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 - CARRY OVER THEORY EXAMINATION - APRIL 2023

Subject: Materials Science and Engineering

Time: 3 Hours **Max. Marks: 100**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* **three Sections -A, B, & C.** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *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. Which of the following factors is more relevant to represent complete solubility of two metals in each other? (CO1) 1

(a) Chemical affinity

(b) Valency factor

(c) Crystal structure factor

(d) Relative size factor

1-b. Toughness of steel is increased by adding nickel. (CO1) 1

(a) TRUE

(b) FALSE

1-c. Hot rolling of mild steel is carried out (CO2) 1

(a) at recrystallisation temperature

(b) between 100°C to 150°C

(c) below recrystallisation temperature

(d) above recrystallisation temperature

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1-d. Monal metal is an alloy of (CO2) 1

(a) Iron and carbon

(b) Copper and zinc

(c) Aluminium and copper

(d) Copper and nickel

1-e. Which of the following is an example of inter-diffusion process? (CO3) 1

(a) Ni in Ni

(b) Si in Ge

(c) C in α-iron

(d) Na in Cl

1-f. Diffusion through polycrystalline material is faster than the single crystal material at higher temperature. (CO3) 1

(a) TRUE

(b) FALSE

1-g. As compared to the elements, the compounds and alloys can be made superconductors at (CO4) 1

(a) higher temperatures

(b) lower temperature

(c) the same temperature

(d) much lower temperature

1-h. Fiber reinforced plastics are made of thermosetting resins and glass fibre. (CO4) 1

(a) TRUE

(b) FALSE

1-i. X rays are (CO5) 1

(a) deflected by an electric field but not by a magnetic field

(b) deflected by a magnetic field but by an electric field

(c) not deflected by an electric or a magnetic field

(d) deflected by both a magnetic field and an electric field

1-j. Which of the following is used in electron microscope? (CO5) 1

(a) electron beams

(b) magnetic fields

(c) light waves

(d) electron beams and magnetic fields

2. Attempt all parts:-

2.a.	What do you understand by term 'crystal lattice'? (CO1)	2
2.b.	What are the disadvantages of cold working of metal? (CO2)	2
2.c.	Narrate concentration. (CO3)	2
2.d.	What are the applications of biomaterials? (CO4)	2
2.e.	What are the different material characterization techniques? (CO5)	2

SECTION B **30**

3. Answer any <u>five</u> of the following:-

3-a.	Calculate the relation between the 'a' and 'r' for the Face Centered Cubic structure. (CO1)	6
3-b.	Differentiate between the fibers and the whiskers, how the strength varies with their diameter. (CO1)	6
3-c.	Explain the following- (CO2) (i) Eutectoid reaction (ii)Peritectic reaction.	6
3-d.	Write the advantage of Cold working of metals. (CO2)	6
3.e.	Explain the age hardening heat treatment of Aluminium alloy, explain with a diagram. (CO3)	6
3.f.	What is importance of the following- i) optical fibers (CO4)	6
3.g.	Write the precautions to be observed while preparing the specimen for microstructure examination? (CO5)	6

SECTION C **50**

4. Answer any <u>one</u> of the following:-

4-a.	What is meant by fracture in materials, explain ductile and brittle fracture in materials also its mechanism. (CO1)	10
4-b.	Draw burger's circuit to show magnitude and direction of a burger's vectors on a crystal having screw dislocation (CO1)	10

5. Answer any <u>one</u> of the following:-

5-a.	Draw the Eutectic phase diagram of Lead and Silver and explain. Write the Eutectic reaction. (CO2)	10
5-b.	Explain the Uniary Phase diagram of Iron with its sketch. (CO2)	10

6. Answer any <u>one</u> 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.	Draw the Time-Temperature-Transformation (T-T-T) diagram and Show the following processes on it and write about the final transformation i) 1080 Steel piece is heated to 8500C, Held for 3minutes and then water quenched to room temperature. (CO3)	10

7. Answer any <u>one</u> of the following:-

7-a.	Write short notes on the following- (CO4) i) Thermo-responsive materials ii) Rheological materials	10
7-b.	What is meant by shape memory alloys, write about their classification and applications. (CO4)	10

8. Answer any <u>one</u> of the following:-

8-a.	Explain the scanning tunnelling microscopy with a neat sketch in details (CO5)	10
8-b.	What is fractgraphy and hoe scanning electron microscopy helps revealing it? (CO5)	10