PG Even Semester (CBCS) Exam., May—2017

CHEMISTRY

(2nd Semester)

Course No. : CH–204 (C)

(Physical Chemistry—II)

Full Marks : 75
Pass Marks : 30

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer **five** questions, selecting **one** from each Unit

UNIT—I

1. *(a)* Discuss the Born model for the calculation of free energy for the 'ion-solvent' interaction. 12

(b) Write a short note on 'electrochemical potential'. 3

2. *(a)* What are concentration cells? Deduce an expression for concentration cell with transference. 2+8=10

(b) Discuss the principle of determination of pH using electromotive force method. 5

UNIT—II

3. Derive an expression for Butler-Volmer equation showing the relationship between the net current density and overpotential of an electrochemical cell. 15

4. Give a schematic presentation of the Helmholtz-Perrin model of the electrical double layer at the electrode solution interface and discuss its limitations. 12+3=15

UNIT—III

5. *(a)* Explain how F-centres are produced. What is the importance of F-centres? 5+5=10

(b) Explain the electronic band structure with appropriate diagram of intrinsic semiconductor. 5

6. *(a)* Explain the formation of $MgAl_2O_4$ in terms of Kirkendall effect and Wagner reaction mechanism. 5+5=10

(b) Explain the non-stoichiometric defects with examples. 5

UNIT—IV

7. Obtain an expression relating surface excess concentration of solute with surface tension and discuss its consequences with surface active agent and surface inactive substance. 15

8. *(a)* With the help of orbital energy level diagram, distinguish among three basic processes of photoelectron spectroscopy. 9

(b) Explain X-ray photoelectron spectrum of Pd metal. 6

UNIT—V

9. *(a)* What do you mean by 'critical micellar concentration'? What are the factors affecting the 'critical micelle concentration' and 'micellar size'? 2+8=10

(b) Write a short note on 'microemulsion'. 5

10. *(a)* Give a brief account of kinetics of micelle formation. 7

(b) Write short notes on the following : 4×2=8

(i) Reverse micelle

(ii) Kraft phenomena

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