

Code No: R07A1BS05

R07**Set No. 2****I B.Tech Examinations, December 2010****APPLIED PHYSICS****Common to BME, IT, ICE, E.COMP.E, ETM, E.CONT.E, EIE, CSE, ECE, CSSE, EEE****Time: 3 hours****Max Marks: 80****Answer any FIVE Questions
All Questions carry equal marks**

1. (a) What are the differences between 'photography' and 'holography'?
- (b) What is recording and reconstruction of a hologram? Explain. [6+10]
2. (a) What are Miller indices? How are they obtained?
- (b) Show that FCC is the most closely packed out of the three cubic structures by calculating the packing factors.
- (c) Copper has FCC structure and the atomic radius is 0.1278 nm. Calculate the interplanar spacing for (1 1 1) and (3 2 1) planes. [4+8+4]
3. (a) Explain the following:
 - i. electrical conductivity and
 - ii. Fermi energy.
- (b) Explain briefly the classical free electron theory of metals.
- (c) On the basis of band theory how the crystalline solids are classified into metals, semiconductors and insulators? [4+6+6]
4. (a) Describe the various methods to achieve population inversion relating to lasers.
- (b) With the help of a suitable diagram, explain the principle, construction and working of a semiconductor laser. [6+10]
5. (a) Write a note on extrinsic semiconductors.
- (b) Derive an expression for the carrier concentration in p-type extrinsic semiconductors. [6+10]
6. (a) Explain the following:
 - i. Polarization vector and
 - ii. Electric displacement.
- (b) Deduce an expression for Lorentz field relating to a dielectric material.
- (c) The radius of the helium atom is $0.55 \text{ \AA}$. Calculate the polarizability of He and its relative permittivity. The number of He atoms in a volume of one metre cube is 2.70×10^{25} atoms. [permittivity of free space = $8.85 \times 10^{-12} \text{ F/m}$] [4+8+4]
7. (a) What is Planck's quantum theory? Explain in detail.

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(b) Write short notes on:

- i. de Broglie hypothesis and
- ii. Heisenberg's uncertainty principle.

[8+8]

8. (a) Why nanomaterials exhibit different properties? Explain.

(b) Describe the various types of carbon nanotubes.

[10+6]

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R07**Set No. 4****I B.Tech Examinations, December 2010****APPLIED PHYSICS****Common to BME, IT, ICE, E.COMP.E, ETM, E.CONT.E, EIE, CSE, ECE, CSSE, EEE****Time: 3 hours****Max Marks: 80****Answer any FIVE Questions
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 - i. electrical conductivity and
 - ii. Fermi energy.
- (b) Explain briefly the classical free electron theory of metals.
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- (c) Copper has FCC structure and the atomic radius is 0.1278 nm. Calculate the interplanar spacing for (1 1 1) and (3 2 1) planes. [4+8+4]
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- (b) Derive an expression for the carrier concentration in p-type extrinsic semiconductors. [6+10]
6. (a) What is Planck's quantum theory? Explain in detail.
- (b) Write short notes on:
 - i. de Broglie hypothesis and
 - ii. Heisenberg's uncertainty principle. [8+8]
7. (a) Why nanomaterials exhibit different properties? Explain.
- (b) Describe the various types of carbon nanotubes. [10+6]
8. (a) Explain the following:
 - i. Polarization vector and

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- ii. Electric displacement.
- (b) Deduce an expression for Lorentz field relating to a dielectric material.
- (c) The radius of the helium atom is $0.55 \text{ \AA}$. Calculate the polarizability of He and its relative permittivity. The number of He atoms in a volume of one metre cube is 2.70×10^{25} atoms. [permittivity of free space = $8.85 \times 10^{-12} \text{ F/m}$]
[4+8+4]

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(b) Derive an expression for the carrier concentration in p-type extrinsic semiconductors. [6+10]
2. (a) What are the differences between 'photography' and 'holography'?
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 - i. Polarization vector and
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 (b) Deduce an expression for Lorentz field relating to a dielectric material.
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(c) On the basis of band theory how the crystalline solids are classified into metals, semiconductors and insulators? [4+6+6]

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(b) With the help of a suitable diagram, explain the principle, construction and working of a semiconductor laser. [6+10]
8. (a) Why nanomaterials exhibit different properties? Explain.
(b) Describe the various types of carbon nanotubes. [10+6]

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R07**Set No. 3****I B.Tech Examinations, December 2010****APPLIED PHYSICS****Common to BME, IT, ICE, E.COMP.E, ETM, E.CONT.E, EIE, CSE, ECE, CSSE, EEE****Time: 3 hours****Max Marks: 80****Answer any FIVE Questions
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- (b) Deduce an expression for Lorentz field relating to a dielectric material.
- (c) The radius of the helium atom is $0.55 \text{ \AA}$. Calculate the polarizability of He and its relative permittivity. The number of He atoms in a volume of one metre cube is 2.70×10^{25} atoms. [permittivity of free space = $8.85 \times 10^{-12} \text{ F/m}$]
[4+8+4]
2. (a) What are the differences between 'photography' and 'holography'?
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5. (a) What is Planck's quantum theory? Explain in detail.
- (b) Write short notes on:
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6. (a) Describe the various methods to achieve population inversion relating to lasers.
- (b) With the help of a suitable diagram, explain the principle, construction and working of a semiconductor laser. [6+10]
7. (a) Write a note on extrinsic semiconductors.
- (b) Derive an expression for the carrier concentration in p-type extrinsic semiconductors. [6+10]
8. (a) Explain the following:

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- i. electrical conductivity and
 - ii. Fermi energy.
- (b) Explain briefly the classical free electron theory of metals.
- (c) On the basis of band theory how the crystalline solids are classified into metals, semiconductors and insulators? [4+6+6]

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