JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -1 EXAMINATION- Sep 2017
B.Tech (BT) IIIrd Semester

COURSE CODE: 10B11BT311   MAX. MARKS:15

COURSE NAME: Thermodynamics and chemical processes

COURSE CREDITS: 4   MAX. TIME: 1 Hr

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

Q1(a). Explain the law of increase of entropy.   1

(b).   What is the effect of isothermal process on first law of thermodynamics?   1

Q2(a). If the equilibrium concentrations of ATP = 1 X 10^{-7} M and ADP= 0.165 M and Pi =0.1M, what are the equilibrium constant and $\Delta G^{o'}$ for the hydrolysis of ATP at 37°C?   2

(b).   The kinetics of many biological reactions can be well understood by Michaelis-Menten kinetics. Justify the statement.   2

Q3(a). In the cell, how the energy from the exergonic reaction of ATP hydrolysis can be used to drive an endergonic reaction?   2

(b).   Elucidate that why ATP is considered as universal currency for biological energy?   2

Q4(a). Calculate the increase in entropy when 1 gm of ice at -10°C is converted into steam at 100°C. (Given : Specific heat of ice= 0.5, Latent heat of ice = 80 cal/gram, Latent heat of steam = 540 cal/gram)   2

(b). Aspergillus niger is used to produce gluconic acid. Product synthesis is monitored in a fermenter; gluconic acid concentration is measured as a function of time for the first 39 h of culture.

Time(h)	Acid concentration (g/l)
0	3.6
16	22
24	51
28	66
32	97
39	167

(i) Determine the rate constant.

(ii) Estimate the product concentration after 20 h.   3

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