Code No: RR11801 **Set No. 1**

I B.Tech Supplementary Examinations, November/December 2005
METALLURGICAL ANALYSIS
(Metallurgy & Material Technology)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Discuss the following with reference to reduction of bulk samples [5+5]
   i. Tabling.
   ii. Mechanical dividers.
   (b) Write briefly on the significance of sampling in the analysis of raw materials. [6]
2. (a) Discuss briefly how the identification of metals is carried out by dry reaction
   (b) How are the following detected in metallurgical materials using spot tests. Give necessary chemical equations.
   i. Aluminium .
   ii. Copper. [6+10]
3. (a) Describe the procedure for Pb determination in Sn base alloys.
   (b) How is Sn estimated in Cu Alloys by volumetric method. [8+8]
4. (a) Discuss the various methods for the estimation of Cr in alloy steels.
   (b) How is Phosphorous in Iron determined by Volumetric method. [8+8]
5. (a) List the different methods for determining iron content, in Iron oxes.
   (b) Discuss the principle involved in the determination of iron content in iron ores by any one method with relevant equations. [8+8]
6. In which analysis process the standard series method is being employed. Explain the method in detail with the help of an example and a relevant figure. Explain the advantages and limitations of this method. [16]
7. (a) What is the fundamental principle of amperometric titration?
   (b) With neat sketches, explain the technique of amperometric titrations with the dropping mercury electrode.
   (c) What is the use of concentrated reagents? [5+6+5]
8. (a) Discuss general considerations of high frequency conductometric titrations.
   (b) Give an account on apparatus used in high frequency conductometric titrations. [8+8]

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Code No: RR11801 **Set No. 2**

I B.Tech Supplementary Examinations, November/December 2005
METALLURGICAL ANALYSIS
(Metallurgy & Material Technology)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Discuss the following with reference to reduction of bulk samples [5+5]
   i. Tabling.
   ii. Mechanical dividers.
   (b) Write briefly on the significance of sampling in the analysis of raw materials. [6]
2. Write in detail the qualitative analysis of cations. Give suitable examples and reactions. [16]
3. How is Copper determined in Brasses, Aluminium Broznes and Nickel Silvers? [5+6+5]
4. (a) Describe the various methods used to estimate the Mn in Ferrous materials.
   (b) With a neat sketch explain the determination of Carbon in ferrous materials by using skrohlein apparatus. [8+8]
5. (a) Classify the following fluxes as acidic / basic / nuetral fluxes
   i. lime
   ii. $Na_2B_4O_7$
   iii. flourspar
   (b) Which of the following fluxes are oxidizing / reducing?
   i. Red lead.
   ii. heamatite.
   iii. charcoal.
   iv. pottasium cyanide.
   (c) Define the following terms: parting, bullion, matte, inquartation assaying, cupellation [6+4+6]
6. (a) What is duplication method in colorimetry? What are its limitations?
   (b) Discuss the theory of colorimetry used for quantitative analysis of metallurgical samples. [7+9]
7. (a) Give an account on the preparation and the use of the hydrogen electrode.
   (b) What are pH meters? Discuss mode of operation. [8+8]

8. (a) With the help of a Wheatstone bridge circuit, explain measurement of conductivity.
   (b) Discuss the basis of conductometric titrations. [10+6]

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Code No: RR11801 **Set No. 3**

I B.Tech Supplementary Examinations, November/December 2005
METALLURGICAL ANALYSIS
(Metallurgy & Material Technology)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Outline the problems associated with sampling of gaseous products.
   (b) Describe a gas sampling system with a neat diagram. [8+8]
2. (a) Write a brief note on 'theory of acid-base indicators'. [4]
   (b) Explain how the following reagents are useful in the qualitative analysis of metal ions.
      i. 1-nitro-2-naphthol.
      ii. dimethyl glyoxime.
      iii. Chramotrophic Acid. [4x3=12]
3. Write the procedure for finding the Phosphorous content in Phosphor bronzes and Gun metals. [16]
4. (a) How is Tungsten estimated by phenazone method in ferrous materials.
   (b) Discuss the Silicon estimation in Ferrous materials by Gravimetric method. [8+8]
5. How is the lime content in lime stone determined quantitatively ? Explain in detail. [16]
6. (a) Explain when Beer's law, generally hold good 'for wide range of concentrations'.
   (b) Explain the alternate method you suggest for solutions which do not follow Beer's law. [8+8]
7. (a) What is the fundamental basis of potentiometry?
   (b) Name various types of indicator and reference electrodes and briefly explain any one of them under each category. [7+9]
8. (a) What is polarography? Discuss the basic principle involved in it.
   (b) With the help of a neat sketch, discuss the use of dropping mercury electrode in polarography. [8+8]

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Code No: RR11801 **Set No. 4**

I B.Tech Supplementary Examinations, November/December 2005
METALLURGICAL ANALYSIS
(Metallurgy & Material Technology)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Describe how a gas sample is collected from a gas stream. [6]
   (b) Write briefly on the following with reference to reduction of bulk sample. [5+5]
      i. Coning & quartering.
      ii. Riffle splitter.

2. (a) Give the essential requirements for the successful application of spot tests for the identification of radicals.
   (b) How are the following detected? Give the necessary chemical reactions
      i. Iron.
      ii. Chromium. [6+10]

3. Discuss in detail about Zinc determination in Tin-bronzes, Gun metals and phosphor bronzes. [16]

4. (a) With a neat sketch explain Sulfur estimation in steels by evolution method.
   (b) Describe the procedure for Mo determination by Volumetric method in steel. [8+8]

5. (a) What is fire assaying? How is it done?
   (b) What are the advantages of fire assaying over wet analysis methods?
   (c) Explain with an example the basic principles involved in fire assaying.[5+6+5]

6. Write short notes on
   (a) standards used in colorimetry and
   (b) duplication method of colorimetry. [8+8]

7. (a) Discuss determination of the absorption curve and concentration of a substance (potassium nitrate) method.
   (b) What is the chief advantage of colorimetric and spectrophotometric methods? [9+7]

8. (a) What is polarograph & Explain with the help of a circuit diagram.
   (b) Briefly describe how a polarogram is obtained by a manual polarograph.[8+8]

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