

Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

[Total No. of Questions: 09]

[Total No. of Pages: 02]

Uni. Roll No.

Program: B.Tech. (Batch 2018 onward)

Semester: 3rd

Name of Subject: Engineering Materials and Metallurgy

Subject Code: PCME-105

Paper ID: 16076

Scientific calculator is Allowed

7 JUN 2023

MORNING

Time Allowed: 03 Hours

Max. Marks: 60

NOTE:

- 1) Parts A and B are compulsory
- 2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
- 3) Any missing data may be assumed appropriately

Part – A

Q1

[Marks: 02 each]

- (a) What is the c/a ratio of HCP crystal?
- (b) Write down the reaction for Peritectic and peritectoid transformation.
- (c) Define Polymorphism.
- (d) Draw the planes (101) and (122) in cubic structure.
- (e) Draw and label cooling curves for pure metal and binary solid solution.
- (f) Difference between case hardening and surface hardening

Part – B

[Marks: 04 each]

- Q2. Draw equilibrium diagram of a system whose component undergoes allotropic change. Also write the reaction involved.
- Q3. What is hardenability? Explain Jominy End quench test.
- Q4. Explain the effect of various alloying elements on the structures and properties of steel.

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Q5. Can you distinguish between Annealing and Normalizing processes? Explain Full Annealing process.

Q6. How to construct the TTT diagram for 0.8% carbon steel? Explain.

Q7. Prove that Atomic packing factor of HCP structure is 74 %.

Part – C

[Marks: 12 each]

Q.8 How ferrous and Non ferrous metals are classified. Explain the effect of any four alloying elements on the structures and properties of steel.

OR

What is dislocation? Differentiate between edge and screw dislocations by means of neat sketches.

Q.9 Illustrate Fe-C equilibrium diagram. Write the reactions occurring in Fe-C diagram. Also explain various phase transformations taking place at 0.9 % carbon content.

OR

Can you list various surface hardening processes? Explain any two of them.
