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| **Scheme of Valuation/Answer Key** | | | | | |
| **APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  THIRD SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018 | | | | | |
| **Course Code: CH205** | | | | | |
| **Course Name: FLUID AND PARTICLE MECHANICS-I** | | | | | |
| Max. Marks: 100 | | |  | Duration: 3 Hours | |
| **PART A** | | | | | |
|  | ***Answer any two full questions, each carries 15 marks.*** | | | | Marks |
| 1 | a) | Explanation of the phenomena – 2 Marks  Expression – 3 Marks  In the expression, for writing the force balance properly – 1.5 Marks  Substitution of proper quantities and obtaining an expression in terms of capillary rise or fall – 1.5 Marks | | | (5) |
|  | b) | Causes of Viscosity –  Intermolecular force of cohesion – 1 Mark  Molecular momentum exchange – 1 Mark  Rheological Classification – 3 Marks  Candidate can use either shear stress vs velocity gradient diagram or suitable phenomenological equations for the classification.  Non-Newtonian classification should include Binghan plastic, Pseudo plastic (shear rate thickening) and Dilatent (shear rate thinning). As example is not explicitly mentioned, it is not required. Time dependent flow including thixotropic and rheopectic also can be avoided in the interest of the marks awarded. | | | (5) |
|  | c) | Use of Newton’s law of viscosity and obtaining the result – 2 Marks  Report the result in a proper unit – 0.5 Marks | | | (2.5) |
|  | d) | Calculation of specific mass (density) with proper unit – 1 Mark  Calculation of specific weight with proper unit – 1 Mark  Calculation of specific volume with proper unit – 0.5 Mark | | | (2.5) |
| 2 | a) | Explanation of metacentre and metacentric height – 2 Marks  Significance with respect to stability – 1 Mark  Stability criteria of floating body – 2 Marks | | | (5) |
|  | b) | Continuous gravity decanter -  Identifying the application of fluid statics principle – 1.5 Marks  Writing proper hydrostatic balance equation – 1.5 Marks  Centrifugal decanter -  Identifying the application of fluid statics principle – 1.5 Marks  Writing proper hydrostatic balance equation – 1.5 Marks  Note: Candidate may either use a sketch or explain all the notations in the hydrostatic balance equation | | | (6) |
|  | c) | Definition or Explanation of lapse rate – 2 Marks  Writing the expression explaining all notations – 2 marks | | |  |
| 3 | a) | Candidate can do an absolute pressure balance or gauge pressure balance for solving the problem.  Writing proper balance – 3 Marks  Solving the problem – 4 Marks  Reporting the answer with proper units – 0.5 Marks  Answer is approximately -40809 N/m2 or 40809 N/m2vacuum  As the sketch is not explicitly asked, if the examiner feels that the candidate is successful in conveying the concept even without a sketch, full credit can be awarded. | | | (7.5) |
|  | b) | Use of Newton’s law of viscosity, equation of torque and obtaining the result – 7 Marks  Report the result in a proper unit – 0.5 Marks | | | (7.5) |
| **PART B** | | | | | |
| ***Answer any two full questions, each carries 15 marks.*** | | | | | |
| 4 | a) | Determine whether the flow is laminar or turbulent by determining Reynold’s number - 2.5 Marks  Use the appropriate equation (in this case laminar) and determine the transition length - 4 Marks  Report the result in a proper unit – 0.5 Marks  Answer is approximately 0.0427 m | | | (7) |
|  | b) | Full credits can be awarded for 2 valid differences with explanation or listing 4 valid differences without explanation | | | (4) |
|  | c) | One mark for each definition | | | (4) |
| 5 | a) | Listing assumptions – 2 Marks  Derivation – 7 Marks  Application – 1 Mark | | | (10) |
|  | b) | Use of Bernouli equation, equation of continuity and obtaining the result – 4.5 Marks  Report the result in a proper unit – 0.5 Marks | | | (5) |
| 6 | a) | Continuity equation in the general form is to be derived from fundamental principle.  Derivation – 10 Marks | | | (10) |
|  | b) | Explanation – 2.5 Marks each | | | (5) |
| **PART C** | | | | | |
| ***Answer any two full questions, each carries20 marks.*** | | | | | |
| 7 | a) | Assumptions – 2.5 Marks  Derivation – 7.5 Marks | | | (10) |
|  | b) | Working – 3 Marks each | | | (6) |
|  | c) | Derivation – 4 Marks | | | (4) |
| 8 | a) | Statement and equation – 3 Marks | | | (3) |
|  | b) | Mention minimum 2 friction factors with definition – 2 Marks  Use of them – 1 Mark  Features of them – 2 Marks | | | (5) |
|  | c) | Use of head loss equation and obtaining loss of head – 5.5 Marks  Report the result in a proper unit – 0.5 Marks  Answer is approximately 0.286 m  Use of Bernouli equation and obtaining pressure drop – 5.5 Marks  Report the result in a proper unit – 0.5 Marks | | | (12) |
| 9 | a) | Explanation of any 5 types of values with a representative sketch – 2 Marks each | | | (10) |
|  | b) | Derivation in a suitable form – 10 Marks | | | (10) |
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