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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**Supplementary Examination – June – 2017**

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

(For Bio-Sciences)

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

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| Q. No. | Sub Div. | Questions | Course  Outcome | Marks |
| 1. | a. | Estimate capillary fall of mercury in 2.5 mm tube, given σHg = 0.52 N/m and angle of contact 130°. | CO1 | 4 |
|  | b. | A plate 0.025 mm distant from a fixed plate, moves at 60 cm/s and requires a force of 2 N per unit area i.e., 2 N/m2 to maintain this speed. Estimate the fluid viscosity between the plates. | CO1 | 16 |
| (OR) | | | | |
| 2 |  | A 15 cm diameter vertical cylinder rotates concentrically inside another cylinder of diameter 15.10 cm. Both cylinders are 25 cm high and space between the cylinder is filled with lubricating oil of unknown viscosity. If a torque of 12 Nm is required to rotate the inner cylinder at 100 rpm, estimate the viscosity of the lubricant. | CO1 | 20 |
| 3. | a. | Infer the surface tension of 40 mm diameter soap bubble, if the gauge pressure inside the bubble is 2.5 N/m2. | CO1 | 4 |
| b. | Estimate the gauge pressure and absolute pressure at a point 3 m below the free surface of a liquid having the density of 1.53 × 103 kg/m3 if the atmospheric pressure is equivalent to 750 mm of mercury. The specific gravity of mercury is 13.6 and density of water 1000 kg/m3. | CO1 | 16 |
| (OR) | | | | |
| 4 | a. | Define hydrostatic law. | CO2 | 1 |
|  | b. | A hydraulic press has a ram of 30 cm diameter and a plunger of 4.5 cm diameter. Find the weight lifted by the hydraulic press when the force applied at the plunger is 500 N. | CO2 | 19 |
| 5. |  | A pipe carrying oil (specific gravity 0.87), changes diameter from 20 cm at position A to 50 cm at a position B which is at 4 m higher level. If the pressure on A and B are 9.81 N/cm2 and 5.88 N/cm2 and the discharge is 200 L/s determine the loss of head. | CO2 | 20 |
| (OR) | | | | |
| 6. |  | Water is flowing through a pipe having diameter 30 cm, 20 cm at the bottom and upper end, respectively. The pressure intensity at the bottom and top section are 24.5 N/cm2 and 9.8 N/cm2. Determine the difference in the datum head if the rate of flow through the pipe is 40 L/s. | CO2 | 20 |
| 7. |  | An oil of sp. gr 0.7 is flowing through a pipe of diameter 300 mm at the rate of 500 lit/s. Find the head loss due to friction and power required to maintain the flow for the length of 1000 m. Take *v* = 0.29 stokes. | CO3 | 20 |
| (OR) | | | | |
| 8. |  | An orifice meter with orifice diameter 10 cm is inserted in a pipe of 20 cm diameter. The upstream and downstream pressure gauges gives readings of 19.62 N/cm2 and 9.81 N/cm2. Find the discharge rate of water,if C*d* = 0.6. | CO3 | 20 |
|  |  | **Compulsory**: |  |  |
| 9. |  | At a sudden enlargement of a water main from 240 mm to 480 mm diameter, the hydraulic head rises by 10 mm. Estimate the rate of flow. | CO3 | 20 |