibrium position is	**CO1**	
	a] minimum b] constant c] Maximum d] Zero		
	2. Oscillations become damped due to	**CO1**	
	a] Normal force b] Friction c] Tangential force d] Parallel force		
	3.Identify a good dielectric	**CO1**	
	a] Iron b] Ceramics c] Plastic d] Magnesium		
	4.Ruby laser is a	**CO2**	
	a] Gas laser b] Solid state laser c] Semiconductor laser d] None of these		
	5.Polarization of light establishes that light has	**CO2**	
	a) Wave nature b) Particle nature c) Transverse wave nature d) Longitudinal nature		
	6. In an optical fiber, the concept of Numerical aperture is applicable in describing the ability of _____	**CO2**	
	a] Light Collection b] Light Scattering c] Light Dispersion d] Light Polarization		
Q.2	**Solve Any Two of the following.**		**3 X 2**
(A)	Define ultra sonic waves? State the important properties of ultra sonic waves.	**CO1**	
(B)	Define specific rotation rotation and give the expression for it explaining every parameter.	**CO2**	
(C)	In Newton's Ring experiment, the diameter of 5th and 15th ring where found to be 33.6×10^{-4} m and 59×10^{-4} m respectively. Calculate the radius of curvature of the Plano-convex lens if the source of light used ($\lambda = 589.0$ nm).	**CO2**	
Q. 3	**Solve Any One of the following.**		
(A)	Describe Newton's Ring method for measuring the wavelength of monochromatic light and give the necessary theory.	**CO2**	**8**
(B)	Draw a neat diagram and explain the Piezo electric method for production of ultra sonic waves .Calculate the length of F_e rod needed to produce ultrasonic waves of frequency 20 KHz. Given- density = 7.23 gm /c.c. $Y = 11.6 \times 10^{10}$ N/m^2.	**CO1**	**6+2**

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Mid Semester Examination – Oct 2018

Course: B. Tech in Mechanical and civil Engineering **Sem: I**

Subject Name: Engineering Physics **Subject Code: BTBS102**

Max Marks: 20 **Date:- 09/10/2018** **Duration:- 1 Hr.**

Instructions to the Students:

1. Figure to the right indicate full marks.
2. Illustrate your answers with neat sketches, diagrams etc.

	(Level/CO)	Marks
Q. 1 Multiple choice Questions.		6
1. In S.H.M. velocity at equilibrium position is	**CO1**	
a] minimum b] constant c] Maximum d] Zero		
2. Oscillations become damped due to	**CO1**	
a] Normal force b] Friction c] Tangential force d] Parallel force		
3.Identify a good dielectric	**CO1**	
a] Iron b] Ceramics c] Plastic d] Magnesium		
4.Ruby laser is a	**CO2**	
a] Gas laser b] Solid state laser c] Semiconductor laser d] None of these		
5.Polarization of light establishes that light has	**CO2**	
a) Wave nature b) Particle nature c) Transverse wave nature d) Longitudinal nature		
6. In an optical fiber, the concept of Numerical aperture is applicable in describing the ability of	**CO2**	
a] Light Collection b] Light Scattering c] Light Dispersion d] Light Polarization		
Q.2 Solve Any Two of the following.		**3 X 2**
(A) Define ultra sonic waves? State the important properties of ultra sonic waves.	**CO1**	
(B) Define specific rotation rotation and give the expression for it explaining every parameter.	**CO2**	
(C) In Newton's Ring experiment, the diameter of 5th and 15th ring where found to be 33.6×10^{-4} m and 59×10^{-4} m respectively. Calculate the radius of curvature of the Plano-convex lens if the source of light used ($\lambda = 589.0$ nm).	**CO2**	
Q. 3 Solve Any One of the following.		
(A) Describe Newton's Ring method for measuring the wavelength of monochromatic light and give the necessary theory.	**CO2**	**8**
(B) Draw a neat diagram and explain the Piezo electric method for production of ultra sonic waves .Calculate the length of F_e rod needed to produce ultrasonic waves of frequency 20 KHz. Given- density = 7.23 gm /c.c. $Y = 11.6 \times 10^{10}$ N/m^2.	**CO1**	**6+2**

Dr. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY
LONERE – RAIGAD – 402103
End Semester Examination – December – 2017

Branch: F.Y. B.Tech. Semester: I

Subject: Engineering Physics (PHY103) Marks: 60

Date: 15 / 12 / 2017 Time: 3 Hrs.

Instructions to the Students:

1. Each question carries 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.

Q1. Attempt the following:

a. Obtain the differential equation of wave motion. (6)

b. What is Piezoelectric and Magnetostriction Effect? (4+2)

Calculate the natural frequency of 40 mm length of a pure iron rod. Given the density of pure iron is 7.25×10^3 kg/m^3 and its Young's Modulus is 115×10^9 N/m^2. Can you use it in magnetostriction oscillator to produce ultrasonic waves?

Q2. Attempt any TWO of the following:

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. (6)

b. What is double refraction? Explain the difference between ordinary ray (O-ray) and extra ordinary ray (e-ray). (6)

c. What is population inversion and stimulated emission? (4+2)

Calculate the acceptance angle of an optical fibre where the refractive index of core is 1.55 and that of cladding is 1.50.

Q3. Attempt the following:

a. With neat diagram explain principle and working of Bainbridge Mass Spectrograph. (6)

b. Derive the time independent Schrodinger's wave equation. (6)

Q4. Attempt the following:

a. Define atomic radius. Calculate atomic radii in SC, BCC and FCC lattices with suitable diagrams. (4+2)

Lead exhibits FCC structure. Each side of unit cell is of 4.95 Å. Calculate radius of lead atom.

OR

Dr.Babasaheb Ambedkar Technological University, Lonere.

Model Answer for Engg. Physics

14 march 2018

Mid Semester Examinations

Q.No. 1 Multiple Choice Questions 6 M

1. b

2. a

3. b

4. b

5. c

6. a

Q.No. 2 Attempt any one

1. Ruby Laser Diagram with Energy Level Diagram 2 M

   Explanation of experimental set up with active material, exciting system, resonant cavity 2 M

   Working with energy level diagram 2 M

2. Statement of HUP 2 M

   Proof of electron cannot exist in nucleus with calculation of K.E. of nucleus as T_{KE} = 20 Mev 4 M

   As this energy is very high for an electron to be remain present in nucleus, hence it cannot be inside nucleus but revolves around the nucleus.

Q.No. 3 Attempt any two

1. Definition of ultrasonic wave 1 M

   Density of Rod = 7.23×10^3 kg/m^3 , Y = 1.16×10^{11} N/m^2 , l = 2.6×10^{-2} m 3 M

$$f = \frac{n}{2l}\sqrt{Y/\rho}$$

$$f = \frac{1}{2\times 2.6\times 10^{-2}}\sqrt{\frac{1.16\times 10^{11}}{7.23\times 10^{3}}}$$

$f = 77$ KHz

2. Statement of Brewster's law $\mu = \tan\phi$ 1 M

Proof of reflected and refracted angle is 90^0 along with ray diagram 2 M

Numerical 1 M

$\mu = \tan\phi$

$\mu = \tan 62^0 24'$

$\mu = 1.9128$

3. Numericals

a. $\frac{e}{m} = \frac{v}{BR}$ 2 M

$$\frac{e}{m} = \frac{10^7}{10^{-2}\times 6\times 10^{-3}}$$

$$\frac{e}{m} = 1.67\times 10^{11}\ C/Kg$$

b. $\sin\Theta_0 = \sqrt{\mu_1^2 - \mu_2^2}$ 2 M

$\mu_2^2 = \mu_1^2 - \sin^2\Theta_0$

$\mu_2^2 = 1.4^2 - \sin^2 30^0$

$= 1.96 - 0.23$

$\mu_2 = 1.308$

a. Derive the relation between interplaner spacing 'd' defined by Miller Indices (hkl) and (4+2)
lattice parameter 'a'.
Calculate the interplaner spacing for (220) plane where the lattice constant is 4.038 A°.

b. What is X-ray? How do we get the continuous spectrum in X-rays explain. (4+2)
An X-ray is operated at 20 kv. Calculate the minimum wavelength of X-rays emitting from it.

Q5. Attempt the following:

a. On the basis of domain theory explain B-H curve and hence explain retentivity and (6)
coercivity.

b. What is Superconductivity? Explain Meissner Effect in Superconductors. (2+4)

Q6. Attempt the following:

a. What is Hall effect? Derive an expression for Hall Coefficient. (6)

b. Derive an expression for electromagnetic wave in free space and hence calculate the (6)
value of velocity of light in free space.

----- END OF PAPER -----

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

First Year B. Tech. (Electrical, Electronics and telecommunication, Computer, IT)

Mid Term Test – March 2017

Subject: Engineering Physics

Time: 1.00 Hr **Total Marks: 20**

Instructions: Solve any four.

Each question carries 5 marks

Q1). Set up differential equation for free oscillations and find its general solution.

Q2). What is Piezoelectric effect? Calculate the length of Fe rod needed to produce ultrasonic waves of frequency 20 kHz.
Given - density = 7.23 gm/c.c. , Y = 11.6×10^{10} N m^2

Q3). In case of Newton's rings, prove $D_n \propto \sqrt{n}$ where D_n is diameter of n^{th} dark ring.

Q4). What are matter waves? Prove $\lambda = \frac{h}{\sqrt{2mE}}$
Calculate wavelength of de Broglie's waves if a mass of 1 kg is moving with speed 10^3 m/s. Are these waves significant?

Q5). What is Metastable state? Find the fractional refractive index and numerical aperture for an optical fibre with refractive indices of core and cladding as 1.5 and 1.49 respectively.

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DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

First Year B. Tech. (Mechanical, Chemical, Civil, Petrochemical)

Unit Test – October 2016

Subject: Engineering Physics

Time: 1.00 Hr **Total Marks: 20**

Instructions: Solve any four.

Each question carries 5 marks.

Q1). Derive the differential equation of wave motion.

$$\frac{d^2y}{dt^2} = v^2 \frac{d^2y}{dx^2}$$

Q2). What is magnetostriction? Calculate the length of Ni rod needed to produce ultrasonic waves of frequency 40 kHz.
Given - density = 8.9 gm/c.c. , Y = 20.8 x 10^{10} N/m^2

Q3). Discuss interference of light in thin film for reflected rays

Q4). Find the relative population (N_2/N_1) of the two states in a ruby laser that produces a light beam of wavelength 6943 Å at 300 K.
Given – k = 1.38 x 10^{-23} J / K

Q5). What is angle of polarization & Brewster law? Calculate Brewster angle for glass (μ = 1.5) immersed in water (μ = 4/3)

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

First Year B. Tech. (Mechanical, Chemical, Civil, Petrochemical)

Unit Test – October 2016

Subject: Engineering Physics

Time: 1.00 Hr **Total Marks: 20**

Instructions: Solve any four.

Each question carries 5 marks.

Q1). Derive the differential equation of wave motion.

$$\frac{d^2y}{dt^2} = v^2 \frac{d^2y}{dx^2}$$

Q2). What is magnetostriction? Calculate the length of Ni rod needed to produce ultrasonic waves of frequency 40 kHz.
Given - density = 8.9 gm/c.c. , $Y = 20.8 \times 10^{10}$ N/m^2

Q3). Discuss interference of light in thin film for reflected rays.

Q4). Find the relative population (N_2/N_1) of the two states in a ruby laser that produces a light beam of wavelength 6943 Å at 300 K.
Given – $k = 1.38 \times 10^{-23}$ J / K

Q5). What is angle of polarization & Brewster law? Calculate Brewster angle for glass ($\mu = 1.5$) immersed in water ($\mu = 4/3$).

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

First Year B. Tech. (EXTC, Electrical, Computer and IT)

Summer End Semester Examination -2017

Subject: Engineering Physics

3 hour **Maximum Marks: 60**

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.

Q.1 Attempt the following

a) What is forced vibration? Obtain the differential equation of forced vibration and find the amplitude of forced vibration and its phase. 7

b) Calculate the length of an iron rod which can be used to produce ultrasonic waves of frequency 20 kHz 3

Given $Y = 11.6\times10^{10}\ N/m^2$, $\rho = 7.23\times10^{3}\ Kg/m^3$

Q.2 Attempt any one of the following.

a) Explain the theory of Newton's rings for reflected light. 7+3

Light of wavelength 5880 Å is incident on a thin film of glass (μ=1.5) such that the angle of refraction in the plate is 60°. Calculate the smallest thickness of plate which will make it dark by reflection 3.926×10^{-5} cm.

b) Explain the principle and working of Ruby laser. 7+3

Calculate the numerical aperture and acceptance angle of optical fibre of refractive index for core and cladding are 1.62 and 1.52 respectively.

Q.3 Attempt the following.

a) Describe Millikan's oil drop method for the determination of electronic charge. 7

b) If the uncertainty in position of an electron is $4\times10^{-10}m$. Calculate the uncertainty in its momentum. 3

Q.4 Attempt the following.

a) What is packing density? Find the packing density for SC, BCC and FCC lattices. 7

b) The interplaner spacing of (100) plane is 2 Å for a FCC crystal. Find the atomic radius. 3

Q.5 Attempt the following.

a) Derive an expression for conductivity of conducting materials in terms of relaxation time of electron. How does conductivity changes with temperature. 5

b) What is intensity of magnetization? Derive an expression for magnetic dipole moment of an atom. What is Bohr magnetron? Find the value of Bohr magnetron. 5

Q.6 Attempt any two of the following

a) What is Hall effect? Derive an expression for Hall Coefficient and mobility of charge carriers. 5

b) What is displacement current? Write Maxwell's equations in integral and differential form and give its physical significance. 5

c) The resistivity of Cu is $1.72\times10^{-8} ohm-m$. Calculate the mobility of electrons in Cu. Given: number of electrons per unit volume (n) $=10.41\times10^{28}/m^3$ 5

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE
First Year B. Tech. (Mechanical, Chemical, Civil and Petrochemical)
Winter End Semester Examination -2016
Subject: Engineering Physics

3 hour **Maximum Marks: 60**

Instructions to the students:

1. All questions are compulsory and each question carries 10 marks
2. Illustrate you 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.

Q.1 Attempt the following

a) Set up differential equation of forced vibration and prove 7

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

$$\theta = \tan^{-1}\left(\frac{2bp}{\omega^2 - p^2}\right)$$

b) Certain piezoelectric crystal of thickness 4mm produces ultrasonic waves of frequency 400 kHz. Calculate the thickness of this crystal to produce ultrasonic frequency of 500 kHz. 3

Q.2 Attempt the following

a) Explain the interference of light in wedge shaped film and prove that for air film 7

$$\beta = \frac{\lambda}{2\theta}$$

b) In Newton's rings experiment, the diameters of 5th and 15th rings were found to be 33.6 x 10^{-4} m and 59 x 10^{-4} m respectively. Calculate the radius of curvature of the Plano-Convex lens if the source of light is sodium (λ = 589.0 nm). 3

OR

Q.2 Attempt the following

a) Explain the principle and working of Ruby Laser. 7

b) Calculate the numerical aperture and hence the acceptance angle for an optical fiber. Given that the R.I. of the core and the cladding are 1.45 and 1.40 respectively. 3

Q.3 Attempt the following.

a) Describe Millikan's oil drop method for determination of electronic charge. 7

b) An electron is accelerated through 1000 volts and is reflected from a crystal. The first order reflection occurs when glancing angle is 70°. Calculate interplanar spacing of a crystal. 3

Q.4 Attempt the following.

a) Derive the relation between lattice constant and density of the cubic crystal. 7

b) Calculate the lattice constant of iron which has BCC structure.

Given $\rho = 7.86\ gm/cc$, A=55.85 3

Q.5 Attempt the following.

a) Derive an expression for magnetic dipole moment of an atom. What is Bohr magnetron and find its value. 7

b) What is Superconductivity? Explain Meissner effect and effect of external magnetic field on superconducting state of material. 3

Q.6 Attempt any two of the following.

a) What is Hall effect? Derive an expression for Hall Coefficient and mobility of charge carriers. 5

b) The conductivity and the Hall Coefficient of N-type semiconductor are 112 mho/m and 1.25 x 10^{-4} m^3/C respectively. Calculate the charge carrier density and electron mobility. 5

c) Derive an expression for electromagnetic wave in free space. Find the value of velocity of light in free space. 5

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DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

First Year B. Tech. (Mechanical, Chemical, Civil, Petrochemical)

Unit Test – October 2016

Subject: Engineering Physics

Time: 1.00 Hr **Total Marks: 20**

Instructions: Solve any four.

Each question carries 5 marks.

Q1). Derive the differential equation of wave motion.

$$\frac{d^2y}{dt^2} = v^2 \frac{d^2y}{dx^2}$$

Q2). What is magnetostriction? Calculate the length of Ni rod needed to produce ultrasonic waves of frequency 40 kHz.
Given - density = 8.9 gm c.c. , Y = 20.8 x 10^{10} N m^2

Q3). Discuss interference of light in thin film for reflected rays.

Q4). Find the relative population (N_2 N_1) of the two states in a ruby laser that produces a light beam of wavelength 6943 Å at 300 K.
Given – k = 1.38 x 10^{-23} J / K

Q5). What is angle of polarization & Brewster law? Calculate Brewster angle for glass (μ = 1.5) immersed in water (μ = 4/3).

DR. BABASAHEB AMBEDKAR [redacted] HNOLOGICAL UNIVERSITY, LONE[redacted]

First Year B. Tech. (Electrical, Electronics and telecommunication, Computer, IT)

Mid Term Test March 2017

Subject: Engineering Physics

Time: 1.00 Hr Total Marks: 20

Instructions: Solve any four

Each question carries 5 marks.

Q1) Set up differential equation for free oscillations and find its general solution

Q2) What is Piezoelectric effect? Calculate the length of Fe rod needed to produce ultrasonic waves of frequency 20 kHz.
Given - density = 7.23 gm c.c. , $Y = 11.6 \times 10^{10}$ N m^{-2}

Q3) In case of Newton's rings, prove $D_n \propto \sqrt{n}$ where D_n is diameter of n^{th} dark ring

Q4). What are matter waves? Prove $\lambda = \frac{h}{\sqrt{2mE}}$
Calculate wavelength of de Broglie's waves if a mass of 1 kg is moving with speed 10^3 m s. Are these waves significant?

Q5). What is Metastable state? Find the fractional refractive index and numerical aperture for an optical fibre with refractive indices of core and cladding as 1.5 and 1.49 respectively.

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DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

First Year B. Tech. (Electrical, Electronics and telecommunication, Computer, IT)

Mid Term Test March 2017

Subject: Engineering Physics

Time: 1.00 Hr Total Marks: 20

Instructions: Solve any four

Each question carries 5 marks.

Q1) Set up differential equation for free oscillations and find its general solution

Q2) What is Piezoelectric effect? Calculate the length of Fe rod needed to produce ultrasonic waves of frequency 20 kHz.
Given - density = 7.23 gm/c.c. , Y = 11.6×10^{10} N/m^2

Q3) In case of Newton's rings, prove $D_n \propto \sqrt{n}$ where D_n is diameter of n^{th} dark ring

Q4) What are matter waves? Prove $\lambda = \frac{h}{\sqrt{2mE}}$
Calculate wavelength of de Broglie's waves if a mass of 1 kg is moving with speed 10^3 m/s. Are these waves significant?

Q5) What is Metastable state? Find the fractional refractive index and numerical aperture for an optical fibre with refractive indices of core and cladding as 1.5 and 1.49 respectively.

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Total No. of Printed Pages: 2

SUBJECT CODE NO:- P- 186

FACULTY OF ENGINEERING AND TECHNOLOGY

F. E. (ALL) (CGPA) Mock Examination May/June 2018

Engineering Physics

(Revised)

(Time: Three Hours) **(Max. Mark: 80)**

" Please check whether you have got the right question Paper".

I. **Attempt Q. No. 1 from section A and Q. No. 6 from section B are compulsory.**

II. Solve any **two questions** from the remaining question **from each section A and B.**

III. Figures to the right indicate full marks.

IV. Use of non-programmable calculator is allowed.

Section- A

Q.1 Attempt any five questions from the following. **10**

a) what are positive rays? How they are generated.
b) Draw the block diagram of C.R.O.
c) What is the function of velocity selector in Bain bridge mass spectrograph.
d) Mention few applications of X-rays
e) State Bragg's Law. Write its formula.
f) Define the terms. quarter wave plate and Half wave plate.
g) What is isotope and messiner effect.
h) Write any four applications of magnetic materials.

Q.2 a) Discuss Thomson's parabolic method. To determine q'/m' of positive rays, where q' and m' are charge and mass of positive rays respectively. **07**
b) State and explain Bethes Law. **05**
c) A beam of X-rays $\lambda = 0.842\ A^0$ is incident on a crystal at a grazing angle of $8^0\ 35'$ when the first order Bragg's reflection occurs. Calculate the glancing angle for 3rd order reflection. **03**

Q.3 a)Obtain an expression for diameter of n^{th} dark and bright ring. **06**
b) Explain theory of plane transmission grating. **05**
c) How is the refractive index of thin film is determined by Michelson's interferometer? **04**

Q.4 a) Give the salient points of BCS theory. **05**
b) Explain type I & II superconductors. **05.**
c) What are parametric materials? Explain the important properties of parametric materials.

Q.5 Write a short notes on

a) Aston's mass spectrograph. 05

b) Laurent'z half shade polarimeter. 05

c) Magnetic domain and Hystress loop 05

Section-B

Q.6 Attempt any five question from the following. 10

a)State the important properties of matter waves.

b) State Heisen berg's uncertainty principle.

c) Distinguish between spontaneous and stimulated emission.

d) Define i) acceptance angle, II) Numerical aperture.

e) Define absorption co-efficient. Write Sabine's formula

f) What are the properties of ultra-sonic waves

g) What is CNT?

h) Explain the use of Nano particles in space and defense.

Q.7 a) What is Fermi energy? Obtain an expression for Fermi level in n-type extrinsic semiconductor. 05

b) State and explain Raman effect. 04

c) Derive Schrodinger time independent wave equation.

Q.8 a) Explain the construction and working of He-Ne Gas laser. 06

b) What are ultra-sonic waves? Explain the production of ultra-sonic waves by piezoelectric method. 06

c) A hall has a volume of 10000 m^3 and a reverberation time of 2 seconds. Find the total absorption of sound in hall. 03

Q.9 a) Explain the sol-gel method for synthesis of nano particles. 05

b) Explain the different properties of CNT. 05

c) Explain the use of nanotechnology in textile and cosmetics. 05

Q.10 Write a short note on 15

a) Fermi-dirac distribution function.

b) Acceptance angle & Acceptance cone

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