

Total No. of Questions: 6

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Enrollment No.....



Faculty of Engineering
End Sem (Odd) Examination Dec-2019
AU3ES09/FT3ES09/ME3ES09 Engineering Materials
Programme: B.Tech. Branch/Specialisation: AU/FT/ME

Duration: 3 Hrs.

Maximum Marks: 60

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

- Q.1 i. Which of the following is the most common instrument for photographic recording of diffraction patterns? **1**
(a) Debye-Scherrer powder camera
(b) Gamma camera
(c) Geiger tube
(d) Scintillation counter
- ii. Gold has _____ crystal structure. **1**
(a) HCP (b) FCC (c) BCC (d) SCC
- iii. _____ is usually defined as resistance of a material to penetration. **1**
(a) Tensile strength (b) Compressive strength
(c) Hardness (d) Fatigue strength
- iv. Lack of ductility is _____. **1**
(a) Malleability (b) Porosity
(c) Stiffness (d) Brittleness
- v. _____ Process decompose the martensite into a ferrite-cementite mixture. **1**
(a) Annealing (b) Normalising
(c) Tempering (d) None of these
- vi. _____comprise of alternate layers of ferrite and cementite in steel. **1**
(a) Austenite (b) Pearlite
(c) Ledeburite (d) None of these
- vii. Brass is an alloy of **1**
(a) Lead and Tin (b) Copper and Tin
(c) Copper and Zinc (d) Nickel and Zinc

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| | viii. | German silver is an alloy consisting of
(a) Cu, Al, Ni (b) Cu, Pb
(c) Cr, Cu (d) Cu, Zn, Ni | 1 |
| | ix. | In _____ rocks clay or alumina is the main constituent.
(a) Argillaceous (b) Calcareous
(c) Both (a) and (b) (d) None of these | 1 |
| | x. | PVC stand for
(a) Polythene vinyl chloride (b) Phosphorus-vanadium-carbide
(c) Polyvinyl chloride (d) Plastic very compact | 1 |
| Q.2 | i. | What are miller indices? Write the procedure for finding out miller indices for planes. | 3 |
| | ii. | Draw the unit cell for BCC and FCC crystal structure. Discuss the number of atoms, coordination number and atomic packing factor for both unit cells. | 7 |
| OR | iii. | Classify crystal imperfection and explain point defect in detail. | 7 |
| Q.3 | i. | Draw labelled stress-strain diagram for ductile material, brittle material, ceramic and polymer | 4 |
| | ii. | Explain the mechanism of creep failure and fatigue failure. | 6 |
| OR | iii. | Explain and compare Izod and Charpy test. | 6 |
| Q.4 | i. | Draw Bi-Cd Eutectic phase diagram and show grain formation of any one composition other than eutectic point at various temperature. | 3 |
| | ii. | Classify various heat treatment processes. Explain the process of doing full annealing and normalising. | 7 |
| OR | iii. | Draw neat and clean Iron-iron carbide phase diagram indicating various temperature, carbon-content and various zones. Write three important reactions also. | 7 |
| Q.5 | i. | Differentiate between white and grey cast-iron. | 4 |
| | ii. | (a) Classify steel with examples.
(b) Explain Maraging Steel (Composition, properties and application) | 6 |

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| OR | iii. | Write composition, properties and application of two important Aluminium based alloys. | 6 |
| Q.6 | | Attempt any two: | |
| | i. | Describe the structure, properties and application of the following engineering thermoplastic polymers
(a) Acrylonitrile Butadiene styrene (ABS)
(b) Nylons | 5 |
| | ii. | What are the General properties and application of ceramic materials? | 5 |
| | iii. | Write brief note on:
(a) Laminates (b) Clad metals | 5 |

Marking Scheme

AU3ES09/FT3ES09/ME3ES09 Engineering Materials

Q.1	i.	Which of the following is the most common instrument for photographic recording of diffraction patterns?	1
		(a) Debye-Scherrer powder camera	
	ii.	Gold has _____ crystal structure.	1
		(b) FCC	
	iii.	_____ is usually defined as resistance of a material to penetration.	1
		(c) Hardness	
	iv.	Lack of ductility is _____	1
		(d) Brittleness	
	v.	_____ Process decompose the martensite into a ferrite-cementite mixture.	1
		(c) Tempering	
Q.2	vi.	_____ comprise of alternate layers of ferrite and cementite in steel.	1
		(b) Pearlite	
	vii.	Brass is an alloy of _____	1
		(c) Copper and Zinc	
	viii.	German silver is an alloy consisting of _____	1
		(d) Cu, Zn, Ni	
	ix.	In _____ rocks clay or alumina is the main constituent.	1
		(a) Argillaceous	
	x.	PVC stand for _____	1
		(c) Polyvinyl chloride	
OR	i.	Definition of miller indices	3
		Procedure for finding out miller indices for planes	
	ii.	Unit cell diagram for BCC and FCC	7
		Number of atoms	
		Coordination number	
		Atomic packing factor	
	iii.	Crystal imperfection	7
		Classification	
		Explanation of five types of point defect with diagram	

Q.3	i.	Stress-strain diagram for ductile material, brittle material, ceramic and polymer	4
		1 mark for each	
		(1 mark * 4)	
	ii.	Mechanism of creep failure	6
		Explanation	
		Diagram	
		Mechanism of fatigue failure	
		Explanation	
		Diagram	
	OR iii.	Izod Explanation	6
Q.4		Diagram	
		Charpy test Explanation	
		Diagram	
	i.	Bi-Cd Eutectic phase diagram	3
		Grain formation at four to five temperature	
	ii.	Classification of heat treatment processes	7
		Process of doing full annealing	
		Process of normalising	
	OR iii.	Iron-iron carbide phase diagram indicating	7
		Correct zones	
Q.5		Correct temperatures	
		Correct compositions	
		Three important reactions	
	i.	Differentiate between white and grey cast-iron.	4
		1 mark for each difference	
		(1 mark * 4)	
	ii.	(a) Classify steel with examples.	6
		(b) Maraging Steel	
		Composition	
		Properties	
OR		Application	
	iii.	Two important Aluminium based alloys	6
		Composition	
		Properties	
		Application	

Q.6 Attempt any two:

i.	Structure, properties and application of thermoplastic polymers	5
	(a) Acrylonitrile Butadiene styrene (ABS)	2.5 marks
	(b) Nylons	2.5 marks
ii.	General properties of ceramic materials	5
	At least three properties 1 mark for each	3 marks
	Application of ceramic materials	
	At least four applications 0.5 mark for each	2 marks
iii.	Write brief note on:	5
	(a) Laminates	2.5 marks
	(b) Clad metals	2.5 marks
