

(An Autonomous Institution Affiliated to University of Mumbai)

Re Examination for F.Y.BTech (Civil/Mechanical/Electrical) 2016-17

Even Semester

Total marks: 75

Duration: 3 Hrs

Class/Sem: F.Y.BTech (C/M/E) Sem-II

Subject: APPLIED PHYSICS-II

Course code: BT205

Master file.

- Attempt any FIVE questions out of SEVEN questions.
- Answers to all sub questions should be grouped together.
- Draw diagrams wherever necessary.
- Assume suitable data if necessary.
- Figures to the right indicate full marks, module number and course outcome number respectively.

Q. No.		Max Mark	CO No	Module No
1 (a)	Write a short note on Simple Cubic structure explaining its coordination number and atomic packing factor.	6	I	CO1
(b)	Explain the terms (i) susceptibility (ii) absolute permeability.	4	III	CO2
(c) 2	Explain divergence theorem and curl theorem.	5	IV	CO2
(a)	Differentiate between continuous and characteristic X-rays.	6	II	CO1
(b)	Derive Atomic packing factor for FCC structure.	4	I	CO1
(c)	A particle of rest mass m_0 has an energy $4m_0c^2$. Find the momentum in the units of m_0c . What is the energy of the particle in a frame in which its momentum is $2m_0c$?	5	V	CO3
(a)	Derive Bragg's equation in crystals.	6	II	CO1
(b)	A substance with FCC structure has density 6,250 kg/m ³ and molecular weight 60.2. Calculate the lattice constant a. Given Avogadro Number = 6.023x10 ²⁶ per kg mol	4	I	CO1
(c)	State Poisson's equation and Laplace's equation.	5	IV	CO2

Derive Gauss' law in integral and differential form and hence explain significance of the same.	6	IV	CO2
Two electrons are ejected in opposite directions from a radioactive sample in opposite directions, each having a speed 0.67c w.r.t the sample. Calculate the speed of one of the electron relative to the other classically and relativistically.	4	V	CO3
Differentiate between soft and hard magnetic materials.	5	III	CO2
Derive Lorentz transformation equations.	7	V	
Given: $\vec{E} = kr^3\hat{r}$ in a spherical distribution that has radius r where k is a constant. Find: (i) charge density ρ .	3	IV	CO2
Find the intercepts made by (322) plane on X, Y and Z axes. Given lattice constant is $2A^{\circ}$. Draw the plane.	5	I	CO1
Write a short note on HCP structure.	6	I	CO1
Find $\nabla \vec{r} $ where \vec{r} is position vector and using the result, prove that	4	IV	CO2
$\vec{\nabla} \times (\vec{\nabla} function) = 0.$			
Derive Curie-Weiss law for ferromagnetic materials.	5	III	CO2
Write a note on hysteresis in ferromagnetic materials.	6	III	CO2
Calculate the distance between two adjacent ions of KCl crystal which has an FCC structure. Given density of KCl = 1.99×10^3 kg/m ³ and molecular mass of KCl = 74.6 .	4	I	CO1
Explain how X-rays are produced using a Coolidge tube.	5	II	CO1
	Significance of the same. Two electrons are ejected in opposite directions from a radioactive sample in opposite directions, each having a speed $0.67c$ w.r.t the sample. Calculate the speed of one of the electron relative to the other classically and relativistically. Differentiate between soft and hard magnetic materials. Derive Lorentz transformation equations. Given: $\vec{E} = kr^3\hat{r}$ in a spherical distribution that has radius r where k is a constant. Find: (i) charge density ρ . Find the intercepts made by (322) plane on X, Y and Z axes. Given lattice constant is $2A^\circ$. Draw the plane. Write a short note on HCP structure. Find $\nabla \vec{r}$ where \vec{r} is position vector and using the result, prove that $\vec{\nabla} \times (\vec{\nabla} function) = 0$. Derive Curie-Weiss law for ferromagnetic materials. Calculate the distance between two adjacent ions of KCl crystal which has an FCC structure. Given density of KCl = 1.99×10^3 kg/m³ and molecular mass of KCl = 74.6 .	significance of the same. Two electrons are ejected in opposite directions from a radioactive sample in opposite directions, each having a speed 0.67c w.r.t the sample. Calculate the speed of one of the electron relative to the other classically and relativistically. Differentiate between soft and hard magnetic materials. 5 Derive Lorentz transformation equations. Given: $\vec{E} = kr^3 \hat{r}$ in a spherical distribution that has radius r where k is a constant. Find: (i) charge density ρ . Find the intercepts made by (322) plane on X, Y and Z axes. Given lattice constant is $2A^\circ$. Draw the plane. Write a short note on HCP structure. Find $\nabla \vec{r} $ where \vec{r} is position vector and using the result, prove that $\vec{\nabla} \times (\vec{\nabla} function) = 0$. Derive Curie-Weiss law for ferromagnetic materials. 5 Write a note on hysteresis in ferromagnetic materials. 6 Calculate the distance between two adjacent ions of KCl crystal which has an FCC structure. Given density of KCl = 1.99x10 ³ kg/m ³ and molecular mass of KCl = 74.6.	significance of the same. Two electrons are ejected in opposite directions from a radioactive sample in opposite directions, each having a speed $0.67c$ w.r.t the sample. Calculate the speed of one of the electron relative to the other classically and relativistically. Differentiate between soft and hard magnetic materials. Derive Lorentz transformation equations. Given: $\vec{E} = kr^3\hat{r}$ in a spherical distribution that has radius r where k is a constant. Find: (i) charge density p . Find the intercepts made by (322) plane on X, Y and Z axes. Given lattice constant is $2A^0$. Draw the plane. Write a short note on HCP structure. Find $\nabla \vec{r} $ where \vec{r} is position vector and using the result, prove that $\vec{\nabla} \times (\vec{\nabla} function) = 0$. Derive Curie-Weiss law for ferromagnetic materials. Significance of the same. 4 V Write a note on hysteresis in ferromagnetic materials. 5 III Write a note on hysteresis in ferromagnetic materials. 6 III Calculate the distance between two adjacent ions of KCl crystal which has an FCC structure. Given density of KCl = 1.99×10^3 kg/m³ and molecular mass of KCl = 74.6 .

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Staff file.

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Q. No.		Max Mark	CO No	Module No
1 (a)	Write a short note on Simple Cubic structure explaining its coordination number and atomic packing factor.	6	I	CO1
(b)	Explain the terms (i) susceptibility (ii) absolute permeability.	4	III	CO2
(c) 2	Explain divergence theorem and curl theorem.	5	IV	CO2
(a)	Differentiate between continuous and characteristic X-rays.	6	II	CO1
(b)	Derive Atomic packing factor for FCC structure.	4	I	CO1
(c)	A particle of rest mass m_0 has an energy $4m_0c^2$. Find the momentum in the units of m_0c . What is the energy of the particle in a frame in which its momentum is $2m_0c$?	5	V	CO3
3				
(a)	Derive Bragg's equation in crystals.	6	Π	CO1
(b)	A substance with FCC structure has density 6,250 kg/m ³ and molecular weight 60.2. Calculate the lattice constant a. Given Avogadro Number = 6.023x10 ²⁶ per kg mol	4	I	CO1
(c)	State Poisson's equation and Laplace's equation.	5	IV	CO2

4		6	IV	CO2
(a)	Derive Gauss' law in integral and differential form and hence explain significance of the same.	O	1 V	COZ
(b)	Two electrons are ejected in opposite directions from a radioactive sample in opposite directions, each having a speed 0.67c w.r.t the sample. Calculate the speed of one of the electron relative to the other classically and relativistically.	4	V	CO3
(c) 5	Differentiate between soft and hard magnetic materials.	5	III	CO2
(a)	Derive Lorentz transformation equations.	7	V	
(b)	Given: $\vec{E} = kr^3\hat{r}$ in a spherical distribution that has radius r where k is a constant. Find: (i) charge density ρ .	3	IV	CO2
(c)	Find the intercepts made by (322) plane on X, Y and Z axes. Given lattice constant is $2A^{\circ}$. Draw the plane.	5	Ι .	CO1
6		_	,	G01
(a)	Write a short note on HCP structure.	6	I	CO1
(b)	Find $\nabla \vec{r} $ where \vec{r} is position vector and using the result, prove that	4	IV	CO2
	$\overrightarrow{\nabla} \times (\overrightarrow{\nabla} function) = 0.$			
(c) ¹	Derive Curie-Weiss law for ferromagnetic materials.	5	III	CO2
7				
(a)	Write a note on hysteresis in ferromagnetic materials.	6	III	CO2
(b)	Calculate the distance between two adjacent ions of KCl crystal which has an FCC structure. Given density of KCl = 1.99×10^3 kg/m ³ and molecular mass of KCl = 74.6 .	4	I	CO1
(c)	Explain how X-rays are produced using a Coolidge tube.	5	II	CO1

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-				
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1				
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(c) 2	Explain divergence theorem and curl theorem.	5	IV	CO2
	Differentiate between continuous and characteristic X-rays.	6	II	CO1
(a)		4	Ī	CO1
(b) (c)	Derive Atomic packing factor for FCC structure. A particle of rest mass m_0 has an energy $4m_0c^2$. Find the momentum in	5	V	CO3
. 2	the units of m_0c . What is the energy of the particle in a frame in which its momentum is $2m_0c$?			
(2)	Derive Bragg's equation in crystals.	6	II	CO1
(a) (b)	A substance with FCC structure has density 6,250 kg/m ³ and molecular weight 60.2. Calculate the lattice constant a. Given Avogadro Number = 6.023x10 ²⁶ per kg mol	4	I	CO1
(c)	State Poisson's equation and Laplace's equation.	5	IV	CO2

4 (a)	Derive Gauss' law in integral and differential form and hence explain	6	IV	CO2
(u)	significance of the same.			
(b)	Two electrons are ejected in opposite directions from a radioactive sample in opposite directions, each having a speed 0.67c w.r.t the sample. Calculate the speed of one of the electron relative to the other classically and relativistically.	4	. V	CO3
(c) 5	Differentiate between soft and hard magnetic materials.	5	III	CO2
(a)	Derive Lorentz transformation equations.	7	V	
(b)	Given: $\vec{E} = kr^3\hat{r}$ in a spherical distribution that has radius r where k is a constant. Find: (i) charge density ρ .	3	IV	CO2
(c)	Find the intercepts made by (322) plane on X, Y and Z axes. Given lattice constant is $2A^{\circ}$. Draw the plane.	5	I	CO1
6				
(a)	Write a short note on HCP structure.	6	I	CO1
(b)	Find $\nabla \vec{r} $ where \vec{r} is position vector and using the result, prove that	4	IV	CO2
	$\overrightarrow{\nabla} \times (\overrightarrow{\nabla} function) = 0.$			
(c) ^x	Derive Curie-Weiss law for ferromagnetic materials.	5	III	CO2
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(a)	Write a note on hysteresis in ferromagnetic materials.	6	III	CO2
(b)	Calculate the distance between two adjacent ions of KCl crystal which has an FCC structure. Given density of KCl = $1.99 \times 10^3 \text{ kg/m}^3$ and molecular mass of KCl = 74.6 .	4	I	CO1
(c)	Explain how X-rays are produced using a Coolidge tube.	5	II	CO1

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Q. No.		Max Mark	CO No	Module No
1		11100		110
(a)	Write a short note on Simple Cubic structure explaining its coordination number and atomic packing factor.	6	I	CO1
(b)	Explain the terms (i) susceptibility (ii) absolute permeability.	4	III	CO2
(c) ⁻ 2	Explain divergence theorem and curl theorem.	5	IV	CO2
(a)	Differentiate between continuous and characteristic X-rays.	6	II	CO1
(b)	Derive Atomic packing factor for FCC structure.	4	I	CO1
(c)	A particle of rest mass m_0 has an energy $4m_0c^2$. Find the momentum in the units of m_0c . What is the energy of the particle in a frame in which	5	V	CO3
3	its momentum is 2m ₀ c?			
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(c)	State Poisson's equation and Laplace's equation.	5	IV	CO2

4 (a)	Derive Gauss' law in integral and differential form and hence explain significance of the same.	6	IV	CO2
(b)	Two electrons are ejected in opposite directions from a radioactive sample in opposite directions, each having a speed 0.67c w.r.t the sample. Calculate the speed of one of the electron relative to the other classically and relativistically.	4	V	CO3
(c) 5	Differentiate between soft and hard magnetic materials.	5	III	CO2
(a)	Derive Lorentz transformation equations.	7	V	
(b)	Given: $\vec{E} = kr^3\hat{r}$ in a spherical distribution that has radius r where k is a	3	IV	CO2
(c)	constant. Find: (i) charge density ρ . Find the intercepts made by (322) plane on X, Y and Z axes. Given lattice constant is $2A^{\circ}$. Draw the plane.	5	Ι .	CO1
6				
(a)	Write a short note on HCP structure.	6	I	CO1
(b)	Find $\nabla \vec{r}$ where \vec{r} is position vector and using the result, prove that	4	IV	CO2
	$\vec{\nabla} \times (\vec{\nabla} function) = 0.$			
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(a)	Write a note on hysteresis in ferromagnetic materials.	6	III	CO2
(b)	Calculate the distance between two adjacent ions of KCl crystal which has an FCC structure. Given density of KCl = 1.99×10^3 kg/m ³ and molecular mass of KCl = 74.6 .	4	Ι	CO1
(c)	Explain how X-rays are produced using a Coolidge tube.	5	II	CO1