05/06/18 FN

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 40065

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018
Second Semester
Computer Science and Engineering
PH 8252 – PHYSICS FOR INFORMATION SCIENCE
(Common to Information Technology)
(Regulations 2017)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A (10×2=20 Marks)

1. How does the classical free electron theory lead to Ohm's law ?
2. Explain the concept of hole in semiconductors.
3. Distinguish between direct and indirect band in semiconductor.
4. You are given a piece of extrinsic semiconductor. How will you find to which type it belongs ?
5. Derive the relation between magnetic susceptibility and relative permeability.
6. Which material would you use for the hard drive and for a power generator ?
7. Discuss absorption of light by semiconductors.
8. What are the optical properties ?
9. What do you understand by quantum confinement ?
10. What are the Nanodevices ?

PART – B (5×16=80 Marks)

11. a) Deduce a mathematical expression for electrical conductivity of a conducting material and hence obtain Wiedemann-Franz Law. (10+6)

(OR)

b) What is density states ? Derive an expression for the density of states. (2+14)

12. a) Derive an expression for the carrier concentration in N-type and P-type semiconductors. (8+8)

(OR)

b) Explain with a sketch the variation of Fermi level with temperature and concentration impurities in P and N type semiconductors. (8+8)

13. a) Compare and contrast the different types of magnetic materials and mention their properties and applications. (16)

(OR)

b) Explain the domain theory of ferromagnetism. Using that how will you explain the properties of ferromagnetic materials. (16)

14. a) Explain the theory and working of LED. What are the advantages of using LED in electronic display ? (16)

(OR)

b) What is a solar cell ? Discuss in detail the construction and working of solar cell. Mention the applications of solar cell. (16)

15. a) Explain an experimental method used to measure the Hall coefficient of a specimen. Discuss in the principle and working of magnetic hard disk. (8+8)

(OR)

b) Draw energy band diagram for the p-n junction diode. Discuss in detail the operation and applications of single electron transistor. (6+10)

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 80285

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Second Semester

Computer Science and Engineering

PH 8252 — PHYSICS FOR INFORMATION SCIENCE

(Common to Information Technology)

(Regulation 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State Wiedemann-Franz law.
2. Distinguish between electron rest mass and effective mass.
3. How does the carrier concentrations in semiconductors vary with temperature?
4. Outline the features of Schottky diode.
5. Show the magnetic dipole alignment in ferro, anti-ferro and ferrimagentism.
6. What are magnetic domains?
7. Comment on the blue color of the sky.
8. Why organic LED is called so?
9. Define the term quantum confinement.
10. List the various low dimensional systems.

PART B — (5 × 16 = 80 marks)

11. (a) Explain the Classical free electron model of materials and deduce an expression for the electrical conductivity. Also discuss the success and failures of this model.

Or

(b) (i) Contrast the terms degenerate and non- degenerate states. (6)

(ii) Derive the energy value of a particle in a three dimensional box. (10)

12. (a) (i) Discuss the direct and indirect band gap semiconductors. (10)

(ii) Silicon crystal is doped with atoms 5×10^{20} per m^3. The donor level is 0.05 eV from the edge of the conduction band. Taking the band gap to be 1.12 eV, calculate the position of the Fermi level at 200 K. (6)

Or

(b) (i) Describe Hall effect. Mention its significances. (10)

(ii) A semiconducting crystal, 12 mm long, 5 mm wide and 1 mm thick, has a magnetic flux density of 0.5 Weber/m^2 applied from front to back perpendicular to the largest faces. When current of 20 mA flows lengthwise through the specimen, the voltage measured across its width is found to be 37 μV. What is the Hall coefficient of this semiconductor? (6)

13. (a) (i) Categorize magnetic materials and tabulate its properties and applications. (12)

(ii) The magnetic susceptibility of silicon is -0.4×10^{-5}. Calculate the flux density and magnetic moment per unit volume when field of intensity 5×10^5 A/m is applied. (4)

Or

(b) (i) Draw the Hysteresis curve of typical ferromagnetic materials and explain it through domain concept. (10)

(ii) Identify the relevant magnetic properties used for memory storage. (6)

14. (a) (i) Explain the terms associated with optical materials (12)

(1) Luminescence

(2) Kerr effect

(3) Recombination.

(ii) Compare the absorption, emission and scattering of light in metals and semiconductors. (4)

Or

(b) Illustrate the working and I-V characteristics of (i) Solar cell and (ii) Organic LEDs and (iii) laser diodes.

15. (a) (i) Define Fermi energy and explain how it depends on the size of the materials? (4)

(ii) Demonstrate the effect of quantum confinement in low dimensional systems and Obtain the expression for DOS. (12)

Or

(b) Describe the construction and working of (i) nano diodes (ii) SET (iii) Quantum dot lasers.

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B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018
Second Semester
Computer Science and Engineering
PH 8252 – PHYSICS FOR INFORMATION SCIENCE
(Common to Information Technology)
(Regulations 2017)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A (10×2=20 Marks)

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2. Explain the concept of hole in semiconductors.
3. Distinguish between direct and indirect band in semiconductor.
4. You are given a piece of extrinsic semiconductor. How will you find to which type it belongs ?
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6. Which material would you use for the hard drive and for a power generator ?
7. Discuss absorption of light by semiconductors.
8. What are the optical properties ?
9. What do you understand by quantum confinement ?
10. What are the Nanodevices ?

PART – B (5×16=80 Marks)

11. a) Deduce a mathematical expression for electrical conductivity of a conducting material and hence obtain Wiedemann-Franz Law. (10+6)

(OR)

b) What is density states ? Derive an expression for the density of states. (2+14)

12. a) Derive an expression for the carrier concentration in N-type and P-type semiconductors. (8+8)

(OR)

b) Explain with a sketch the variation of Fermi level with temperature and concentration impurities in P and N type semiconductors. (8+8)

13. a) Compare and contrast the different types of magnetic materials and mention their properties and applications. (16)

(OR)

b) Explain the domain theory of ferromagnetism. Using that how will you explain the properties of ferromagnetic materials. (16)

14. a) Explain the theory and working of LED. What are the advantages of using LED in electronic display ? (16)

(OR)

b) What is a solar cell ? Discuss in detail the construction and working of solar cell. Mention the applications of solar cell. (16)

15. a) Explain an experimental method used to measure the Hall coefficient of a specimen. Discuss in the principle and working of magnetic hard disk. (8+8)

(OR)

b) Draw energy band diagram for the p-n junction diode. Discuss in detail the operation and applications of single electron transistor. (6+10)

Reg. No. :

Question Paper Code : 90499

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019
Second Semester
Computer Science and Engineering
PH8252 – PHYSICS FOR INFORMATION SCIENCE
(Common to Information Technology)
(Regulations 2017)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. Write down the expression for electrical conductivity of a metallic conductor.
2. Which statistics can be used for explaining energy distribution in conductors? Write down the expression.
3. Draw the energy band diagram for an intrinsic semiconductor with necessary parameters.
4. Differentiate between direct and indirect band gap materials.
5. Define magnetic permeability and susceptibility.
6. What are hard and soft magnetic materials ? Give examples for both.
7. Discuss the absorption, emission and scattering of light in metals.
8. How LASER is different from LED ?
9. What is quantum confinement ?
10. What is a single electron transistor ? How does it work ?

PART – B **(5×16=80 Marks)**

11. a) Discuss the classical free electron theory in detail. What are the success and failures of this theory ?

(OR)

b) Derive an expression for the density of single-particle states as a function of energy for a free electron gas in three dimension.

12. a) Derive an expression for carrier concentration in intrinsic semiconductors.

(OR)

b) Discuss the variation of Fermi level with temperature and impurity concentration with the help of neat diagrams.

13. a) How materials can be classified according to their magnetic properties ? Describe them with examples.

(OR)

b) What are GMR sensors ? Explain their applications in digital storage media with necessary diagrams.

14. a) Discuss the carrier generation and recombination processes in semiconductor devices with neat diagram.

(OR)

b) What is photo-current ? How photo-current is generated in a P-N junction diode ?

15. a) How nanomaterials are different from bulk materials? Discuss the basic properties of nanomaterials.

(OR)

b) What are carbon nanotubes ? Explain their properties and applications in detail.