

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST III EXAMINATION- DEC 2022

B.Tech (BT) IIIrd Semester

COURSE CODE (CREDITS): 18B11BT313 (4)

MAX. MARKS : 35

COURSE NAME: Thermodynamics and Chemical processes

COURSE COORDINATOR: Dr. Poonam Sharma

MAX. TIME: Two Hours

Note: All questions are compulsory.

- Q1(a). Discuss the arrangement of baffles in mixing equipments. 3
- (b). Electron transfer via redox reactions generates biological energy. Justify this statement. 3
- Q2. Differentiate between 6
- (a). Rheopectic and Thixotropic fluids
- (b). Conduction and Convection
- (c). Enthalpy and Entropy
- Q3(a). Discuss the applications of Thermodynamic laws. 4
- (b). Elucidate how the Reynolds number is related to fluid flow. 4
- Q4(a). Counter current and co-current flow both play role in double tube pass heat exchanger. Explain 4
- (b). Heat is transferred from one fluid to a second fluid across metal wall. The film coefficients are 1.2 and $1.7 \text{ KWm}^{-2}\text{K}^{-1}$. The metal is 6 mm thick and has a thermal conductivity of $19 \text{ W m}^{-1} \text{ K}^{-1}$. On one side of the wall there is scale deposit with a fouling factor estimated at $830 \text{ Wm}^{-2}\text{K}^{-1}$. Calculate the overall heat transfer coefficient. 4
- Q5. The deformation of a certain fermentation broth is determined by using an impeller viscometer. The density of the cell suspension is approximately 1000 kg m^{-3} . Samples of broth are poured into a glass beaker of diameter 15 cm and stirred slowly using a Rushton turbine of diameter 4 cm and value of $K = 10.2$. Following results are recorded, when the stirrer shaft is attached to a device.

Stirrer speed (s^{-1})	Torque (N m)
0.185	3.57×10^{-6}
0.163	3.45×10^{-6}
0.126	3.31×10^{-6}
0.111	3.20×10^{-6}

Evaluate non-Newtonian parameters.