Total No. of Questions—**8**] [Total No. of Printed Pages—**4**

Seat No.	

[5252]-518

S.E.(Mechanical and Automobile Engineering) (Second Semester)
EXAMINATION, 2017
ENGINEERING METALLURGY
(2015 PATTERN)

Time : Two Hours **Maximum Marks : 50**

***N.B.* :—** (*i*) Answer *four* questions : Q. No. **1** *or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6**, Q. No. **7** *or* Q. No. **8**.

(*ii*) Neat diagram should be drawn wherever necessary.

(*iii*) Use of non-programmable electronic pocket calculator is allowed.

(*iv*) Figures to the right indicate full marks.

(*v*) Write answers relevant to the question. Irrelevant statements will not score marks.

1. (*a*) Define the following terms : [1+1+1+1=4]

1. Phase
2. Alloy
3. Grain
4. Nucleation.

(*b*) Differentiate between microscopy and macroscopy. [4]

(*c*) What is the purpose of using etchant ? Explain with diagram. [2+2=4]

Or

2. (*a*) Write Hume Rothery's rule of solid solubility. [4]

(*b*) Explain any *two* methods of grain size measurement. [2+2=4] (*c*) Differentiate between transmission electron microscope and scanning electron microscope. [4]

3. (*a*) What are the different types of cast iron ? Explain gray cast iron microstructure. State and justify the use of grey cast iron in two applications. [2+2+2=6]

(*b*) Draw neat diagram of microstructures and indicate phases present and their amounts into the following plain carbon steels under equilibrium conditions : [2+2=4]

(*i*) 0.2 % carbon steel,

(*ii*) 0.8 % carbon steel.

(*c*) Give brief explanation of austenite to pearlite transformation ? [3]

Or

4. (*a*) On an Iron-Iron carbide phase diagram, indicate the temperature range of the following heat treatment and mention relative cooling rates : [6]

(*i*) Full Annealing

(*ii*) Normalising

(*iii*) Hardening

(*iv*) Process annealing

(*v*) Nitriding

(*vi*) Carburising.

(*b*) Differentiate between Martempering and Austempering. [4]

(*c*) Explain with the help of figure, Widmansttaten structure. [3]

5. (*a*) Explain classification of steels on the basis of composition. [4]

(*b*) What do you understand by weld decay of austenitic stainless steel ? State the methods of prevention of weld decay. [2+2=4]

(*c*) Prepare a table comparing alloy steels and plain carbon steels on the basis of the following : [4]

(*i*) Corrosion resistance

(*ii*) Hardenability

(*iii*) Cost

(*iv*) Toughness.

Or

6. (*a*) What will be the AISI equivalent of the following : [2+2=4]

(*i*) C40

(*ii*) T80.

(*b*) Explain with a neat sketch heat treatment cycle of high speed steel with proper reasoning. [4]

(*c*) Invar is an alloy containing 64% Iron and 36% Nickel. What is its most notable property ? Stats and justify two applications for which this notable property is most suitable. [2+2=4]

7. (*a*) What is age hardening ? Which alloys can be age hardened ? [3+3=6]

(*b*) Give classification of copper alloys. Differentiate between brass and bronze. [2+2=4]

(*c*) Write a short note on bearing materials. [3]