2E1004

B. Tech. (Sem. II) (Back) Examination, June/July - 2012
Common for All Branch
203 Chemistry

Time : **3 Hours]**

[Maximum Marks : **80**
[Min. Passing Marks : **24**

*Attempt any **five** questions, selecting **one** **question** from **each** **unit.** All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary.) Any data you feel missing suitably be assumed and stated clearly, Units of quantities used/calculated must be stated clearly.*

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1._____ Nil _____   2._____ Nil _____

UNIT - I

1 (a) What is hardness of water ? Describe in detail the EDTA method of hardness determination.

8

   (b) A sample of water contain following impurities :
   (i) $Ca(HCO_3)_2$ = 8.1 mg/l
   (ii) $Mg(HCO_3)_2$ = 7.3 mg/l
   (iii) $CaSO_4$ = 13.6 mg/l
   (iv) $MgSO_4$ = 12 mg/l
   (v) $MgCl_2$ = 1.9 mg/l
   (vi) $NaCl$ = 20 mg/l
   Calculate the quantity of lime and soda required for the softening of 60,000 liters of hard water if the purity of lime is 90% and soda is 95%.

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OR

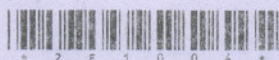1 (a) Describe hot lime-soda process for water softening.

6

   (b) Write short notes on :
   (i)   Break-point chlorination.
   (ii) Boiler corrosion.

$3 \times 2 = 6$

(c) The total hardness of 100 litres of water was completely removed by a zeolite softener. The zeolite softener required 30 lit of NaCl solution containing 1500 mg/lit of NaCl for regeneration. Calculate the hardness of water in ppm.

4

UNIT - II

2 (a) Describe the determination of calorific value of solid fuel by using bomb calorimeter.

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(b) 1 kg of solid fuel contain following constituents :

(i)   C = 72%

(ii) H = 5%

(iii) O = 4%

(iv) N = 2%

(v)   S = 3% and remaining ash.

Calculate the quantity of oxygen and air required for complete combustion.

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OR

2 (a) Write short notes on :

(i)   Otto-Hoffmann's by product coke oven process

(ii) flue gas analysis by Orsat's apparatus.

6×2=12

(b) A sample of coal contains C=93%, H = 5% and remaining ash. The following data was obtained when the coal was tested in bomb calorimeter.

(i)   Weight of coal burnt = 0.92 gm

(ii) Weight of water taken = 2550 gm

(iii) Water equivalent of bomb calorimeter = 500 gm

(iv) Rise in Temperature = 2.42 °C

(v)   Fuse wire correction = 10 Cal

(vi) acid correction = 50 Cal.

Calculate the HCV and LCV of coal sample if latent heat of condensation of steam as 550 cal/gm.

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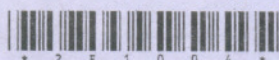
UNIT - III

3   (a)   What is Gibb's phase fule ? Discuss the water system with the help of phase diagram.

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   (b)   Write short note on the following :
      (i)   Natural rubber and vulcanization.
      (ii)   Thermoplastic and Thermosetting resins.

$2 \times 4 = 8$

OR

3   Write short notes on the following :
   (i)   Bakelite
   (ii)   Reduced phase rule
   (iii) flash and fire point
   (iv)   Solid lubricants

$4 \times 4 = 16$

UNIT - IV

4   (a)   Describe cathodic protection methods for corrosion control.

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   (b)   What is optical fiber ? Describe the construction, working and applications of optical fiber.

8

OR

4   (a)   What are superconductors ? Describe their properties and uses.

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   (b)   Write short notes on any two of the following :
      (i)   fullerenes
      (ii)   Organic electronic material
      (iii) Galvanic corrosion
      (iv)   Pitting corrosion.

$5 \times 2 = 10$
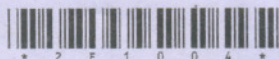
UNIT - V

5   (a)   Describe the manufacturing of Portland cement by rotary Kiln technology.

10

      (b)   Write short note on Seger cone test of refractories.

6

OR

5   (a)   What is glass ? How it is manufactured ? Explain the importance of annelaing of glass.

12

      (b)   Write short note on setting and hardening of cement.

4