

FERROUS-NON FERROUS METALLURGY

Full Marks : 70

Time : 3 hours

Answer Q. No. 1 which is compulsory and
any **five** from the rest

The figures in the right-hand margin indicate marks

1. Answer all questions : **2 × 10**

(i) What is pig iron ?

(ii) What do you mean by gangue materials ?

(iii) What is the maximum solubility of Carbon
in austenite ?

(iv) How heat is produced in an electric arc
furnace ?

(v) What are the elements which are not
removed in Bessemer furnace ?

(Turn Over)

- (vi) Define peritectoid reaction.
- (vii) Mention the composition of most commonly used stainless steel.
- (viii) What is the role of cryolite in aluminium extraction by Hall-Heroult's process ?
- (ix) What is carburisation of steel done ?
- (x) What is an eutectic mixture ?
2. (a) What are the important ores of copper ? Mention places where copper ore deposits occur in India. List out main applications of copper. 5
- (b) Discuss the main steps involve in the production of copper by pyro metallurgical process. Explain them. 5
3. (a) What is the basic principle of ion-exchange technique ? For what purpose ion-exchanger is used in hydrometallurgical process ? 5
- (b) Discuss the nitriding heat treatment process. 5

4. (a) Name different Aluminium ores available in India. Explain Bayer's process for production of Alumina. 5
- (b) Explain Hall-Heroult's process for Aluminium production. 5
5. (a) Discuss the advantages and disadvantages of Bessemer process. 5
- (b) Briefly explain LD steel-making process. 5
6. (a) With a schematic diagram indicate the different zones of a blast furnace. What are the main advantages of bell less top (BLT) charging system ? 5
- (b) Explain the role of humidification and oxygen enriched blast on the productivity of blast furnace. 5
7. (a) Draw iron-iron carbide Phase diagram. Mention what are the important phase changes take place at 0.83%C and at 4.3%C ? 3 + 2

(4)

(b) What is lever rule ? What are pearlite and cementite ? What are hypo-eutectoid and hyper-eutectoid steels ? $1 + 2 + 2$

8. (a) What is wrought iron ? How it is prepared from pig iron ? Give a typical composition of wrought iron. $1 + 3 + 2$

(b) Differentiate between cast iron and wrought iron. Mention various uses of wrought iron. $2 + 2$