



[4656] – 102

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| Seat No. | |
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**F.E. (Semester – I) Examination, 2014
ENGINEERING CHEMISTRY
(2012 Pattern)**

Time : 2 Hours

Max. Marks : 50

Instructions : 1) Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, Q. 7 or Q. 8.

2) Neat diagram must be drawn **wherever** necessary.

3) Figure to the **right** side indicate **full** marks.

4) **Use** of logarithmic table or electronic pocket calculator is **allowed**.

5) Assume suitable data if **necessary**.

1. A) Define scale and sludge. Give the causes, disadvantages and removal of scale and sludge formation in boiler. 6
- B) State and derive Beer Lamberts law. 3
- C) Define specific conductance, equivalent conductance and molar conductance. 3

OR

2. A) Explain the pH metric titration of - mixture of weak acid - strong acid against std. alkali giving chemical reaction procedure with titration curve. 6
- B) What are merits of green synthesis and demerits of traditional synthesis of indigo dye ? 3
- C) A water sample is non alkaline to phenolphthalein indicator. However, 100 ml of the same sample on titration with 0.02 N H₂SO₄ requires 14.5 ml of acid to obtain end point using methyl orange indicator. Identify type of alkalinity and determine its extent. 3
3. A) Give preparation reaction, properties and uses of following polymers. 6
 - a) LDPE
 - b) Styrene - butadiene rubber
- B) What is biodiesel ? Give its synthesis and advantages. 3
- C) A gaseous fuel used in internal combustion engine contain CH₄ = 45%, H₂ = 30%, CO = 20%, N₂ = 5% by volume. Find the minimum quantity (volume) of air required for complete combustion of 1 M³ of gaseous fuel. 3

OR

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4. A) Draw neat labelled diagram and give the construction, working of bomb calorimeter to determine GCV of a fuel. 6
- B) Distinguish thermoplastic and thermosetting polymer with suitable example. 3
- C) What is biodegradable polymer ? Give the structure of PHBV and its applications ? 3
5. A) Explain structure, properties and applications of fullerene. 5
- B) Explain industrial production of hydrogen by steam reforming of methane and coke. 4
- C) Explain the structure and properties of graphite. 4

OR

6. A) Give the isotopes of hydrogen with their applications and write the properties of hydrogen which makes it more difficult to store and transport. 5
- B) What are the types of CNTs with respect to their structure ? Give the applications of CNTs. 4
- C) Explain chemical storage method of hydrogen gas in the form of alanates and metal hydrides. 4
7. A) Define corrosion and explain effect of following factors on rate of corrosion 5
- i) Purity of metal
- ii) Relative area of anode and cathode.
- B) State the types of oxide film formed on the surface of following metals with reactions. 4
- 1) Na 2) Al
- 3) Au 4) Mo
- C) What is cathodic coating ? Explain timing with neat labelled diagram to protect metal from corrosion. 4

OR

8. A) Explain electrochemical corrosion by H_2 evolution and O_2 absorption mechanism. 5
- B) What is principle of cathodic protection and explain it with any one suitable method ? 4
- C) Define electroplating. Explain electroplating process with neat labeled diagram and applications. 4

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