18103

Roll No.

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B. Tech. I - Sem. UD (Main) Exam., Jan. - 2020

1FY2 – 03 Engineering Chemistry

Time: 3 Hours

Maximum Marks: 100

Min. Passing Marks: 33

Instructions to Candidates:

***PART - A** : Short answer questions (up to 25 words) 10 × 2 marks 20 marks.*
*All **ten** questions are compulsory.*

***PART - B** : Analytical Problem Solving questions (up to 100 words) 6×5 marks 30 marks*
*Candidates have to answer **six** questions out of **eight.***

***PART - C** : Descriptive Analytical Problem Solving questions 5×10 marks 50 marks.*
*Candidates have to answer **five** questions out of **seven.***

1. NIL 2. NIL

PART – A

Q.1 How are exhausted ion – exchange resins regenerated?

Q.2 What happens when temporary hard water is boiled? Give equations.

Q.3 What is power alcohol?

Q.4 What is sweetening of petrol?

Q.5 What is chemical formula of rust?

Q.6 The rate of metallic corrosion increases with increase in temperature. Give reason.

Q.7 Write the formula and uses of Paracetamol.

Q.8 Write the formula with percentage of borosilicate glass.

Q.9 Define Emulsification.

Q.10 Write the components with percentage of Portland cement.

PART – B

Q.1 How calorific value of a gaseous fuel is determined by Junker's calorimeter.

Q.2 What are the requirements of boiler feed water?

Q.3 Define cloud and pour points and how it is determined in laboratory?

Q.4 Explain the mechanism of free radical substitution reaction with suitable example.

Q.5 Explain role of gypsum in cement manufacturing.

Q.6 Differentiate between chemical corrosion and electrochemical corrosion.

Q.7 Write short notes on –

(a) Galvanic corrosion

(b) Breakpoint chlorination

Q.8 What is the significance of octane number and cetane number and for which these are used. How these can be improved?

PART – C

Q.1 0.72gm of a fuel containing 80% carbon, when burnt in a Bomb calorimeter, increased the temperature of water from 27.3° C to 29.1° C. If the calorimeter contains 250 gms of water and its water equivalent is 150 gms, calculate the HVC of fuel. Answer is calculated in kJ/kg.

Q.2 A water sample on analysis give following data –

Ca^{+2} = 30mg/L; Mg^{+2} = 24mg/L; CO_2 = 24mg/L; HCl = 50mg/L; K^+ = 10mg/L;

Calculate the quantity of lime (90% pure) and soda (94% pure) required to soften one million liters of water sample.

Q.3 Define cement and explain its manufacturing by R.K. method with chemical reaction and neat diagram.

Q.4 Explain scale formation and slug formation in boilers. How are they removed?

Q.5 Write short notes on any two –

(a) Refining of gasoline

(b) Characteristics of a good fuel

(c) Metallurgical coke

Q.6 (a) How is corrosion prevented by cathodic protection? Explain.

(b) Explain Pitting corrosion

Q.7 (a) Explain thick and thin layer mechanism of lubrication.

(b) Explain general chemistry of different types of glass.
