

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST I EXAMINATION- SEP. 2023

B.Tech (BT) IIIrd Semester

COURSE CODE: 18B11BT313

MAX. MARKS : 15

COURSE NAME: Thermodynamics and Chemical processes

COURSE CREDITS: 4

MAX. TIME: One Hour

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

Q1(a). Under what conditions the enthalpy change is equal to the internal energy change? 1 [COI]

(b). What are heat capacities at constant volume and constant pressure? What is the relationship between them? 2[COI]

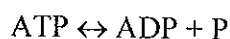
Q2(a). Elaborate how electron transfer via redox reactions generates biological energy. 2[COII]

(b). Calculate the maximum work obtained when 0.75 mol of an ideal gas expands isothermally and reversible at 27°C from a volume of 15 L to 25 L. 2[COI]

Q3(a). Explain coupling of reactions with the help of an example. 2[COII]

(b). Differentiate between reaction kinetics and reaction thermodynamics. 1[COIII]

Q4(a). For the hydrolysis of ATP:



If equilibrium concentrations of ATP = $1 \times 10^{-7} \text{M}$, ADP = 0.165M and P = 0.1 M. What is the equilibrium constant and ΔG° for the hydrolysis of ATP at 37°C? 2[COII]

(b). Q3(a). Calculate the increase in entropy when 1 gram of ice at -10°C is converted into steam at 100°C (Specific heat of ice = 0.5 and Latent heat of steam = 540 cal/gram) 3[COI]