15 a) Classify liquid crystals and give suitable example for each.   5
    b) Define the terms:
       i)   Phase
       ii)   Component   5

16 a) Explain the principle and applications of potentiometric titrations.   5
    b) Write the electrode representation and electrodic reaction for the reduction process of
       i)   Calomel electrode and
       ii)   Quinhydrone electrode   5

17 a) What is phenolpthalien and methyl orange alkalinity of water? Explain.   5
    b) Give one example each for   5
       i)   Addition polymer
       ii)   Condensation polymer
       iii) Co-polymer
       and give their structure

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FACULTY OF ENGINEERING & INFORMATICS

B.E. I – Year (New) (Suppl.) Examination, January 2016

Subject: Engineering Chemistry

Time: 3 Hours

Max.Marks: 75

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1	Define single electrode potential.	2
2	What is a battery? Give one example each for primary and secondary batteries.	3
3	Explain sacrificial anodic method of protecting corrosion.	3
4	Define the term "Reverse osmosis" and what is its use.	2
5	Write the structure of Bakelite.	2
6	What is conducting polymer? Give one example.	3

7 Define the terms:
   i) HCV and
   ii) LCV of a fuel.   2

8	Explain various sources of Bio Diesel.	3
9	What is Pattinson's process? Explain.	3

10 Define:
   i) Saponification number and
   ii) Acid value.   2

PART – B (5x10 = 50 Marks)

11 a) Construct a cell for the reaction

$$Fe + Ni^{2+} \rightarrow Fe^{2+} + Ni$$
$$\text{(s)} \quad \text{(0.1m)} \quad \text{(0.01m)} \quad \text{(s)}$$

Calculate the e.m.f. of the cell at 25°C from the following S.R.P. values data

$E^o_{Fe^{2+}/Fe}$ = -0.440 V and $E^o_{Ni^{+2}/Ni}$ = -0.250 V

Is the cell reaction spontaneous or not?   5

b) Discuss the construction, working and applications of Nickel-Cadmium battery.   5

12 a) Explain:
   i) Galvanic corrosion
   ii) Electroplating.   5

b) Describe ion-exchange method of softening of water.   5

13 a) Write the preparation and properties of
   i) Poly urethane and
   ii) Buna – S rubber.   6

b) Discuss the applications of conducting polymers.   4

14 a) What is meant by cracking of petroleum? Describe moving bed catalytic cracking method used for cracking of petroleum.   6

b) Write the characteristics of a good propellant.   4

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FACULTY OF ENGINEERING

B.E. I – Year (New) (Main) Examination, June / July 2015

Subject: Engineering Chemistry

Time: 3 Hours   Max. Marks: 75

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1 Represent Calomel electrode and write the electrodic reaction for reduction process and mention the S.R.P. value of the electrode.   3
2 Draw the conductometric titration plot of weak acid against strong base and explain the graph.
3 What is waterline corrosion? Explain.   3
4 Name three substances used for sterilization of water.   2
5 Define the term "functionality" of monomers. Explain its significance with a suitable example.   2
6 Explain the types of composite materials.   3
7 Define octane number. How will you improve the anti-knocking value of fuel?   3
8 Classify rocket fuels.   2
9 Define phase and component.   2
10 Classify lubricants and give one example each.   3

PART – B (5x10 = 50 Marks)

11 a) For the cell reaction $Zn(s)+Fe^{2+} \rightleftharpoons Zn^{2+}+Fe(s)$. Calculate the reactive concentration of Zn^{2+} and Fe^{2+} at which the overall cell E.M.F. becomes zero.

$E^{o}_{Fe^{2+}/Fe}$ = -0.440 V and $E^{o}_{Zn^{2+}/Zn}$ = -0.760 V.   6

   b) Explain hydrogen – oxygen fuel cell.   4

12 a) Define metallic corrosion. Explain electrochemical theory of corrosion.   6
   b) What are the characteristics of a paint? Name the various constituents of paints.   4

13 a) Differentiate between homopolymer and co-polymer.   4
   b) What are conducting polymers? Discuss the applications of conducting polymers.   6

14 a) What are chemical fuels? How are they classified? Give suitable examples for each class.
   b) A gaseous fuel has the following composition by volume: H_2 = 25%, methane = 30%, ethane = 11%, ethylene = 4.5%, butane = 2.5%, CO = 6.0%, CO_2 = 8%, O_2 = 2% and N_2 = 12%. Calculate the air fuel ratio and volumetric analysis of dry products of combustion using 40% excess air.   6

15 a) Write the principles of Green Chemistry.   5
   b) Draw a neat diagram of water system and label the parts. Calculate the degree of freedom at triple point.   5

16 a) Derive Nernst equation.   4
   b) Differentiate between potentiometric titrations and pH metric titrations by taking a suitable example like HCl Vs NaOH.   6

17 a) How do you determine the permanent hardness of water by EDTA method? Explain.   5
   b) Explain the mechanism of extreme-pressure lubrication.   5

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