

Answer key
 Engineering Chemistry - I
 FE (comp/IT) supplementary

Q.1. Attempt all.

a) Distinguish between Galvanizing and Tinning -
 Any 3 points - 3M

b) To calculate acid value :-

① Wt. of oil = density \times volume

= 0.86×20

= 17.2 gm \longrightarrow 1M

② Acid value = $\frac{V \times N \times 56}{W}$

= $\frac{2.5 \times 0.1 \times 56}{17.2}$

= 0.81 mg of KOH \longrightarrow 2M

3M

c) Explanation and reason of low rate of corrosion of Mo is influenced by atm. oxygen - (3M)

d) Non-combustible matter of fuel - 2M
 Significance - 1M

3M

e) Scale formation meaning \longrightarrow 1.5M
 Drawbacks \longrightarrow 1.5M

3M

Q.2

a) Lubrication \longrightarrow Definition - 1M

Diagram - 1M

Explanation - 2M

4M

(b) (i) Strength of standard hard water = 1 mg/ml
- 1m

(ii) Strength of 1 ml EDTA =

$50 \text{ ml SHW} = 25 \text{ ml EDTA}$

$50 \times 1 \text{ mg CaCO}_3 \text{ eq.} = 25 \text{ ml EDTA}$

$\therefore 1 \text{ ml EDTA} = \frac{50}{25} \text{ mg CaCO}_3 \text{ eq.}$

$1 \text{ ml EDTA} = 2 \text{ mg CaCO}_3 \text{ eq.}$

(2) Total hardness :-

$50 \text{ ml water sample} = 40 \text{ ml EDTA}$

$\therefore 1 \text{ lit w/s Total H} = 40 \times 2 \times 20$
 $= 1600 \text{ mg CaCO}_3 \text{ eq.}$

(3) Permanent Hardness \Rightarrow

$50 \text{ ml B/F W S} = 25 \text{ ml EDTA}$

$\therefore \text{Permanent H in 1 lit w/s} = 25 \times 2 \times 20$
 $= 1000 \text{ mg CaCO}_3 \text{ eq.}$

(4) Temp. H = Total H - Perm. H

$= 1600 - 1000$

$= 600 \text{ ppm.}$

(c) Factors affecting rate of corrosion -

(a) Position of metal in galvanic series - 2m

(b) pH of medium - 2m

(c) Purity of metal - 2m

Q. 3 (a) Write a note on - (i) Pitting corrosion - 2m

(ii) Stress corrosion - 2m

(iii) Intergranular c - 2m

4m
(any 2)

(b) Corrosion → Definition — 1m
 Principle of cathodic protection — 1m
 Sacrificial anodic protection — 3m } (5m)

(c) $\% C = \frac{\text{increase in wt. of KOH bulb} \times 12 \times 100}{\text{wt. of coal} \times 44}$
 $= \frac{4.88 \times 12 \times 100}{1.5 \times 44} = \frac{5856}{66} = \underline{88.7\%}$ — 3m

$\% H = \frac{\text{increase in wt. of CaCl}_2 \text{ tube} \times 2 \times 100}{\text{wt. of coal} \times 18}$
 $= \frac{1.25 \times 2 \times 100}{1.5 \times 18} = \frac{250}{27} = \underline{9.25\%}$ — 3m } (6m)

Q.4 (a) Definition of biodiesel — 1m
Transesterification reaction — 2m
Advantages of bio-diesel — 1m } (4m)

(b) Ion Exchange method — diagram — 2m
Softening & Regeneration reaction — 2m
Advantages — 1m } (5m)

(c) Definition ⇒ Cloud & pour point — 3m
& significance ⇒
Justification of selection of lubricant — 2m
Properties req. in lubricants — 1m } (6m)