[63] **SEAT No._____** *No. of printed pages : 03*

SARDAR PATEL UNIVERSITY

M. Sc. (Semester – IV) CBCS Examination
Thursday, 19th April 2018
2:00 p.m. to 5:00 p.m.
PS04ECHE03 Selected Topics in Physical Chemistry – II

Total Marks : 70

Note : Figures to the right indicate full marks.

Q . 1 Select the correct answer from the alternatives given below to the each question; [08]

[i] The process that converts solid coal into liquid hydrocarbons fuels is known as _____.

(a) cracking (b) carbonation
(c) liquefaction (d) catalytic conversion

[ii] The conductivity of micelles is _____ .

(a) higher than colloidal solution (b) lower than colloidal solution
(c) equals to colloidal solution (d) cannot correlate

[iii] Luminescence initiated by chemical reaction and not by irradiation is called _____.

(a) electrochemiluminescence (b) fluorescence
(c) emission (d) phosphorescence

[iv] The quantized vibrational energies are given by _____ .

(a) $E_\upsilon = ½ h \upsilon$ (b) $E_\upsilon = (\upsilon + ½) h \upsilon$
(c) $E_\upsilon = ½ (J + 1) h \upsilon$ (d) $E_\upsilon = (\upsilon + ½)$

[v] The equivalent conductivity of an anionic surfactant of the type N^+ and R^- in water is plotted against _____.

(a) the square root of the normality of the solution
(b) the dissolution of anion
(c) the CMC of the multiple dissociation
(d) the square of the normality of the solution

[vi] In _____, the energy release from a chemical reaction is directly converted to electrical energy.

(a) solar cell (b) electrolytic cell
(c) hydrogen/oxygen fuel cell (d) fossil – fuel power station

[vii] Pipeline natural gases are principally contains;

(a) Iso-butane, (b) Ethane, (c) Methane, (d) Propane

[viii] The statement "one quantum of light is absorbed per molecule of absorbing and reacting substance that disappears" was stated by _____.

(a) Beer-Lambert law (b) Warburn-Bodenstein law
(c) Stefan-Boltzmann law (d) Stark-Einstein law

(P.T.O.)

Q . 2 Answer the following in short ; (ANY SEVEN) [14]

[a] How photochemistry is valuable in your life ?

[b] What do you mean by resonance radiation ?

[c] Explain Jablonski Diagram.

[d] Give the expression quantum yield and quantum efficiency.

[e] Enlist difference between exciplex and excimer.

[f] What is hydrobphobic interaction?

[g] Give brief about reverse micelles.

[h] How fossil fuels are obtained ?

[i] How concentrator photovoltaic functions ?

Q . 3 [a] With the help of suitable diagram, discuss the various photo physical pathways for electronically excited molecules. [06]

[b] [i] Explain frank Condon principle with suitable figure. [03]

[ii] Discussion emission spectra observed through radiation after the excitation of polyatomic molecules. [03]

OR

[b] Describe the selection rule for the electronic energy states. What will be the term symbol for the O^+, F^-, Cl^- and N^+ ? [06]

Q . 4 [a] Derive the Stern Volmer equation from collision quenching theory. How the Stern Volmer equation deviates from the excitation states? [06]

[b] Explain FRET with its derived principle between two molecules with suitable spectral diagram. How FRET is applicable in biological systems? [06]

OR

[b] [i] Discuss about the factors affecting the excited state energy. [03]

[ii] What do you mean by photo induced energy transfer process ? [03]

Q . 5 [a] What is micellization? How the normality of the ionic compound like Na^+B^- and Na^+R^- affect the micellization of concentration ? Enlist the methods for determination of CMC. [06]

[b] [i] What is micro-emulsion ? Discuss about its formation and their stability ? [03]

[ii] Give classification of surface active agents. [03]

OR

[b] [i] What is the role of micellar catalysis on chemical reaction? [03]

[ii] Discus about any two factors affecting the value of Critical Micelle Concentration in aqueous media ? [03]

Q . 6 [a] Explain energy routes of petroleum and exploration of petroleum resources. [06]

[b] [i] Classify solar cells in various generations with suitable examples. [03]

[ii] Discuss any two electrochemical power sources in fuel cells. [03]

OR

[b] [i] Give design and mechanism for the solar cells. [03]

[ii] What is the chemistry of Fuel cells ? Explain with diagram and necessary reactions. [03]