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| Name: |  |
| Enrolment No: | |

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, January 2020

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| Program Name : B.Tech (APE Gas) Course Name : Fluid Mechanics Course Code : MECH2007 Nos. of page(s) : 1 | Semester : III Time : 03 hrs Max. Marks : 100 |
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Instructions: *The question paper consists of three sections. Answer the questions section wise.*

Note: *Assume suitable data wherever necessary*

SECTION A (Answer all questions)

| S. No. | | Marks | CO |
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| 1. | Define (i) Ideal fluid and real fluid (ii) Surface tension and capillarity | 5 | CO1 |
| 2 | Differentiate between major and minor energy losses. | 5 | CO5 |
| 3. | Explain the terms path line, streak line, streamline, and stream tubes. | 5 | CO1 |
| 4 | Explain how viscosity changes with temperature for liquids and gases | 5 | CO1 |
| 5 | Write Navier stokes equation and explain the significance of each term in the equation. | 5 | CO3 |
| 6 | What are NPSH, cavitation and priming | 5 | CO4 |

SECTION B (Answer all questions)

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| 7. | A rectangular plane surface 2 m wide and 3 m deep lies vertical in water with its 2 m edge parallel to water surface and coinciding with the surface. Determine the total pressure and position of center of pressure. | 10 | CO1 |
| 8 | Derive Euler's equation of motion along a streamline and get the Bernoulli's equation. | 10 | CO3 |
| 9 | A horizontal venturimeter with inlet diameter 30cm and throat diameter 15cm is used to measure the flow of oil of specific gravity 0.8. The discharge of oil thorough venturimeter is 50 litres/s, find the reading of the oil-mercury differential manometer. Take $C_d = 0.98$. | 10 | CO4 |
| 10 | Given that $u = -4ax(x^2 - 3y^2)$, $v = 4ay(3x^2 - y^2)$. Examine whether these velocity components represent a physically possible two-dimensional flow. If so whether the flow is rotational or irrotational? | 10 | CO2 |
| 11 | Derive continuity equation. | 10 | CO2 |

SECTION C

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| 12 | The difference in water surface levels in two tanks, which are connected by three pipes in series of lengths 300m, 170m, and 210m and of diameters 300mm, 200mm and 400mm respectively, is 12m. Determine the rate of flow of water if co-efficient of friction are 0.005, 0.0052 and 0.0048 respectively. Considering: (i) minor losses (ii) neglecting minor losses. | 20 | CO5 |
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