PRESIDENCY UNIVERSITY, BENGALURU
SCHOOL OF ENGINEERING

Max Marks: 30   Max Time: 55 Minutes   Weightage: 15 %   **Set A**

TEST 2

II Semester 2016-2017   Course: **ME A 112 Material Science**   20 April 2017

Instructions:

  i.   Write legibly
  ii.   Scientific and non-programmable calculators are permitted

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Part A

(4 Q x 3 M= 12 Marks)

1. Distinguish between toughness and ductility of a material

2. What is stress and strain? Mention their units

3. Describe dislocation motion and its relation to slip systems

4. Mention any three differences between slip and twinning

Part B

(2 Q x 5 M= 10 Marks)

5. Draw the stress versus strain curve and locate the salient points.

6. Describe the Brinell and Rockwell hardness test.

Part C

(1 Q x 8 M= 8 Marks)

7. How can the strength of a material be improved? Mention the different strengthening mechanisms and describe any one of them.

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Max Marks: 30   Max Time: 55 Minutes   Weightage: 15 %   **Set B**

TEST 2

II Semester 2016-2017   Course: **ME A 112 Material Science**   27 March 2017

Instructions:
  i.   Write legibly
  ii. Scientific and non-programmable calculators are permitted

Part A

(4 Q x 3 M= 12 Marks)

1. What is a solid solution? Give an example.

2. Define the term Component with an example

3. What is heat capacity of a metal? How does it respond with temperature?

4. Distinguish between Ferrite and Pearlite with respect to Fe-C phase diagram

Part B

(2 Q x 5 M= 10 Marks)

5. Explain grain boundaries and stacking faults

6. Calculate the number of degrees of freedom for gaseous mixture containing CH_4 and SO_2. Explain the significance

Part C

(1 Q x 8 M= 8 Marks)

7. Describe phase rule for a two components system

Max Marks: 30   Max Time: 55 Minutes   Weightage: 15 %   **Set B**

TEST 1

II Semester 2016-2017   Course: **ME A 112 Material Science**   28 February 2017

Instructions:

   i.   Write legibly

   ii.   Scientific and non-programmable calculators are permitted

Part A

(4 Q x 3 M= 12 Marks)

1. On a Cartesian coordinate system draw a plane that cuts X, Y, and Z- axes at (1, 0 and 0) and (1, 1, 0) respectively and assuming it as a cubic crystal.

2. Differentiate between amorphous and crystalline solids.

3. Describe the structure and properties of diamond.

4. Describe the unit cell characteristics of tetragonal, orthorhombic and cubic latticies.

Part B

(2 Q x 5 M= 10 Marks)

5. What is radius ratio rule? Explain its significance. Predict the structure of CsCl and coordination number of Cs+ if the radius of Cs+ is 169 pm and that of Cl- is 181 pm.

6. Explain Schottky and Frenkel defects in crystals with a pictorial representation.

Part C

(1 Q x 8 M= 8 Marks)

7. A beam of X-rays of wavelength 0.071 nm is diffracted by a plane of rock salt at (0 1 1) along the crystallographic axes (lattice constant of 0.3 nm). Find the glancing angle for the second-order diffraction.

Max Marks: 30　　　Max Time: 55 Minutes　　　Weightage: 15 %　　　**Set A**

TEST 2

II Semester 2016-2017　　　Course: **ME A 112 Material Science**　　　27 March 2017

Instructions:

　i.　Write legibly

　ii.　Scientific and non-programmable calculators are permitted

Part A

(4 Q x 3 M= 12 Marks)

1. What is phase rule? Mention its applications.

2. Define the term Phase with an example

3. Define thermal expansion and give its mathematical expression

4. Mention the various phases that are present in Fe-C equilibrium

Part B

(2 Q x 5 M= 10 Marks)

5. Explain edge and screw dislocations

6. Calculate the number of degrees of freedom for a pure gas. Explain the significance.

Part C

(1 Q x 8 M= 8 Marks)

7. Describe phase rule for a one component system.

Max Marks: 30   Max Time: 55 Minutes   Weightage: 15 %   **Set A**

TEST 1

II Semester 2016-2017   Course: **ME A 112 Material Science**   28 February 2017

Instructions:
  i.   Write legibly
  ii.   Scientific and non-programmable calculators are permitted

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Part A

(4 Q x 3 M= 12 Marks)

1. Define Miller Indices. Identify its Miller indices of a plane that cuts X, Y, and Z- axes at 4, 6 and 8 respectively, assuming it as a crystal plane.

2. Differentiate between Rotating crystal XRD and powder XRD methods.

3. List any three structural properties of graphite.

4. Write the structure and calculate the atoms per unit cell for Simple cubic, Body Centered and Face centered cubic systems.

Part B

(2 Q x 5 M= 10 Marks)

5. State and derive Bragg's law of X-ray diffraction.

6. Explain briefly the different types of Point defects in crystals.

Part C

(1 Q x 8 M= 8 Marks)

7. A plane in a unit cell of rock salt has intercepts as shown in the figure. Find the Miller Indicies and hence the inter-planar distance. Given the lattice constant 0.28 nm.