Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **14CE2003** | **Duration :** | **3hrs** |
| **Sub. Name :** | **MECHANICS OF FLUIDS** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. |  | An oil of viscosity 5 poise is used for lubrication between a shaft and sleeve. The diameter of the shaft is 0.5 m and it rotates at 200 rpm. Calculate the power loss in oil for a sleeve length of 100 mm. The thickness of oil film is 1 mm. | CO1 | 20 |
| **(OR)** | | | | |
| 2. |  | Estimate the dynamic viscosity of an oil, which is used for lubrication between the square plate of size 0.8 × 0.8 m and an inclined plane with angle of inclination 30° as shown in figure. The weight of the square plate is 300 N, and it slides down the inclined plane with a uniform velocity of 0.3 m/s. The thickness of oil film is 1.5 mm. | CO1 | 20 |
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| 3. |  | A simple U-tube manometer containing mercury is connected to pipe through which a fluid of specific gravity 0.8 is flowing. Estimate the vacuum pressure inside pipe, if difference in mercury level between limbs is 40 cm and left limb fluid height is 15 cm. | CO1 | 20 |
| **(OR)** | | | | |
| 4. | a. | Obtain the equation to the stream lines for the velocity field given as  V = 2x3 i – 6x2 y j. | CO3 | 10 |
| b. | Explain briefly the different types of flow. | CO2 | 10 |
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| 5. | a. | A 30 cm diameter pipe, conveying oil, branches into two pipes of diameter 20 cm and 15 cm respectively. The average velocities in 30 cm diameter and 20 cm diameter sections are 2.5 m/s and 2 m/s, respectively. Estimate the discharge rate in two branches. | CO3 | 14 |
| b. | Explain Reynold’s experiment. | CO3 | 6 |
| **(OR)** | | | | |
| 6. |  | An orifice meter with orifice diameter 15 cm is inserted in a 30 cm diameter pipe carrying oil of specific gravity 0.9. Mercury manometer connected to both ends of orifice meter gives a differential reading of 50 cm. Measure the actual flow rate through the pipe, given *Cd*= 0.64. | CO2 | 20 |
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| 7. | a. | A horizontal venturimeter with inlet and throat diameter of 20 cm and 10 cm, respectively is used to measure flow of oil of specific gravity 0.8. Estimate the reading of the oil-mercury manometer, if the discharge rate is 60 lit/s. Assume C*d* = 0.98. | CO2 | 10 |
| b. | Give the advantages of triangular notch over a rectangular notch. | CO2 | 10 |
| **(OR)** | | | | |
| 8. | a. | A rectangular notch of 0.5m long is used to measure a discharge of 0.04m3/s. An error of 2mm was made in measuring the head over the notch. Calculate the percentage of error in the discharge, take Cd = 0.6. | CO2 | 14 |
| b. | Compare total energy line with hydraulic gradient line. | CO3 | 6 |
|  | | **Compulsory**: |  |  |
| 9. |  | Three pipes of diameters 300mm, 200mm, 400mm, and lengths 450m, 255m, 315m respectively are connected in series. The difference in water level in two tanks is 18m. Determine the rate of flow if coefficient of friction are 0.0075. 0.0078, 0.0072 respectively neglecting minor losses. | CO3 | 20 |