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Seat No.
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**F.E. EXAMINATION, 2019**  
**ENGINEERING CHEMISTRY**  
**(2015 PATTERN)**

**Time : Two Hours**

**Maximum Marks : 50**

**N.B. :—**

(i) Neat diagrams must be drawn wherever necessary.

(ii) Figures to the right indicate full marks.

(iii) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(iv) Assume suitable data, if necessary.

1. (a) Explain boiler corrosion giving causes, reactions involved and preventive measures taken. [6]
- (b) Explain conductometric titration between weak acid and strong base with the help of titration curve and reaction. [3]
- (c) Describe the construction of glass electrode with figure and half cell representation. [3]

Or

2. (a) Draw a labelled block diagram of single beam spectrophotometer and explain the components involved. [6]
- (b) Explain any *three* principles of green chemistry with relevant examples. [3]

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- (c) 100 ml of a hard water sample requires 18 ml of 0.01 M EDTA solution. 100 ml of the same sample after boiling and filtration required 7 ml of the same EDTA solution. Calculate the total, temporary and permanent hardness of the water sample. [3]

3. (a) Explain the mechanism of free radical polymerization using suitable example. [6]
- (b) Explain how percentage moisture and percentage volatile matter is determined in proximate analysis of coal. [3]
- (c) The following observations were noted in a bomb calorimeter experiment — Mass of coal sample = 1.708 g; weight of water in calorimeter = 2000 g; water equivalent of calorimeter = 580 g; initial temperature = 23.252°C; final temperature = 26.773°C. Find the GCV of the coal sample. Also calculate the NCV if given coal contains 5% hydrogen. [3]

Or

4. (a) How is the percentage of carbon, hydrogen and sulphur determined in ultimate analysis of coal ? [6]
- (b) Differentiate between LDPE and HDPE with respect to preparation, properties and applications. [3]
- (c) Give the preparation, properties and applications of styrene-butadiene rubber (SBR). [3]

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5. (a) What are the problems involved in storage and transportation of hydrogen ? Explain any *two* methods of hydrogen storage. [6]
- (b) Explain the structure, properties and applications of fullerene. [4]
- (c) What are the isotopes of carbon ? Give their applications. [3]

Or

6. (a) Differentiate between the structure, properties and applications of diamond and graphite. [6]
- (b) Give the preparation and applications of silane and germane. [4]
- (c) Explain the manufacture of hydrogen by steam reforming of methane. [3]

7. (a) Explain the hydrogen evolution and oxygen absorption mechanism of wet corrosion. [6]
- (b) Discuss any *four* factors affecting the rate of corrosion. [4]
- (c) Define galvanization. Explain the process involved with the help of a neat diagram. [3]

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- Or
8. (a) What is the principle of cathodic protection ? Explain cathodic protection using sacrificial anode and impressed current method. [6]
- (b) Write the mechanism of dry corrosion due to oxygen. What is Pilling-Bedworth ratio ? Give its significance. [4]
- (c) Explain electroplating with help of figure and reactions involved. [3]

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