0038

Ollscoil na hÉireann, Gaillimh

National University of Ireland, Galway

First Semester Examinations, 2005/2006

Exam Code(s)	
Exam(s)	First Civil Engineering
Module Code(s)	CE107
Module(s)	Fundamentals of Civil Engineering
Paper No.	1
Repeat Paper	
External Examiner(s)	Professor M. O'Mahony
Internal Examiner(s)	Professor P. O'Donoghue
	Mr. Stephen Nash

Instructions: Answer four questions

Duration	2 hrs
No. of Answer books	1
Requirements:	
Handout	
MCQ	
Statistical Tables	
Graph Paper	
Log Graph Paper	
Other Material	
No. of Pages	3
Department(s)	Civil Engineering

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FIRST SEMESTER EXAMINATIONS 2005

FIRST CIVIL ENGINEERING EXAMINATIONS

FUNDAMENTALS OF CIVIL ENGINEERING

Professor M. O'Mahony
Professor P. E. O'Donoghue
Mr. S. Nash

Time allowed: **2** hours
Answer **4** questions

1. (a) Determine the support reactions and calculate the forces in all the members of the pin-jointed truss shown in Figure Q1. (20 marks)

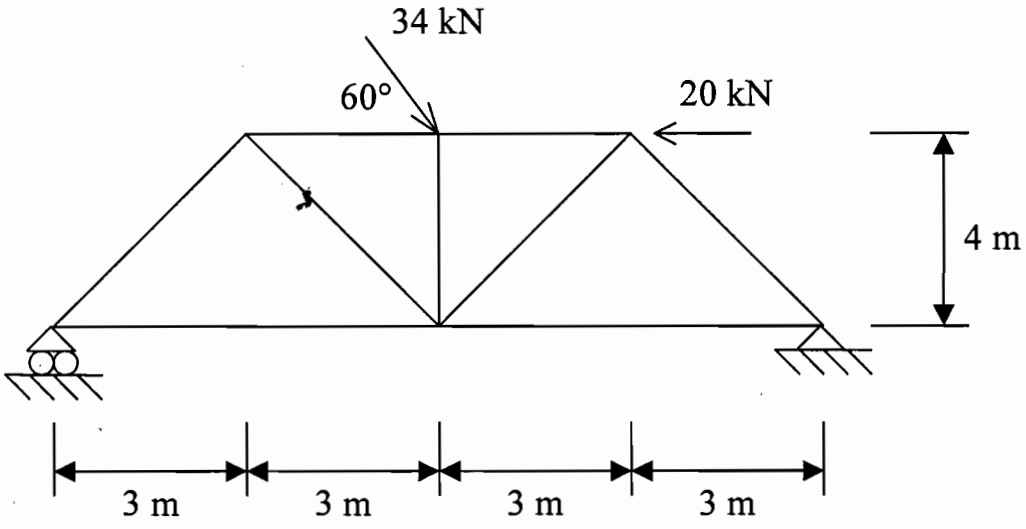

Figure Q1

2. (a) You have been employed by a concrete laboratory to monitor the workability of its concrete mixes. Describe three characteristics of concrete which would give you an indication of its workability and outline two common tests which you might use to determine workability? (14 marks)

(b) You have determined that the concrete's workability is too low. Suggest three methods by which the workability could be improved? (6 marks)

3. (a) Classify the following types of water flow and explain the reasons behind your classification: (8 marks)

i) water flowing through a hose pipe connected to a tap which has been running at full flow and is suddenly turned off

ii) oil being pumped at a constant rate through a pipeline of constant diameter

iii) water flowing in a river channel

iv) water flowing through a fireman's hose with a nozzle at the end

(b) Explain the Continuity Equation and its applications to fluid flow. (4 marks)

(c) Water is flowing through the pipe network shown in Figure Q3. Water flows through Pipe 1 (diameter, 40 cm) at a rate of 2 m^3/s. It is required that Pipes 4 – 7 have the same pipe diameter and that Pipes 4 – 6 carry 10%, 20% and 55% of the flow respectively. It is also required that the velocity of the flow in Pipe 7 be half that in Pipe 1. Calculate the water velocities and the diameter of Pipes 4 – 7. (8 marks)

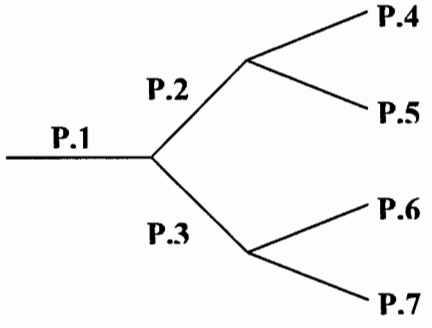

Figure Q3

4. (a) A tank is constructed, as shown in Figure Q4, with a solid partition in the middle which has a gate at its bottom. The gate is hinged at Point A and is free to swing to the left or right. The tank is filled with water on one side of the partition and a synthetic fluid on the other side of the partition as shown in the diagram. Calculate the magnitude and line if action of the resultant force on the gate due to the two liquids and determine in which direction the gate will move? (12 marks)

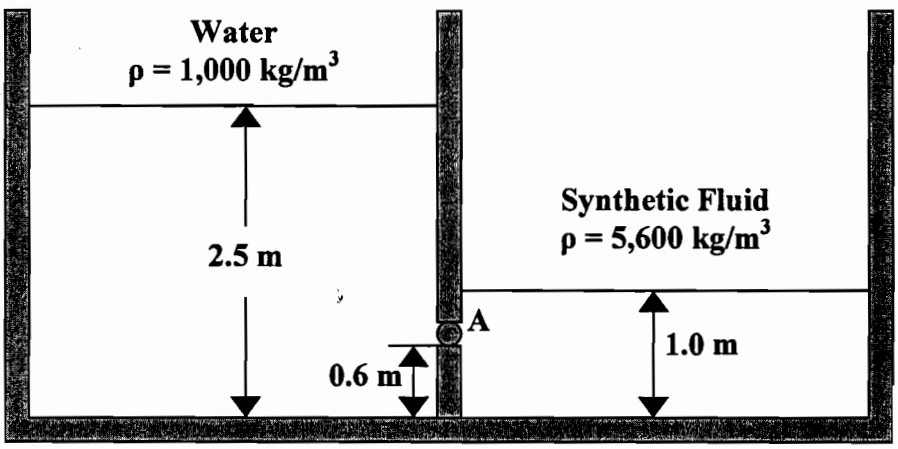

Figure Q4

(b) Define the following physical properties relating to a soil (8 marks)

i) the void ratio

ii) the porosity

iii) the water content

iv) the degree of saturation

5. Distinguish between the following terms:

i) a point load and a distributed load (4 marks)

ii) the stress and strain developed in a steel beam (4 marks)

iii) the plastic limit and the liquid limit for a particular soil (4 marks)

iv) fixed time and traffic actuated traffic signals (4 marks)

v) buoyancy and pressure in relation to fluids (4 marks)