B.E. I & II First/Second Semester Old (C.B.S. Pattern)

111 - Applied Chemistry

P. Pages : 2 **GUG/W/18/1455**

Time : Three Hours * 1 1 5 3 * Max. Marks : 80

Notes : 1. All questions carry equal marks.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Diagrams and Chemical equation should be given wherever necessary.

1. a) A water sample on analysis gave the following data: **11**

$MgSO_4$ = 60 ppm, $Mg(HCO_3)_2$ = 73 ppm
$CaSO_4$ = 68 ppm, NaCl =58 ppm,
$CaCl_2$ = 111 ppm,

Calculate the amount of lime (90% pure) and soda (95% pure) required for softening 80,000 litre of water.

If 80,000 litre of the same water is passed through a Zeolite bed, how much NaCl will be required for its regeneration? **5**

OR

2. a) Describe Break point chlorination. State their significance. **6**

b) Explain the softening process for hard water which is to be used for high pressure boiler. **7**

c) What is caustic embrittlement? Discuss its preventive measures. **3**

3. a) Explain mechanism of Corrosion by direct chemical attack. **6**

b) How design and material selection help to control metallic corrosion? **6**

c) Write short notes on: **4**
i) Water line Corrosion.
ii) Cathodic Protection.

OR

4. a) Give Reasons. **6**
i) Steel Pipe connected to copper plumbing gets corroded.
ii) Wire mesh corrodes faster at the joints.
iii) Rusting of iron is quicker in saline water.

b) Write advantages, applications and limitations of fuel cell. **6**

c) Discuss factors affecting rate of Corrosion. **4**

5. a) Discuss the process of manufacturing of Portland cement by dry process. **6**

b) Discuss the characteristics of microscopic constituents of Portland cement. **6**

c) Explain the concept of carbon credits. **4**

OR

6. a) What is soundness of cement? **3**

b) Explain setting and hardening in Portland cement. **3**

c) Explain any six principles of green chemistry. **6**

d) Write a short note on ready mix concrete. **4**

7. a) Describe the construction and working of Bomb calorimeter. **6**

b) Explain Fischer Tropsch's process for gasoliene synthesis. **6**

c) A boiler is fired with coal having C = 78%, H = 6%, S = 1.5%, O = 5% and rest Nitrogen. Calculate gross and net calorific value of coal using Dulong's formula. **4**

OR

8. a) Calculate net calorific value of gaseous fuel at NTP from data obtained during determination of calorific value using Boy's calorimeter volume of gaseous fuel burnt. **6**

at NTP = 0.089 m^3
weight of water used for.
cooling = 31 kg.
Weight of steam condensed = 0.03 kg
Temperature of incoming water = 20.6º C
Temperature of outgoing water = 33.4º C

b) i) What is octane number? **4**
ii) What is cetane number?

c) Write short note on. **6**
i) CNG ii) Biodiesel.

9. a) Distinguish between Boundary & Hydrodynamic lubrication with reference to film thickness and mechanism. **6**

b) A lubricating oil has same viscosity as standard naphthenic and paraffinic type oils at 210ºf. Their viscosities at 100º f are 340 SUS, 460 SUS and 230 SUS resp. find viscosity index of the oil. **4**

c) Define Cloud point and pour point. **3**

d) Define flash point and fire point. **3**

OR

10. a) A boiler is fired with a coal having following composition. C = 74%, H = 6.8%, O=13.2%, N =2.1%, S =1.0% and remaining ash.
calculate:

i) Minimum theoretical air required for complete combustion of 1 kg fuel. **6**

ii) Percentage composition of dry flue gas by mass it 20% excess air is used. **6**

b) Explain drop point method for testing of semisolid lubricant. **4**

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