Manmohan Technical University
Office of the Controller of Examinations
Exam Year: 2082, Mangsir(Model Question)

Exam Roll: ……………………………………………………………………

Exam Roll in words: ……………………………………………………………

| School: SOE | Level: BEE | Invigilator's Sign: ………………. |
| Program: BEE | Year/Part: I/II | Superintendent's Sign: ………… |

Subject: Electrical Engineering Materials (EG457EE)

Code No. …………………………

Code No. [   ]

------------------✂------------------------------------✂------------------------------------✂----------------------------

i.   *Answers should be given by filling the Multiple-Choice Questions' Answer Sheet.*
ii.   *The main answer sheet can be used for rough work.*

| **GROUP A** *(Multiple-Choice Questions)* | **[10x1=10]** | **Time: 20 Minutes** |

1) What is the primary role of a catalyst in a chemical reaction?
a) To increase the temperature of the reaction. b) To provide a new reaction pathway with lower activation energy.
c) To increase the number of reactants.   d) To drive the reaction to completion by consuming products

2) The phenomenon in **solar while convert light into electricity**
A) Refraction   **B) Photovoltaic effect**
C) Luminescence   **D) Polarization**

3) A dielectric material can become a conductor if:
a) It is subjected to a strong magnetic field   b) It is heated to a very high temperature
c) Its permittivity is lowered significantly   d) Its polarization becomes zero

4) A semiconductor has _____ temperature coefficient of resistance.
a) Negative   b)Positive
c)Zero   d) None of the above

5) The battery connections required to forward bias PN junction are
a) +ve terminal to p and -ve terminal to n   b) -ve terminal to p and +ve terminal to n
c) -ve terminal to p and -ve terminal to n   d) None of above

7) Which statement describes the Fermi-Dirac distribution function?
a) It describes the probability of occupying an energy state by identical bosons.
b) It describes the probability of occupying an energy state by identical fermions.
c) It describes the probability of occupying an energy state by identical classical particles.
d) It describes the probability of occupying an energy state by any particle

8) The temperature at which a ferromagnetic material loses its ferromagnetic properties is called the:
a) Critical temperature   b) Curie temperature
c) Absolute temperature   d) Transition temperature

9) The phenomenon where magnetic flux lines are completely ejected from the interior of a superconductor is known as:
a) Meissner effect   b) Magnetostriction
c) Hall effect   d) Josephson effect

10) **which one is Maxwell's fourth equation that incorporates the concept of the displacement current**
a) $\nabla \cdot D$.   b) $\partial D/\partial t$.
c) J.   d) $\nabla \cdot B$.

Multiple Choice Questions' Answer Sheet

Marks Secured: _____

In Words: _____

Examiner's Sign: _____ Date: _____

Scrutinizer's Marks: _____

In Words: _____

Scrutinizer's Sign: _____ Date: _____

Corrected Fill
Ⓐ ● Ⓒ Ⓓ

Incorrected Fill
✗ Ⓑ ● ✓

1.	Ⓐ Ⓑ Ⓒ Ⓓ	6.	Ⓐ Ⓑ Ⓒ Ⓓ
2.	Ⓐ Ⓑ Ⓒ Ⓓ	7.	Ⓐ Ⓑ Ⓒ Ⓓ
3.	Ⓐ Ⓑ Ⓒ Ⓓ	8.	Ⓐ Ⓑ Ⓒ Ⓓ
4.	Ⓐ Ⓑ Ⓒ Ⓓ	9.	Ⓐ Ⓑ Ⓒ Ⓓ
5.	Ⓐ Ⓑ Ⓒ Ⓓ	10.	Ⓐ Ⓑ Ⓒ Ⓓ

School: SOE	Level: BE	Time: 3 Hours
Program: BEE	Year/Part: I/II	Full Marks: 50
Subject: **Electrical Engineering Materials (EG457EE)**		

- ✓ *Candidates are required to give their answers in their own words as far as practicable.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

GROUP A *(Multiple-Choice Questions in separate paper)* **[10×1=10]**

GROUP B *(Short Answer Questions - **Attempt Any Eight**)* **[8×2=16]**

1. Differentiate between intrinsic semiconductor and extrinsic semiconductor.

2. Resistivity of semiconductor decreases with increase in temperature, why?

3. What is an ideal P-N junction? Explain current during forward bias and reverse bias.

4. Explain displacement current from Maxwell equation originating from Ampere's Law,

5. What is the gradient of scalar field? Describe its significance.

6. Explain Meissner effect in superconductivity.

7. What are dielectric materials? why they are used to build capacitors?

8. What is LASER and its key character?

9. What is the pH of a buffer solution containing 1 M acetic acid (CH_3COOH) and 0.1 M sodium acetate (CH_3COONa), given that the Ka of acetic acid is 1.8×10^{-5}?

GROUP C *(Long Answer Questions - **Attempt Any Six**)* **[6×4=24]**

10. Define Standard Electrode Potential. Explain the measurement of Electrode using suitable diagram.

11. What are complex refractive. Explain optical properties of metal and non-metal with clear diagram.

12. What is polarizability? Prove the Clausius-Mossotti Relation
$$(\varepsilon_r - 1) / (\varepsilon_r + 2) = (N \alpha) / (3 \varepsilon_0)$$
ε_r: is the relative permittivity (or dielectric constant) of the material.
N: is the number density of the polarizable constituents.

α: is the atomic or molecular polarizability.

ε_0: is the permittivity of free space.

13. Explain Metal, Semiconductor, and Insulator on the basis energy bands with diagram.

14. Explain the working of BJT based on energy diagram.

15. Mention three characteristics of uniform plane wave and explain its solution in free space.

16. Derive the reflection and transmission coefficients for a plane wave at a normal incidence interface between two media and analyze the resulting standing wave.

THE END