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B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2007.

Second Semester

Mechanical Engineering

CY 1153 — CHEMISTRY — II

(Common to Aeronautical Engineering, Automobile Engineering, Mechatronics Engineering, Metallurgical Engineering and Production Engineering)

(Regulation 2004)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1.   What is knocking?

2.   Define the terms : Gross calorific value and net calorific value.

3.   Why is polymer alloy?

4.   What should be the flash point of a good lubricant? Give reason.

5.   What is differential aeration corrosion?

6.   What is caustic embrittlement?

7.   State phase rule.

8.   What are the limitations of powder metallurgy?

9.   What is EDTA? Draw its structure.

10. How can you estimate Nickel gravimetrically?

PART B — (5 × 16 = 80 marks)

11. (a) (i)   Explain the proximate analysis of coal.   (8)

         (ii) Mention the various fractions obtained during the fractional distillation of crude petroleum oil. Give their composition and uses.
                                                                                               (8)

Or

     (b) (i)   Describe the manufacture of producer gas. Detail the reactions involved.   (8)

         (ii) With a block diagram explain Bergius process obtaining synthetic petrol.   (8)

12. (a) (i)   What are abrasives? How are they classified? Discuss the characteristics of (1) Diamond and (2) Silicon carbide as abrasive materials.   (8)

         (ii) Explain the following properties of refractories :

               (1) Refractoriness

               (2) Thermal spalling.   (8)

Or

     (b) (i)   What are the advantages of solid lubricants? Discuss the structure of graphite and its use as a solid lubricant.   (8)

         (ii) What are polyamides? Discuss the important characteristics of any two important polyamides.   (8)

13. (a) (i)   Explain the mechanism of wet corrosion by oxygen absorption type.
                                                                                               (8)

         (ii) Give an account of cathodic protection by impressed current and sacrificial anodic methods.   (8)

Or

     (b) (i)   What are ion-exchange resins? How will you purify water using ion exchange resin?   (8)

         (ii) With a neat diagram explain reverse osmosis process of desalination.   (8)

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14. (a) (i) Draw and explain the phase diagram for Lead–Silver system. (8)

    (ii) Explain the condensed phase rule. Mention the applications of phase rule. (8)

Or

(b) (i) Detail the various steps involved in the preparation of metal powders. (8)

    (ii) Explain the following processes :

    (1) Compacting and (2) Sintering. (8)

15. (a) (i) What is iodometry? Explain the principle involved in the estimation of copper iodometrically. (8)

    (ii) Outline the principle involved in the estimation of Zinc complexometrically. (8)

Or

(b) (i) Explain the principle involved in the estimation of ferrous iron using external indicator dichrometrically. (8)

    (ii) Draw a schematic diagram of instrumentation used in atomic absorption spectroscopy. (8)

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