00802 **B.Tech. Civil (Construction Management)/**
B.Tech. Civil (Water Resources Engineering)
Term-End Examination

June, 2019

ET-105(B) : CHEMISTRY

Time : 3 hours   *Maximum Marks : 70*

Note : (i) *Attempt any seven questions.*

(ii) *All questions carry equal marks.*

(iii) *Use of scientific calculator is permitted.*

1.   (a)   How many electrons, protons and neutrons   **4+6**
are there in :
(i)   Helium
(ii) Carbon
(iii) Fluorine and
(iv) Bismuth atoms

(b)   If the electron in a hydrogen atom goes from
n=10 state to the ground state, a photon will
be emitted. Calculate the wavelength of the
photon.

2.   (a)   What is a fuel cell ? Draw and explain   **5+5**
schematic representation of a H_2 - O_2 fuel
cell using an alkaline electrolyte.

(b)   Calculate the velocity of electrons ejected
from a platinum surface when a radiation
of wavelength 150 nm is incident on it. Take
work function for platinum as 5 eV.

3. (a) What do you understand by Genetic **5+5** Engineering ? Explain.

   (b) Which of the following are extensive properties and which are intensive properties.

   (i) Viscosity (ii) Temperature

   (iii) Weight (iv) Refractive index,

   (v) Pressure of a gas.

4. (a) A carnot's engine operates between a source **5+5** at 800 K and a sink at 400 K

   (i) Calculate the efficiency

   (ii) What will be the heat absorbed from the source to do a work of 2500 J ?

   (b) Calculate the pressure at which water must be heated to produce superheated steam at $150°C$, given that the latent heat of vaporisation of water is $2257 \ Jg^{-1}$ at $100°C$.

5. (a) 4.88g of calcium chloride (M.W 111) are **6+4** present in 52.8 ml of aqueous solution. The density of the solution is 1.12g/ml. Calculate the molarity, normality, molality and mole fraction.

   (b) When 2.94 moles of Iodine and 8.1 moles of hydrogen are heated at $444°C$, until equilibrium is established, 5.64 moles of HI are formed. Find the equilibrium constant.

6. (a) How would you convert 2-propanol to propene, propyne into 2-butene and 2-butene into butane ? **6+4**

(b) Describe in brief the thermosetting plastics.

7. (a) Explain the following with reason(s) : **5+5**
(i) Usually the first ionization energy of elements increases with the atomic number of elements in a period of the periodic table.
(ii) Fluorine has lower electron affinity than chlorine.

(b) (i) How is benzene converted to ethyl benzene ?
(ii) What are the characteristics of aromatic compounds ?

8. (a) Explain in brief the desirable features of an industrial process. **5+5**

(b) Describe two reactions for preparing ethylene glycol from ethylene. What are the uses of ethylene glycol ?

Physical constants :

$e = 1.6 \times 10^{-19}$ C

$\epsilon_0 = 8.854 \times 10^{-12}$ F/m

$M_e = 9.1 \times 10^{-31}$ kg

$h = 6.63 \times 10^{-34}$ m^2 kg/s

$R_H = 1.097 \times 10^7$ m^{-1}