Reg. No. :

Question Paper Code: U3D03

B.E./B.Tech. DEGREE EXAMINATION, NOV 2022

Third Semester

Biotechnology

21UBT303- APPLIED THERMODYNAMICS FOR BIOTECHNOLOGISTS

(Regulations 2019)

Duration: Three hours   Maximum: 100 Marks

Answer All Questions

PART A - (10x 2 = 20 Marks)

1.	State the zeroth law of thermodynamics.	CO1- U
2.	Differentiate state and path function.	CO1- U
3.	Predict the relationship between activity and activity coefficient.	CO2- App
4.	Calculate the temperature at which 0.654 moles of neon gas occupies 12.30L at 1.95 atm.	CO2- App
5.	Analyze the problems encountered during phase equilibrium.	CO3- Ana
6.	Define bubble point temperature.	CO1- U
7.	Define extent of reaction.	CO1- U
8.	Define available energy.	CO1- U
9.	Identify anabolic products.	CO1- U
10.	Define yield coefficient.	CO1- U

PART – B (5 x 16= 80Marks)

11. (a) Zia is a Mechanical Engineering student who is unaware of the engine having 100% efficiency. You as a Chemical engineer, elucidate the principle, proportions and working of such engines for him.   CO1- U   (16)

Or

(b) Explain the laws of thermodynamics with the corresponding derivations.   CO1- U   (16)

12. (a) Explain the partial molar properties of a solution with general equations.   CO1- U   (16)

Or

(b) Discuss the Gibbs-Duhem equation and its various forms and analyze its application in various fields.   CO1- U   (16)

13. (a) Illustrate the phase diagrams for binary solutions considering constant pressure equilibria and constant temperature equilibria.   CO2- App   (16)

Or

(b) Sketch the V-L equilibrium for azeotropic solution and explain in detail about azeotropic mixture.   CO2- App   (16)

14. (a) Explain the role of equilibrium constant and analyze the effect of temperature on equilibrium constant.   CO3- Ana   (16)

Or

(b) Analyze the methods for evaluation of equilibrium constants.   CO3- Ana   (16)

15. (a) Explain the thermodynamics of microbial growth   CO1- U   (16)

Or

(b) Explain the stoichiometry of microbial growth and product formation   CO1- U   (16)

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