Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
A Constituent Institution of Manipal University

III SEMESTER B.TECH. (MECHATRONICS ENGINEERING)

END SEMESTER EXAMINATIONS, DEC 2016/JAN 2017

SUBJECT: MATERIAL SCIENCE AND ENGINEERING [MTE 2101]

REVISED CREDIT SYSTEM

Time: 3 Hours **MAX. MARKS: 50**

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.
- Draw neat labelled diagram wherever necessary.

1A. Represent the following Miller Indices in a unit cell cubic structure: **(04)**

i. [111]
ii. (110)
iii. [101]
iv. (011)

1B. Calculate the amounts of α and *L* at 1250°C in the Cu-40% Ni alloy shown in Fig. 1B. **(04)**

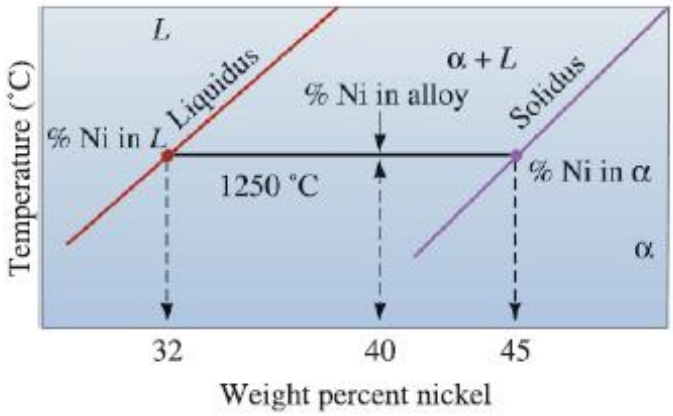

Fig. 1B

1C. Explain the condensation polymerisation reaction of polyester. **(02)**

2A. Draw Iron – Iron Carbide equilibrium diagram and explain the reaction taking place at 727°C. **(05)**

2B. Distinguish between thermoset and thermoplastic polymers. **(03)**

2C. Certain materials have permanent magnetic moments even in the absence of external field. Name and describe this phenomenon. **(02)**

3A. Explain the phenomena of refraction and absorption with one application for each. **(04)**

3B. With a neat diagram, list the steps involved in Chemical Vapor Depsoition (CVD) process. **(03)**

3C. Write a short note on: **(03)**

i. Frenkel Defect
ii. Schottky Defect

4A. Draw and explain the TTT curve for 0.76% C steel. **(05)**

4B. Illustrate and describe physical vapor deposition process for thin films. **(03)**

4C. List the Hume – Rothery rules for the formation of solid solution. **(02)**

5A. Define composite. Explain fibre reinforced composite and laminar composite. **(04)**

5B. Explain the following terms: **(03)**

i. Superconductivity
ii. Mathiessens rule of resistivity

5C. Explain the flame hardening surface heat treatment process. **(03)**