COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY

B.TECH. DEGREE III SEMESTER SUPPLEMENTARY EXAMINATION IN MARINE ENGINEERING DECEMBER 2020

MRE 1305 FLUID MECHANICS AND MACHINERY
(*2013 Scheme*)

Time: 30 Minutes [for Answering and Scanning/Uploading the page of the Answer Sheet]
Max. Marks: 10

INSTRUCTIONS

1. You have to be available in Google Meet Video Camera throughout the examination hours.
2. Those students who are not present through Google Meet Video Camera will not be permitted towrite the online examination.
3. You have to share your '**live location**' to the faculty before uploading the answer sheet.
4. You have to answer only one question.
5. You have to write register number, subject code and module/group number (as given in the question paper) in each page.
6. Answer may not exceed one page of an A4 size paper in a standard handwriting, as far as possible.
7. If at all an answer goes beyond one page, (due to your handwriting) another page can also be used. In such a situation, the page number should be given as 1/2, 2/2.
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MODULE - I
(Answer *ANY ONE* question)

I(1).   A 2m wide and 3 m long rectangular sluice gate is hinged at A as shown in   (10)
figure. It is kept closed by a weight fixed to the gate. The total weight of the gate
and weight fixed to the gate is 35 kN. Find the height of the oil (specific gravity
0.9) 'h' which will just cause the gate to open. The centre of gravity of the
weight and gate is G.

OR

I(2).   With the help of a graph, explain the properties of any 5 different types of fluids   (10)
along with examples.

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MODULE - II
(Answer ***ANY ONE*** question)

II(1).　　The velocity component of an incompressible flow field along x ,y, z direction　(10)
are $U\left(\dfrac{x}{L} - \dfrac{y}{L}\right), \dfrac{Uy}{L}, O$ respectively, where U and L are constants. If they exist, find the stream function and velocity potential.

OR

II(2).　　Explain the different types of loss of energy in pipe flow.　(10)

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MODULE - III
(Answer *ANY ONE* question)

III(1).   An open cylindrical vessel of 10 cm diameter and 30 cm deep is filled with water up to the top. If it is rotating about its vertical axis with a speed of 700 r.p.m., find the quantity of liquid left in the vessel.   (10)

OR

III(2).   Show that the velocity distribution across a flow of viscous fluid between two parallel plates are parabolic in nature. Also show that maximum velocity is equal to one and a half times the average velocity.   (10)

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MODULE - IV
(Answer *ANY ONE* question)

IV(1). Design a Pelton wheel for a head of 70 m when running at 100 r.p.m. The Pelton wheel develops 95 kW shaft power. The velocity of the buckets = 0.4 times the velocity of jet, overall efficiency =0.85 and coefficient of the velocity is equal to 0.98.   (10)

OR

IV(2). A Kaplan turbine runner is to be designed to develop 9 MW. The net available head is 5m. If the speed ratio = 2, flow ratio = 0.68, overall efficiency = 86% and diameter of the boss is $1/3^{rd}$ diameter of the runner. Find the diameter of the runner, its speed and the specific speed of the turbine.   (10)

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MODULE - V
(Answer *ANY ONE* question)

V(1). With the help of a diagram, explain main parts of a centrifugal pump. (10)

OR

V(2). The cylinder of a single acting reciprocating pump is 14 cm in diameter and 30 cm in stroke. The pump is running at 30 r.p.m. and discharge water to a height of 10m. The diameter and length of the delivery pipe are 10 cm and 30 cm respectively. If a large air vessel is fitted in the delivery pipe at a distance of 2 m from the centre of the pump, find the pressure head in the cylinder at the beginning of the delivery stroke and in the middle of the delivery stroke. (Take f = 0.01). (10)

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