Register Number:……..

KUMARAGURU
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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 2015

(Regulation 2014)

Second Semester

BIOTECHNOLOGY

U14PHT206 : APPLIED PHYSICS

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Matching type item with multiple choice code [K_1]

List I	List II
A. Mobility	i. $\Omega^{-1}m^{-1}$
B. Thermal Conductivity	ii. $m^2V^{-1}s^{-1}$
C. Electrical Conductivity	iii. $W\Omega K^{-2}$
D. Lorentz Number	iv. $Wm^{-1}K^{-1}$

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

2. At very high temperature, the mean free path and collision time in a conductor are proportional to [K_1]

a) 1/T
b) Independent of T (temperature)
c) $1/T^2$
d) T

3. Sequence the following sentences: Variation if Fermi level with temperature in P-type semiconductor. [K_1]

1. Further increase in temperature results in generation of electron-hole pairs due to breaking of covalent bonds and the material tend to behave in intrinsic manner.
2. At 0K, the Fermi level lies exactly halfway between the acceptor level and valence band.
3. The Fermi level shifts upwards with increase in temperature and finally reaches the middle of the band gap.
4. As the temperature is increased, more and more acceptor atoms are ionized.

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

4. The forbidden energy gap in a semiconductor is a function of [K_1]

a) Voltage
b) Potential
c) Current
d) Temperature

5. Which of the following statements are true [K_1]

1. Alpha rays are positively charged particles
2. Beta rays are positively charged particles
3. Gamma rays are electromagnetic waves
4. Beta rays are positively electromagnetic waves

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

6. The value of One Bohr magneton is equal to [K_1]

a) 9.27×10^{-24} A m^{-2}
b) 9.27×10^{-34} A m^{-2}
c) 9.27×10^{-14} A m^{-2}
d) 9.27×10^{24} A m^{-2}

7. The following item consists of two statements , one labeled as the “Assertion (A)” and other as “Reason(A)”. Examine these two statements and select the answers from the following codes. [K_1]

Assertion (A): In a normal A-scan of the body, the echoes returned to the detector are usually weak

Reason (R): In A-scan method the returned signal is exponentially absorbed by the body tissue.

a) A is true but R is false
b) A is false bur R is true
c) Both A and R are individually true and R is the correct explanation for A
d) Both A and R are individually true and R is not the correct explanation for A

8. The Orientation Polarization is produced in [K_1]

a) Non-Polar molecules
b) Solid materials
c) Polar molecules
d) Ionic molecules

9. The sputtering is achieved by ------- and ---------- method. [K_1]

a) AC voltage , RF voltage
b) DC voltage , LF voltage
c) AC voltage , DC voltage
d) DC voltage , RF voltage

10. Carbon Nano Tubes are -------- times stronger than steel. [K_1]

a) 30
b) 10
c) 20
d) 100

PART B (10 x 2 = 20 Marks)

(Answer not more than 40 words)

11. Find the drift velocity of free electrons with mobility of 6.9973 x10^{-3} $m^2V^{-1}s^{-1}$ in Silver for an electric field of 100 Vm^{-1}. [K_2]
12. Show that (mathematically) the superconductors are perfectly diamagnetic. [K_2]
13. What is meant by effective mass of an electron? [K_1]
14. Show the variation of the Fermi level of n-type semiconductor with temperature. [K_2]
15. Define Ferrites. Mention its applications. [K_2]
16. State ferro electric materials? Give examples. [K_1]
17. Mention the advantages of Chemical Vapour Deposition technique. [K_2]
18. Write short note on nanomaterials. [K_1]
19. Mention the applications of Phonocardiograph. [K_1]
20. Mention the principle of photo multiplier tube. [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.	(i). Describe any two methods with neat sketch the synthesis of Carbon Nano Tubes.	(10)	[K_1]
	(ii). Point out the important properties of Carbon Nano Tubes.	(4)	[K_1]
22.	(i). Derive an expression for the density of energy states and based on that calculate the carrier concentration in metals.	(10)	[K_2]
	(ii). Superconducting tin has a critical temperature of 3.7K at zero magnetic field and it has a critical field of 0.0306 Tesla. Find the critical field at 2K.	(4)	[K_2]
23.	(i). Define Hall effect and derive an expression for Hall voltage and Hall Co-efficient in a semiconducting material.	(10)	[K_2]
	(ii). For a silicon semiconductor with a band gap of 1.12eV, determine the position of the Fermi level at 300K if $m_e^* = 0.12\ m_o$ and $m_h^* = 0.28\ m_o$.	(4)	[K_2]
24.	(i).Give the Weiss theory of ferromagnetism and derive an expression for its susceptibility.	(10)	[K_2]
	(ii).Calculate the electronic polarisability of Se atom. The atomic radius of Se is 0.12nm.	(4)	[K_2]
25.	(i). What is shape memory effect? Discuss their characteristics, properties and applications.	(7)	[K_1]
	(ii). Discuss in detail the properties and applications of Metallic glasses.	(7)	[K_1]
26.	(i). Discuss the construction and working of Scintillation detector.	(7)	[K_1]
	(ii). Explain the method of obtaining nuclear image of an organ of our body using Positron Camera.	(7)	[K_1]

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