

Code No: R07A1BS05

R07**Set No. 2**

I B.Tech Examinations, December 2010

APPLIED PHYSICSCommon 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 Å. 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 = 8.85×10^{-12} 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**

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CSSE, EEE

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (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]
2. (a) What are the differences between 'photography' and 'holography'?
- (b) What is recording and reconstruction of a hologram? Explain. [6+10]
3. (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]
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) 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 \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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R07**Set No. 1**

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CSSE, EEE

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Write a note on extrinsic semiconductors.
(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'?
(b) What is recording and reconstruction of a hologram? Explain. [6+10]
3. (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 \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]
4. (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]
5. (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]
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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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7. (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]
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**

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CSSE, EEE

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (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 \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'?
- (b) What is recording and reconstruction of a hologram? Explain. [6+10]
3. (a) Why nanomaterials exhibit different properties? Explain.
- (b) Describe the various types of carbon nanotubes. [10+6]
4. (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]
5. (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]
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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