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Bharatiya Vidya Bhavan's
SARDAR PATEL COLLEGE OF ENGINEERING

(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.

Good luck!

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)	Explain divergence theorem and curl theorem.	5	IV	CO2
2				
(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_o 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	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 = 6.023×10^{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 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)	Differentiate between soft and hard magnetic materials.	5	III	CO2
5				
(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 $\nabla\lvert\vec{r}\rvert$ where $\vec{r}$ is position vector and using the result, prove that $\vec{\nabla}\times(\vec{\nabla}\,function) = 0$.	4	IV	CO2
(c)	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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(a)	Write a short note on HCP structure.	6	I	CO1
(b)	Find $\nabla\lvert\vec{r}\rvert$ where $\vec{r}$ is position vector and using the result, prove that $\vec{\nabla} \times (\vec{\nabla} function) = 0$.	4	IV	CO2
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