School of Engineering and Applied Science (SEAS), Ahmedabad University

Name: _____ Roll no.: _____

B. Tech. (All Majors)
Course: ENR108 Materials and the Engineering World
Mid Term Exam (Winter Semester: 2025); Full Marks: 30; Wt.: 20%
March 4, 2025, Tuesday, 05.00 PM – 06.30 PM

Instructions:

1 Answer in these sheets and submit it.
2 Numbers to the right indicate full marks.
3 All acronyms and symbols carry their usual meaning.
4 Assume suitable data wherever necessary and specify it clearly in your answers.
5 The use of only a non-programmable scientific calculator is allowed for calculation, if any.

Q-1. Choose the correct answer(s). Tick accurately. [5]

I. Photoluminescence refers to the following:
   a. Luminescence from materials excited by photons.
   b. Luminescence from materials excited by energetic electrons. Ex. CRT.
   c. Luminescence from electron hole recombination generates photon/ due to electricity.
   d. None of the above.

II. If I_0 is the intensity of incident light wave, I_T is the intensity of transmitted wave, I_A is the intensity of absorbed light wave and I_R is the intensity of reflected light wave, light matter interaction can be represented as following:
   a. $I_0 = I_T - I_A + I_R$
   b. $I_0 = I_T + I_A + I_R$
   c. $I_0 = I_T + I_A - I_R$
   d. $I_0 = I_T - I_A - I_R$

III. Which one of the following is not the assembly operation:
   a. Welding
   b. Soldering
   c. Adhesive bonding
   d. Machining/Material removing

IV. Which of the following shows negative temperature coefficient of resistance:
   a. Silicon
   b. Silver
   c. Aluminium
   d. Copper

V. Which of the following is true for superconductors:
   a. Superconductor materials show zero resistance at all temperatures.
   b. Superconductor materials do not show zero resistance at a particular temperature.
   c. Superconductor materials show zero resistance at a particular temperature.
   d. None of the above

Q-2(a). Write the classification for ceramics based on composition. Name one example for each. [3]

Ans.

Q-2(b). Name four elements used as network modifiers in glass composition. [2]

Ans.

Q-3. Draw and label the hysteresis curve. [5]

Ans.

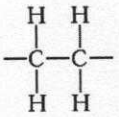
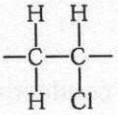
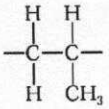
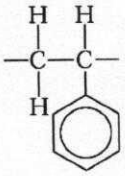
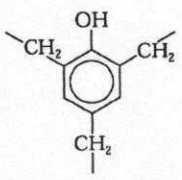
Q-4(a). Write the formula for conductivity in semiconductors. [2]

Ans.

Q-4(b). Name three types of diodes and one application for each respectively. [3]

Ans.

Q-5. Match the polymers with their repeat unit. [5]

Polymer	*Repeat unit (Mer)*
Phenol-formaldehyde (Bakelite)	
Polypropylene (PP)	
Polyethylene (PE)	
Polyvinyl chloride (PVC)	
Polystyrene (PS)	

Q-6. Assume that the molecular weight distributions given in the following table are for PVC sample. For this material, compute (a) the number average molecular weight, (b) the weight average molecular weight and, (c) the degree of polymerization corresponding to the number average molecular weight. Take atomic weights of C, H and Cl respectively, 12.01, 1.01 and 35.45 g/mol. [5]

Molecular Weight Range (g/mol)	*Mean Molecular Weight M_i (g/mol)*	*Number of molecules N_i*
5000-10000	7500	50
10000-15000	12500	160
15000-20000	17500	220
20000-25000	22500	270
25000-30000	27500	200
30000-35000	32500	80
35000-40000	37500	20

Ans.

***** All the best *****