KUMARAGURU
college of technology
character is life

GENERAL INSTRUCTIONS TO THE CANDIDATES

1. Candidates are instructed to answer the questions as per Bloom's Taxonomy knowledge level (K_1 to K_6)
2. Candidates are strictly instructed not to write anything in the question paper other than their roll number.
3. Candidates should search their pockets, desks and benches and handover to the Hall Superintendent/ Invigilator if any paper, book or note which they may find therein as soon as they enter the examination hall.
4. Candidates are not permitted to bring electronic watches with memory, laptop computers, personal systems, walkie-talkie sets, paging devices, mobile phones, cameras, recording systems or any other gadget / device /object that would be of unfair assistance to him / her.
5. Corrective measures as per KCT examination policies will be imposed for malpractice in the hall like copying from any papers, books or notes and attempting to elicit the answer from neighbours.

B.TECH DEGREE EXAMINATIONS: JUNE 2016

(Regulation 2015)

Second Semester

BIOTECHNOLOGY

U15PHT206:Applied Physics

COURSE OUTCOMES

CO1: Apply core concepts in Materials Science to solve engineering problems
CO2: Determine the position of the acceptor or donor levels and the band gap of an extrinsic semiconductor
CO3: Classify & differentiate the structure and physical properties of conducting materials
CO4: Apply the techniques to manufacture of modern materials and nano materials for engineering applications
CO5: Sketch the skills and techniques for biotechnological and medical applications.

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1.   Match the List I with List II   CO1   [K_1]

	List I	List II
A.	To determine the probability of filling of electron	1.Current density
B.	The product of drift velocity and collision time	2.Fermi function
C.	The current flowing per unit area	3.Josephson effect
D.	Micro waves	4.Mean free path

	A	B	C	D
a)	1	3	4	2
b)	4	2	1	3
c)	2	4	1	3
d)	3	4	2	1

2. The unit of Lorentz number is   CO1 [K₁]

   a) W/m/K   b) $W\Omega K^{-2}$

   c) Wm^{-2} d) $W/m/\Omega$

3. Beta rays are   CO5 [K₁]

   a) Positive charged particles   b) Acoustic waves

   c) Negative charged particles.   d) Positively electromagnetic waves

4. The principle used in ultrasonic scanning   CO5 [K₁]

   a) reflection   b) scatteing

   c) refraction   d) diffraction

5. Consider the following statements   CO3 [K₂]
   1. The electronic polarization decreases with increase in temperature.
   2. The orientation polarization decreases with increase in temperature.
   3. The Space charge polarization decreases with increase in temperature.
   4. The Ionic polarization is independent of temperature.
   Which of following statements are correct?

   a) 2,3   b) 1,3

   c) 1,2,3   d) 2,4

6. Magnetic recording tape is most commonly made from   CO3 [K₁]

   a) Silver nitrate   b) Silicon-iron

   c) Diamagnetic material   d) Ferric oxide

7. The following items consists of two statements, one labeled as the "Assertion(A)"   CO2 [K₁]
   and other as "Reason(R)".Examine these two statements and select the answers
   from the following codes.
   Assertion (A): Recombination of electron and hole takes place directly in compound
   semiconductors.
   Reason(R): Compound semiconductors are used for making LED and laser diodes.

   a) Both A and R are individually true but R is correct reason for A   b) A is false but R is true

   c) A is true but R is false   d) Both A and R are individually true but R is not correct reason for A

8. Example for Metal –Metalloid metallic glass is   CO4 [K$_1$]

a) Cu-Ni   b)

c) Fe-C   d) Cu-Zr

9. Sequence the following sentences in variation of carrier concentration of p-type semiconductors.   CO2 [K$_3$]

1. In saturation temperature range the hole concentration in valence band is equal to acceptor impurity concentration.

2. For slight temperature rise electrons jumped to acceptor level.

3. At very high temperatures whole concentration in valence band increases and intrinsic process exceeds.

4.The acceptor level is vacant and valence band full at low temperature

a) 2-4-1-3   b) 4-1-3-2

c) 4-2-1-3   d) 3-1-4-2

10. Metallic glasses used as transformer core material because of their   CO4 [K$_1$]

a) Soft magnetic property   b) Hard magnetic property

c) Diamagnetic property   d) Paramagnetic property

PART B (10 x 2 = 20 Marks)

(Answer not more than 40 words)

11. Define thermal conductivity.   CO1 [K$_1$]

12. Recognize the impact of isotope mass in the critical field of superconductors?   CO1 [K$_2$]

13. Determine the intrinsic carrier concentration in pure silicon, if its conductivity is 5×10^{-4} Ω/m,electron mobility is $0.14 m^2$/Vs and hole mobility is $0.05 \ m^2$/Vs.   CO2 [K$_2$]

14. What do you infer from the sign of Hall co efficient?   CO2 [K$_2$]

15. A magnetic material has a magnetization of 3000 A/m and flux density of $0.044 \ wb \ / \ m^2$. Calculate the magnetizing force of the material.   CO3 [K$_2$]

16. All the insulators are not Dielctrics.Justify the statement.   CO3 [K$_2$]

17. Identify Pseudo elasticity.   CO4 [K$_1$]

18. What is meant by Top down approach involved in the preparation of nano materials?   CO4 [K$_1$]

19. List out the scanning methods involved in ultrasonic scanning.   CO5 [K$_1$]

20. Give a note on Geiger Muller counter.   CO5 [K$_1$]

Answer any FIVE Questions:-

PART C (5 x 14 = 70 Marks)

(Answer not more than 300 words)

Q.No. 21 is Compulsory

21.	Define intrinsic semiconductor. Derive an expression for carrier concentration in an intrinsic semiconductor.		CO2 [K$_1$]
22.	(i).Derive an expression for electrical conductivity based on classical free electron theory. Deduce Wiedemann Franz law.	(10)	CO1 [K$_1$]
	(ii).The critical temperature of a super conducting material is 2.5K at zero magnetic field and it has a critical field of 0.04Tesla.Calculate the critical field at 3K.	(4)	CO1 [K$_2$]
23.	(i).Determine the Hall coefficient in n type and p type semiconductors.	(7)	CO2 [K$_1$]
	(ii) Discuss the experiment set up to obtain Hall coefficient.	(7)	CO2 [K$_1$]
24.	Explain in detail about the Langevin's theory of Paramagnetism.		CO3 [K$_1$]
25.	What are metallic glasses? Explain the preparation, properties and application of metallic glasses.		CO4 [K$_1$]
26.	(i).Explain the construction and working of Gamma Camera.	(10)	CO5 [K$_1$]
	(ii).What is PCG? Mention the applications of PCG.	(4)	CO5 [K$_1$]
27.	(i.)Derive an expression for the density of energy states.	(10)	CO1 [K$_1$]
	(ii)A uniform silver wire has a resistivity of 1.54×10^{-8} Ω m at room temperature. For an electric field along the wire of 1 volt/cm, compute the average drift velocity of electron assuming that there are 5.8×10^{28} conduction electrons/m^3. Also calculate mobility.	(4)	CO1 [K$_2$]

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