Printed Page:- Subject Code:- AME0302

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech.

SEM: III - THEORY EXAMINATION (2021 - 2022)

Subject: Materials Science and Engineering

Time: 03:00 Hours Max. Marks: 100

General Instructions:

1. All questions are compulsory. It comprises of three Sections A, B and C.

- Section A - Question No- 1 is objective type question carrying 1 mark each & Question No- 2 is very short type questions carrying 2 marks each.
- Section B - Question No- 3 is Long answer type - I questions carrying 6 marks each.
- Section C - Question No- 4 to 8 are Long answer type - II questions carrying 10 marks each.
- No sheet should be left blank. Any written material after a Blank sheet will not be evaluated/checked.

SECTION A 20

1. Attempt all parts:-

1-a. Body centred cubic space lattice is found in (CO1) 1

1. Zn, Mg, Co, Cd
2. Cu, Pb, Ag, Ni
3. Ti, Cr, Mo
4. None of the above

1-b. Amorphous material is one (CO1) 1

1. In which atoms align themselves in a geometric pattern upon solidfication
2. In which there is no definite atomic structure and atoms exist in a random pattern just as in a liquid
3. Which is not attacked by phosphrous
4. Whicj emits fumes on melting

1-c. Eutectic reaction for Iron-carbon system occurs at (CO2) 1

1. 600°C
2. 723°C
3. 1130°C
4. 1493°C

1-d. As per Gibb's phase rule, if number of components is equal to 2 then the number of phases will be (CO2) 1

1. less than and equal to 2
2. less than and equal to 3

3. less than and equal to 4
4. less than and equal to 5

1-e. The lattice diffusion is caused by (CO3) 1

1. Grain boundaries
2. Screw dislocations
3. Point imperfections
4. Twins

1-f. A light weight Al-Li alloy suitable for making aircraft structure is obtained. The process involved in this transformation is (CO3) 1

1. precipitation hardening
2. cyniding
3. splat cooling
4. flame hardening

1-g. Carbon nano tubes are also called as (CO4) 1

1. Bucky tubes
2. Bulky tubes
3. Bulk tubes
4. Buck balls

1-h. Yttrium-Ba-Cu oxide superconductor superconducts at -183 degree. It is a (CO4) 1

1. High temerature superconductor
2. Metallic superconductor
3. Type I superconductor
4. Poisonous superconductor

1-i. In Atomic Absorption Spectroscopy, with what material is the cathode in Hollow cathode lamp constructed? (CO5) 1

1. Tungsten
2. Quartz
3. Element to be investigated
4. Aluminium

1-j. Which of the following is the function of the Flame or Emission system in Atomic Absorption Spectroscopy? (CO5) 1

1. To split the beam into two
2. To break the steady light into pulsating light
3. To filter unwanted components
4. To reduce the sample into atomic state

2. Attempt all parts:-

2-a. Define hexagonal close packed structure. (CO1) 2

2-b. Define Gibb's phase rule. (CO2) 2

2-c. Define pipe diffusion. (CO3) 2

2-d.	What are the smart materials? (CO4)	2
2-e.	What are the different kind of microscopes used in crysallographic investigations? (CO5)	2

SECTION B 30

3. Answer any five of the following:-

3-a.	Derive an expression for Atomic Packing Factor in case of HCP. (CO1)	6
3-b.	What are the factors affecting creep, explain. (CO1)	6
3-c.	Differentiate between cooling of a pure element, binary and binary eutectic system. (CO2)	6
3-d.	Explain the following- (CO2) (i) Eutectoid reaction (ii)Peritectic reaction.	6
3-e.	Explain annealing and its objective. (CO3)	6
3-f.	Draw the stress-strain diagram for a composite material and explain it. (CO4)	6
3-g.	Explain a inter-granular fracture with a neat sketch. (CO5)	6

SECTION C 50

4. Answer any one of the following:-

4-a.	Derive an expression for Atomic Packing Factor in case of HCP unit cell. (CO1)	10
4-b.	Draw burger's circuit to show magnitude and direction of a burger's vectors on a crystal having Edge dislocation. (CO1)	10

5. Answer any one of the following:-

5-a.	Draw the iron-carbon equilibrium diagram and explain. (CO2)	10
5-b.	Draw the Eutectic phase diagram of Lead and Silver and explain. Write the Eutectic reaction. (CO2)	10

6. Answer any one of the following:-

6-a.	Draw the Time-Temperature-Transformation (T-T-T) diagram and Show the following processes on it, write about the final transformation- i) 1080 Steel piece is heated to 8500C and then water quenched to room temperature. (CO3)	10
6-b.	Write the procedure of preparation of thin films. (CO3)	10

7. Answer any one of the following:-

7-a.	What is Rheological materials; explain various Rheological materials and their applications. (CO4)	10
7-b.	Write short notes on the following- (CO4) i) Smart gels ii) Chromic materials iii) Thermo-responsive materials	10

8. Answer any one of the following:-

8-a.	Explain the transmission electron microscopy with a neat sketch in details. (CO5)	10
8-b.	What is meant by fracture in materials, explain ductile and brittle fracture in materials also its mechanism. (CO5)	10