Combined First and Second Semester B.Tech. Degree Examination,
March 2018
(2013 Scheme)
13.103 : ENGINEERING CHEMISTRY (ABCEFHMNPRSTU)

Time : 3 Hours
Max. Marks : 100

PART – A

Answer all questions. Each question carries 2 marks. 

1. Explain the role of plasticizers in moulding.
2. State and explain Beer-Lambert’s law.
3. What is Helmholtz electrical double layer ?
4. What are corrosion inhibitors ? Give one example.
6. What are the major causes behind boiler corrosion ?
7. What is meant by sewage ? Write any two characteristics of sewage.
8. Which is greater BOD or COD ? Why ?
9. Distinguish between octane number and cetane number.
10. Write a brief note on Biodiesel.

(10×2=20 Marks)

PART – B

Answer any one full question from each Module. Each question carries 20 marks. 

(20×4=80 Marks)

Module I

11. a) Describe the principle, instrumentation and applications of TGA.
   
   b) Discuss the structure of natural rubber. Explain why natural rubber needs vulcanization. How vulcanization is carried out ?

   OR

P.T.O.
12. a) Describe the principle, instrumentation and applications of electronic spectroscopy.
   b) Write note on NMR spectroscopy. How will you distinguish between 1-bromo propane and 2-bromo propane using $^1\text{H}$-NMR spectroscopy? (10+10)

Module II

13. a) Discuss the working of a glass electrode with a neat sketch. How will you determine the pH of a solution experimentally using glass electrode?
   b) Describe the metallic and non metallic coating for corrosion prevention. (10+10)
      OR

14. a) Illustrate the construction, working and application of concentration cell.
   b) Explain the mechanism of rusting of iron under different environmental conditions. Give details of corrosion control through cathodic protection. (10+10)

Module III

15. a) Calculate the temporary and total hardness of a sample of water containing $\text{Mg}(\text{HCO}_3) = 73 \text{ mg/L}$; $\text{Ca}(\text{HCO}_3)_2 = 162 \text{ mg/L}$; $\text{MgCl}_2 = 95 \text{ mg/L}$ and $\text{CaSO}_4 = 136 \text{ mg/L}$. (At. mass : $\text{Mg} = 24$, $\text{Ca} = 40$, $\text{C} = 12$, $\text{O} = 16$, $\text{Cl} = 35.5$, $\text{S} = 32$)
   b) What are the effects of air pollution on environment? Discuss the methods employed to control air pollution. (8+12)
      OR

16. a) What are the various steps involved in the purification of water for domestic use?
   b) i) Discuss the cause and consequence of photochemical smog.
      ii) Write note on causes and consequences of ozone depletion. (10+5+5)

Module IV

17. a) Discuss the classification, preparation and applications of nanomaterials.
   b) Describe the method of determination of calorific value of a solid fuel by bomb calorimeter. (10+10)
      OR

18. a) Describe the mechanism involved in the setting and hardening of cement.
   b) i) Write note on dimensional stability and porosity of refractories.
      ii) Describe the manufacture of carborundum. (10+5+5)