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ET-204(A)

B.Tech. Civil (Construction Management)

Term-End Examination

00015

June, 2017

ET-204(A) : MATERIALS SCIENCE

Time : 3 hours *Maximum Marks : 70*

Note : *Answer any* ***seven*** *questions. All questions carry equal marks. Use of calculator is permitted.*

1. Write short notes on all ***four*** of the following : $4 \times 2\frac{1}{2}$

(a) Ceramics

(b) Polymers

(c) Electronic Material

(d) Composite

2. (a) What are the Four P's ? Explain. 4

(b) Write down the application of any ***four*** materials : $4 \times 1\frac{1}{2}$

(i) CI

(ii) Low carbon steel

(iii) Titanium alloys

(iv) Soda-lime glass

(v) Silicon nitride

(vi) Silicon carbide

(vii) Alumina

(viii) Nylon

(ix) Epoxy

(x) Cu

3. Show the energy level of Hydrogen atom.

Determine the wavelength of light that is emitted when an electron in a hydrogen atom makes a transition from the state of n = 3 (a) to the ground state, and (b) to a state with n = 2. *5+5*

4. (a) Calculate the energy released during Polymerization of PVC. *5*

(b) What is metallic bond ? Explain with example. *5*

5. (a) Show the unit cell dimension and Bravais lattices of the following crystal systems : 5×1

(i) Cubic

(ii) Hexagonal

(iii) Monoclinic

(iv) Tetragonal

(v) Triclinic

(b) Determine the packing fraction for a body-centred cubic structure. Write the assumptions also. 5

6. What is Homogeneous and Heterogeneous Nucleation ? Explain. Draw and explain the Iron-Carbon phase diagram. 5+5

7. Explain all ***four*** of the following : $4 \times 2\frac{1}{2}$

(i) Hooke's Law

(ii) Stress at a point

(iii) Dislocation theory

(iv) Stress – Strain Diagram

8. Define the following : $4 \times 2\frac{1}{2}$

(a) Meissner Effect

(b) Type-I and Type-II Superconductors

(c) p-n Junction

(d) Phonon Scattering

9. Explain the effect of the following variables on mechanical properties : $4 \times 2\frac{1}{2}$

(a) Grain Size

(b) Temperature

(c) Strain Rate

(d) Fatigue

10. (a) What is degradation of polymers ? 5

(b) Explain corrosion of steel in a concrete-steel combination. 5