**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 Al 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 retain 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]**