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.E DEGREE EXAMINATIONS: JUNE 2015

(Regulation 2014)

Second Semester

CIVIL ENGINEERING

U14PHT201 : Materials Science

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. **Assertion (A):** The free electrons move randomly in all directions, without any loss in the energy. [K_1]
   Reason (R): The free electrons collide with each other and also with the lattice elastically.
   a) A is false and R is True
   b) A is True but R is false
   c) Both A and R are True and R is the correct explanation of A.
   d) Both A and R are True and R is not the correct explanation of A.
2. High Temperature Superconductors (HTC) [K_1]
   1. have high transition temperature

2. are not direction dependent
3. have PEROVSKITE crystal structure
4. are not reactive

a) 2 and 4 are correct
b) 1 and 3 are correct
c) 4 and 3 are correct
d) 2 and 1 are correct

3. The intensity of the sound waves [K_1]

1. is directly proportional to the square of the frequency of the sound waves
2. is inversely proportional to the amplitude of the waves
3. is inversely proportional to the square of the distance from the source of sound to the receiving end
4. is directly proportional to the square of the velocity of the sound in that medium

a) 1 and 3 are correct
b) 1 and 4 are correct
c) 2 and 3 are correct
d) 2 and 4 are correct

4. Match List I (Materials) with the list II (Sound Absorption Co-efficient) and select the correct answer using the codes given. [K_1]

Materials	**Sound Absorption Co-efficient**
A. Marbles	1. 0.02
B. Glass	2. 0.06
C. Wooden floor	3. 0.15 – 0.30
D. Carpet	4. 0.01

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

5. Consider the following sentences. [K_1]

1. Charge carriers are produced due to the breaking of covalent bonds
2. The reason for negative temperature co-efficient of resistance is, when the temperature is increased, large number of charge carriers are produced.
3. So the electrons moves freely and gives rise to conductivity.
4. Semiconductors have negative temperature co-efficient of resistance.

The correct sequence is

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

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

6. Match list I with list II and select the correct answer using the codes given below. [K_1]

List I	List II
A. Conductance	1. $m^2 V^{-1} s^{-1}$
B. Mobility	2. Ω - m
C. Resistivity	3. mho
D. Lorentz Number	4. $W\Omega K^{-1}$

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

7. **Assertion (A) :** The materials which are easy to magnetize and demagnetize are called as soft magnetic materials. [K_1]

Reason (R) : In the soft magnetic materials, the domain wall motion will be easy.

a) Both A and R are false b) A is true and R is false

c) Both A and R are True and R is not the correct explanation of A. d) Both A and R are True and R is the correct explanation of A.

8. Dielectric Constant [K_1]

1. Of any dielectric material can be measured by comparing the capacity of the empty condenser (C_o) and the condenser filled with the specimen (C_s)

2. For Diamond is 5.68

3. For Water at O^0 C is 8

For Germanium is 1

a) 1 and 2 are correct b) 2 and 3 are correct

c) 3 and 4 are correct d) 1 and 4 are correct

9. Molten alloy is made to impinge on a fast rotating roller to form [K_1]

a) One-way shape memory alloy b) Two-way shape memory alloy

c) Metallic glasses d) Quantum wire

10. Ball milling technique is an example of [K_1]

a) Top Down Process b) Bottom up Process

c) Vapour phase deposition process d) Plasma assisted deposition process

PART B (10 x 2 = 20 Marks)

(Answer not more than 40 words)

11.	Distinguish between Loudness and Intensity	[K_4]
12.	List the conditions of good acoustics for an auditorium	[K_1]
13.	A wire of diameter 0.16 cm carries a steady current of 10 A. Calculate the drift velocity of electrons in copper and current density. Given that n= $8.46*10^{28}$ per m^3	[K_4]
14.	Illustrate the Meissner's effect with a diagram	[K_3]
15.	Compare elemental and compound semiconductor	[K_5]
16.	Define Hall Voltage	[K_1]
17.	Explain the magneto – optical recording method	[K_2]
18.	Distinguish Lorentz force and Coulomb force in Dielectrics	[K_4]
19.	List the different phases of Shape memory alloys (SMA).	[K_1]
20.	Name a few bottom up approaches for synthesizing nano materials	[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.	Deduce an expression for density of holes in an intrinsic semiconductor. Describe a method for evaluating the energy gap of a semiconductor.	(10+4)	[K_4]
22.	Deduce Sabine's formula for reverberation time.		[K_4]
23.	Explain the following. a) High Temperature Superconductors b) Magnetic Levitation	(10+4)	[K_2]
24.	Discuss in detail the different types of polarization mechanisms in dielectrics. Sketch their dependence on the frequency of applied electric field.	(10+4)	[K_2]
25.	Appraise the properties and applications of metallic glasses.	(14)	[K_5]
26.	Deduce an expression for Hall co-efficient. Describe an experimental method for evaluating the Hall co-efficient with a neat sketch.	(10+4)	[K_4]

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