

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2018****Subject Code:2152106****Date:27/11/2018****Subject Name:Physical Metallurgy****Time: 10:30 AM TO 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

MARKS

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|------------|-----|---|-----------|
| Q.1 | (a) | Write important features of Miller Indices. | 03 |
| | (b) | Define Miller indices. Draw following planes in cubic system (123) (001) (100). | 04 |
| | (c) | Draw Iron –iron carbide equilibrium diagram indicating all important temps, phases, and compositions. | 07 |
| Q.2 | (a) | Draw following directions in cubic system [100] [010] [111] | 03 |
| | (b) | State and explain the Hume Rothery rules of solid solution formation with suitable example. | 04 |
| | (c) | Explain the nucleation and growth mechanism for the solidification of metals. | 07 |
| OR | | | |
| | (c) | Calculate the atomic packing factor for BCC and FCC structure | 07 |
| Q.3 | (a) | Give detail classification of steels. | 03 |
| | (b) | Draw and briefly explain the Aluminum-Silicon binary phase diagram. | 04 |
| | (c) | Explain Austenite grain size? Explain any one technique. | 07 |
| OR | | | |
| Q.3 | (a) | Explain allotropy of iron with neat sketch. | 03 |
| | (b) | Draw the Copper-Nickel binary phase diagram and explain it. | 04 |
| | (c) | Write a note on solidification of metals and alloys. | 07 |
| Q.4 | (a) | Explain allotropy of iron with neat sketch. | 03 |
| | (b) | List out Coding of steel? Explain any one standard with suitable example. | 04 |
| | (c) | What is cooling curve? Draw the cooling curves for binary solid solution alloy and binary eutectic alloy. | 07 |
| OR | | | |
| Q.4 | (a) | Explain why C-Si ratio importance in cast Iron? | 03 |
| | (b) | Mention the effect of alloying elements on the properties of steel. | 04 |
| | (c) | Discuss about Gray Cast iron with chemical composition, properties, application and microstructure. | 07 |
| Q.5 | (a) | Write in detail about basic steps required to prepare metallographic specimen. | 03 |
| | (b) | Explain Metallurgical Microscope with neat diagram. | 04 |
| | (c) | Write short note on Nodular Cast irons. | 07 |
| OR | | | |
| Q.5 | (a) | Discuss effect of impurities on properties of steel. | 03 |
| | (b) | Explain electrolytic polishing. | 04 |
| | (c) | Differentiate between Macroscopic and Microscopic Examination. | 07 |