

Total No. of Questions : 8]

SEAT No. :

P3587

[Total No. of Pages : 4

[5152]-518

S.E. (Mechanical/Automobile) (Semester - II)

ENGINEERING METALLURGY

(2015 Pattern)

Time : 2 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) *Solve Question No. 1 or 2, Question No. 3 or 4, Question No 5 or 6, Question No7 or 8.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw neat, well labelled sketch wherever necessary.*
- 4) *Write answers relevant to question. Irrelevant excess information will not score marks.*

Q1) a) Explain the terms

[4]

- i) Allotropy
 - ii) Solid solution
 - iii) Solidus line:
 - iv) Flow lines
- b) Is etching of a metallographic sample necessary to measure the grain size of a plain carbon steel sample? Explain why? **[4]**
- c) What is metallography? What useful information can be obtained from it? **[4]**

OR

P.T.O.

- Q2) a) Explain the terms [4]**
- i) Slag inclusion
 - ii) Numerical aperture
 - iii) Sulphur segregation
 - iv) Empty magnification
- b) State and explain Gibbs phase rule. [4]
- c) What is spark test? What is its use? [4]

- Q3) a) What is meant by critical temperature line in an equilibrium diagram? What changes take place, during cooling, at A1 temperature in an Iron-Iron carbide phase diagram? [4]**
- b) Write properties and applications of Grey cast iron. [4]
- c) What is Retained austenite? List effect of Retained Austenite? Explain subzero treatment of elimination of retained austenite? [5]

OR

- Q4) a) Why carburising is carried out at a temperature range above 900°C [4]**
- b) What are the advantages of Nodular cast iron over gray cast iron? Draw a typical microstructure of Nodular cast iron. [4]
- c) Explain why thicker sections are more susceptible to cracking during hardening heat treatment. Which heat treatment will you recommend? [5]

- Q5) a)** Explain classification of steel [4]
- b) Explain Heat Affected zone. Due to which manufacturing process is it formed? [4]
- c) What is stainless steel? Explain classification of stainless steel based on microstructure. [4]

OR

- Q6) a)** What is the effect of increasing carbon addition to steel on the following characteristics: [4]
- i) Hardness
 - ii) Ductile to brittle transition temperature
 - iii) Ductility
 - iv) Amount of cementite
- b) Explain the effect of Nickel and Chromium on microstructure and Mechanical properties of steel. [4]
- c) Explain the heat treatment of High speed steel [4]
- Q7) a)** Cartridge brass is easily cold worked but Muntz metal cannot be cold worked. Explain why it is so. [4]
- b) State any two important properties of copper or copper alloys and explain how that is used in an application. [4]

- c) Why is Al-12% Si (LM6) alloy a very popular casting material for automotive applications? [5]

OR

- Q8) a) What is modification treatment used in aluminium alloys? Why is it done? [4]
- b) Write short note on Nickel and Nickel alloys [4]
- c) Explain classification of Aluminium alloys. [5]

OR