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| **Scheme of Valuation/Answer Key**  (Scheme of evaluation (marks in brackets) and answers of problems/key) | | | | | |
| **APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  **FOURTH SEMESTER B.TECH DEGREE EXAMINATION, MAY 2019** | | | | | |
| **Course Code: CH208** | | | | | |
| **Course Name: CHEMISTRY FOR PROCESS ENGINEERING II (CH)** | | | | | |
| Max. Marks: 100 | | |  | Duration: 3 Hours | |
| **PART A** | | | | | |
| ***Answer any two questions. Each question carries 15 marks.*** | | | | | |
|  |  |  | | |  |
| 1 | a) | Theory with Nernst equation (4M), Diagram of cell (1M), Titration curve (1M) | | | (6M) |
|  | b) | Principle of Anodic stripping voltammetry- cleaning, deposition, equilibration, stripping (2M), Graphical plot (1M), Application any two- (1M) | | | (4M) |
|  | c) | Schematic diagram of mass spectrometer- (2.5M), principle & working- (2.5M) | | | (5M) |
| 2 | a) | Working principle of X-ray photon electron spectroscopy and Auger electron spectroscopy with suitable energy level diagrams (3.5+ 3.5 M) | | | (7M) |
|  | b) | Imaging modes in SEM analysis- two types, Secondary electron and back scattered imaging- explanation with principle (1.5+ 1.5M) | | | (3M) |
|  | c) | Amperometric titration of lead ions using sulphate solution- (2.5M), with dichromate solution-(2.5M). (Titration curves are expected) | | | (5M) |
| 3 | a) | Cu2+ + 2e🡪 Cu,  2x96500C produces 63.5g of Cu  10x600C produces 0.197g of Cu (3M) | | | (3M) |
|  | b) | Principle (drawing of polarogram & cell assembly with explanation, Illkovic equation)- (4M), Applications, any two (1M) | | | (5M) |
|  | c) | Schematic diagram of the spectrometer –(3M), Explanation of theory of AES with suitable example- (4M) | | | (7M) |
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| **PART B** | | | | | |
| ***Answer any two questions. Each question carries 15 marks*** | | | | | |
| 4 | a) | Definition of CST (1.5M), Phase diagram of water-nicotine system with proper labelling (2.5M) | | | (4M) |
|  | b) | Correct Derivation –(6 M) | | | (6M) |
|  | c) | Statement of Kohlarausch’s law-(2M).  Write proper equations for molar conductance and calculate  129.8+ 218.4-108.9=239.3 Scm2 mol-1 (3M) | | | (5M) |
| 5 | a) | Principle (3M)  Application (2M) | | | (5M) |
|  | b) | Debye Huckel theory (asymmetry, electrophoretic effects)-(3M)  DHO equation- (1M)  Variation of molar conductance with concentration, explanation- (1M). | | | (5M) |
|  | c) | Working principles of urea biosensor- (2.5M), glucose biosensor (2.5 M) | | | (5M) |
| 6 | a) | Derivation of the Nernst equation-(2M). Ecell= (0.0591/2)[log(0.1/0.01)] =0.02955 V (2M) | | | (4M) |
|  | b) | Definition of transport number-(2M). Equation connecting TN and ionic mobility (1M) | | | (3M) |
|  | c) | Park’s process (4M), steam distillation (4M) | | | (8M) |
| **PART C** | | | | | |
| ***Answer any two questions. Each question carries 20 marks.*** | | | | | |
| 7 | a) | Derivation of Gibbs adsorption isotherm (8M)- Explanation of surface excess (2M) | | | (10M) |
|  | b) | N0=100, N=70  Λ=(2.303/t) [log (N0/N)]= 0.001427 (3M)  T1/2= 0.693/ Λ= 485.63 min (2M) | | | (5M) |
|  | c) | Nuclear fission explanation with an example (3M)  Liquid drop model (2M) | | | (5M) |
| 8 | a) | Postulates –(2M), Correct Derivation- (4M) | | | (6M) |
|  | b) | Hardy Schultz rule (2M), Gold number (2M) | | | (4M) |
|  | c) | Neutron activation analysis (5M)  Radio dating techniques (5M) | | | (10M) |
| 9 | a) | BET equation (3M), Graphical plot and calculation of surface area (2M) | | | (5M) |
|  | b) | Definition (2M). Classification (2M), Applications of emulsions (1M) | | | (5M) |
|  | c) | Binding energy of nucleus (2M), Binding energy and stability of nucleus (2M) | | | (4M) |
|  | d) | Transient equilibrium (3M), Secular equilibrium (3M) | | | (6M) |