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ANNA UNIVERSITY CHENNAI; CHENNAI 600 025
B.E./B.Tech. (Full Time) DEGREE EXAMINATION, APRIL/MAY 2011
II SEMESTER

Common to E & I and EEE
PH9167-Physics of Electrical and Electronic Materials
(Regulation 2008)

Time : 3 Hours

Max Marks : 100

Answer All Questions
Part – A (10 x 2 = 20 Marks)

1. What are the merits and demerits of classical free electron theory of metals?
2. At what temperature we can expect 10% probability that an electron in silver have energy which is 2% above the $E_F = 5\text{eV}$.
3. Distinguish between direct and indirect band gap semiconductors.
4. Draw the typical energy level diagram for Ohmic contact and Schottky diode.
5. What are the different types of polarization in dielectrics?
6. State the Gauss's law at the dielectric boundary.
7. What is Bohr Magneton? Mention its unit.
8. What is superconductivity? List out any two property changes that occur at superconducting state.
9. What is meant by group velocity and group index?
10. Define the term: Luminescence.

Part B (5 x 16 = 80 Marks)

11. (i) Compare the properties of dia, para and ferro magnetic materials.
(ii) Explain the Hysteresis in ferromagnetic materials by domain theory.
(iii) Distinguish between hard and soft magnetic materials. (4+8+4)

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i) Write the response which best reflects the meaning of the text: (6 x 1 = 6)

1. Adam Smith's eighteenth century definition of class was invalidated by

- A. Karl Marx.
- B. The nineteenth century working class.
- C. The social influence of farmers and peasants.
- D. Successive stages of the industrial revolution.

2. During the nineteenth century, many intermediate groups grew up

- A. Between the upper class and the middle class.
- B. Between the working class and the upper middle class.
- C. Within the working class.
- D. Within the aristocracy.

3. The writer regards doctors and teachers as

- A. Middle class.
- B. Working class.
- C. Upper class.
- D. Independent groups outside society.

4. Karl Marx developed his two-class theory

- A. In spite of the farmers and peasants.
- B. Even though new sub-classes were appearing in his day.
- C. Making special allowance for doctors and salaried employees.
- D. With reference to European societies only.

5. Marx's theory of social class was

- A. Oversimplified by the bourgeoisie.
- B. Influential because it was oversimplified.
- C. Influential in spite of being oversimplified.
- D. Not widely known in the nineteenth century.

6. The 'new rich'

- A. Often married into the upper class.
- B. Despised the upper class.
- C. Were often men of initiative and intelligence.
- D. Seldom allowed their children to mix with the upper class.

ii) State whether the following statements are true or false: (4 x 1 = 4)

1) The children of the 'new rich' despised their parents.

2) A 'white-collar' occupation represents social advance for a labourer's son.

3) In the twentieth century class differences have been partly smoothed out by taxation, social services and education.

4) Though a classless society has yet to be perfected, an attempt has been made to provide equal rights.

iii) Choose the definition which best reflects the meaning of the word as it is used in the text: (6 x 1 = 6)

1. successive
A. successful
B. following
C. increasing
D. yearly
2. intermediate
A. in between
B. of average difficulty
C. uncertain
D. vague
3. camps
A. villages
B. holiday accommodation
C. tent sites
D. sections
4. make-up
A. composition
B. progress
C. disguise
D. cosmetics
5. thrifty
A. cunning
B. careful with money
C. quick-witted
D. thirsty
6. elastic
A. made of rubber
B. tightly constricting
C. long lasting
D. not too rigid

12. a) Read the following advertisement published in 'The Hindu' and write a letter of application. Enclose your resume with the letter of application. (16)

<p>Galaxy Systems We require 'Software Developers'</p> <ul style="list-style-type: none">❖ Educational qualification: B.E. / B.Tech.❖ Experience: Minimum 2 years <p>Send your application to: The Executive Director, Galaxy Systems 110. Mount Road. Chennai – 600 002</p>

- b) (i). What is desalination? Discuss the reverse osmosis method of desalination (8)
- (ii) Explain the various steps for the purification of water for municipal supply? (8)
13. a) (i) What are the differences between thermoplastic and thermosetting resins with two examples? (8)
- (ii) Give preparation, properties and uses of Bakelite and polyamides (8)
- (or)
- b) (i) What are the disadvantages of natural rubber? Explain the process of vulcanization of rubber. (8)
- (ii) Give Preparation, properties and uses of epoxy resins and polystyrene? (8)
14. a) (i) What are paints? What are the constituents of paint? Mention their functions with example. (8)
- (ii) Write in detail about differential aeration corrosion and stress corrosion (8)
- (or)
- b) (i) What is cathodic protection? Discuss with example how steel is protected from corrosion cathodically. (8)
- (ii) Explain the mechanism of dry corrosion. Explain the role of oxide film in dry corrosion. (8)
15. a) (i) Explain the setting and hardening of cement with chemical reactions involved. (8)
- (ii) What are ceramic matrix composites? Give its properties and uses. (8)
- (or)
- b) (i) What are metal matrix composites? Give its properties and uses. (8)
- (ii) What are refractories? How they are classified? What are the important properties of refractories? (8)
