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

ELECTRICAL AND ELECTRONICS ENGINEERING

U14PHT205**:** Applied Physics

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Match List I with List II [K_2]

List I	List II
A. Wiedemann – Franz law	i. $\frac{\pi}{2}\left(\frac{8m}{h^2}\right)^{3/2} E^{1/2}\, dE$
B. Fermi distribution function	ii. $\frac{\sigma}{ne}$
C. Density of state	iii. $\frac{K}{\sigma} = LT$
D. Mobility	iv. $\frac{1}{1+\exp\left(\frac{E-E_F}{K_B T}\right)}$

	A	B	C	D
a)	i	iii	iv	ii
b)	ii	iv	i	iii
c)	iii	iv	i	ii
d)	iii	iv	ii	i

2. According to Weber – Fechner law, the sensitiveness of the ear [K_1]

a) Increases with the intensity of sound
b) Decrease with the intensity of sound
c) Decreases with the increase of the intensity of the sound
d) Independent of the sound

3. To reduce air borne noise in a hall [K_1]

a) The hall should be air- conditioned
b) Acoustic filters are used
c) The hall should be provided with verandas or lobbies
d) Walls should be pasted with sound absorbing materials

4. Consider the following statements(k1) [K_2]

1. At any temperature T, The value of Fermi function F(E) is 0.5
2. At any temperature T, The value of Fermi function F(E) is 1
3. The Fermi distribution function for an electron with energy for less than Fermi energy at 0K is 1
4. The Fermi distribution function for an electron with energy for less than Fermi energy at 0K is zero

The correct statements are

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

5. Consider the following statements in Paramagnetic materials [K_2]

1. Below Curie temperature the paramagnetic material behaves as a diamagnetic material
2. Below Curie temperature the paramagnetic material behaves as a conducting material
3. Susceptibility = C/T
4. Susceptibility = C/T-θ,

The correct statements are

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

6. Sequence the following sentences: Variation of Fermi level with temperature in n-type semiconductor. [K_2]

1. Further increase in temperature results in generation of electron hole pairs due to breaking of covalent bonds and the materials behave as a intrinsic manner.
2. As the temperature is increased more and more donor atoms ionized.
3. At 0 K, Fermi level lies exactly halfway between the donor level and the conduction band.

4. The Fermi level shifts downwards when the temperature is increased and finally reaches the middle of the band gap.

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

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

7. The following items consists of two statements, one labeled as the "Assertion(A)" and other as "Reason(R)".Examine these two statements and select the answers from the following codes. [K_2]

Assertion(A): All the dielectric materials are not insulator

Reason(R): All the insulator are dielectric materials

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

c) Both A and R individually true and R is not correct explanation of A d) Both A and R individually true and R is correct explanation of A

8. In thermal plasma, electron temperature is ---------- the ion temperature [K_1]

a) Greater than b) Approximately to

c) Less than d) Equal to

9. The presence of Traps in a material [K_1]

a) Reduces the conductivity b) Reduces the resistivity

c) Increase the conductivity d) Increases the dielectric constant

10. At nano scale surface area to volume ratio of the material ---------- [K_1]

a) Increases b) Decreases

c) Remains constant d) May be increases and decreases

PART B (10 x 2 = 20 Marks)

(Answer not more than 40 words)

11. Determine the relative intensity in decibel, The intensity of sound in a street is 10^{-6} Wm^{-2} [K_2]
12. List out the acoustical factors to be considered during the construction of a building. [K_1]
13. How does electrical resistivity of a metal vary with temperature? [K_1]
14. The critical temperature for a metal with isotopic mass 199.5 is 4.185 K. Calculate the isotopic mass if the critical temperature falls to 4.133K. [K_2]
15. What is meant by R_1, R_2 and M colour centre? [K_2]
16. Distinguish between fluorescence and phosphorescence. [K_2]
17. How will you differentiate magnetic materials based on their spin alignment? [K_2]
18. List out the frequency dependence on polarization. [K_1]
19. List out the different structure of carbon nano tubes. [K_1]
20. Mention any four properties of Plasma. [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 electro deposition and sol – gel technique to synthesis nanoparticles.	(10)	[K_1]
	(ii)	Explain types of plasma.	(4)	[K_2]
22.	(i)	Obtain an expression for rate of absorption of sound energy in a hall by using sabine's concept.	(7)	[K_2]
	(ii)	Define the absorption coefficient in sound. Describe with necessary theory a method of measuring the absorption coefficient of a material.	(7)	[K_1]
23.	(i)	Discuss the Cryotron, Magnetic levitation and Squids in a superconductor with suitable diagrams.	(10)	[K_2]
	(ii)	The density of silver is 10.5 x 10^3 kg/m^3. The atomic weight of silver is 107.9.Assuming that each silver atom provides one conduction electron (i) calculate the density of electrons. The conductivity of silver at 20^0C is 6.8 x 10^7 ohm^{-1} m^{-1} (ii) calculate the mobility of electron in silver.	(4)	[K_2]
24.	(i)	Assuming the Fermi – Dirac distribution derive an expression for the concentration of electrons per unit volume in the conduction band and holes per unit volume in valence band of an intrinsic semiconductor.	(10)	[K_2]
	(ii)	The intrinsic carrier density is 1.8×10^{16} /m^3. If the mobility of electron and hole are 0.15 and 0.08 m^2 V^{-1} s^{-1} respectively, Determine the conductivity.	(4)	[K_2]
25.	(i)	Explain the domain theory of Ferromagnetism. Using that theory, explain the formation of hysteresis in ferromagnetic materials.	(10)	[K_1]
	(ii)	A paramagnetic material has a magnetic field intensity of 10^4 A/m. If the susceptibility of the material at room temperature is 3.7 x 10^{-3}, calculate the magnetization and flux density in the material.	(4)	[K_2]
26.	(i)	Obtain an expression for electronic polarizability in terms of the radius of atoms.	(6)	[K_2]
	(ii)	Discuss in detail the various dielectric break-down mechanism in a dielectric materials	(8)	[K_1]

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