Total No. of Questions :8]

SEAT No. :

**P4025**

[Total No. of Pages :3

# [5351] - 105

## F.E. Engineering

## ENGINEERING CHEMISTRY

## (2015 Pattern) (Semester - I & II)

*Time : 2 Hours]* *[Max. Marks :50*

***Instructions to the candidates:***

1) ***Neat diagrams must be drawn whenever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data if necessory.***
4) ***Use of electronic pocket calculator is allowed (non-programmable).***

***Q1)*** a) What are the causes, disadvantages and preventions of scales and sludges in boilers. **[6]**

b) Explain construction of calomel electrode with labelled diagram and its representation. **[3]**

c) Explain conductometric titration of precipitation reaction ($AgNo_3$ and KCl) using titration curve and reactions involved. **[3]**

OR

***Q2)*** a) Explain different types of electronic transitions that occur in the molecule after absorbance of UV radiations with suitable examples and labeled diagram. **[6]**

b) Explain Phosphate conditioning method of internal treatment of boiler feed water with principle. **[3]**

c) 50 ml water sample requires 3.7 ml of 0.025 N $H_2SO_4$ upto phenolphthalein end point and further 4.8 ml upto methyl orange end point during the titration. Calculate types and amounts of alkalinity present in water. **[3]**

***P.T.O.***

***Q3)*** a) Explain free radical polymerization mechanism with suitable example. **[6]**

b) Give the reaction for preparation of biodiesel. State the advantages of biodiesel. **[3]**

c) 0.5 g of coal sample on complete combustion was found to increase the weight of U tube containing $CaCl_2$ by 0.2 g and U tube containing KOH by 1.2 g. Calculate % of C and H in the given coal sample. **[3]**

OR

***Q4)*** a) What are fuel cells? Explain working of PAFC with figure and cell reactions . State their advantages and limitations. **[6]**

b) What is conducting polymer? Give the structural requirement and its applications. **[3]**

c) Give preparation reaction, properties and applications of SBR. **[3]**

***Q5)*** a) Explain production of hydrogen by steam reforming of methane and coke with reaction conditions and removal of $CO_2$. **[6]**

b) Explain the structure, properties and applications of Graphite. **[4]**

c) Explain physical methods for storage of hydrogen gas. **[3]**

OR

***Q6)*** a) Explain structural features of fullerene with diagram, properties and applications. **[6]**

b) Explain the structure, properties and applications of diamond. **[4]**

c) What are saline hydrides? Give preparation reaction of Lithium hydride with any two applications. **[3]**

***Q7)*** a) Explain the wet corrosion mechanism of hydrogen evolution and oxygen absorption. **[6]**

b) Discuss any four factors affecting rate of corrosion with respect to nature of environment. **[4]**

c) Compare: Cathodic protection & anodic protection. **[3]**

OR

***Q8)*** a) What is Pilling-bedworth rule? State and explain nature of oxide films formed on metal surface along with suitable examples and chemical reactions. **[6]**

b) What is cathodic protection? Explain the method involved using sacrificial anode and give its applications. **[4]**

c) Explain metal cladding method with suitable example. **[3]**