Daffodil International University

B. Sc. in Civil Engineering

Lab Final Examination, Spring - 2025

Course Code: CE 202	Course Title: Engineering Materials Lab	
Section: All	Level-Term: 2-1	Teacher's Initial: MR, SAB
Full Marks: 40	Date: May 29, 2025	Time: 1.5 Hours

Note: There are four questions in total. Answer all of them. Assume any reasonable value if not provided. The figures in the right-hand margin indicate full marks.

1. (a) Explain the terms i) Normal Consistency, ii) SSD, iii) Efflorescence. [CO1, C2] [03]

   (b) Explain the importance of sufficient setting time of cement in actual construction. [CO1, C2] [02]

   (c) Explain the reason of testing compressive strength of mortar instead of cement paste. [CO1, C2] [02]

   (d) Illustrate the field tests for brick samples in a list. [CO1, C2] [03]

2. (a) Compute normal consistency of the cement paste from the following reading obtained using the Vicat's apparatus: [CO2, C3] [04]

No. of observation	1	2	3	4	5	6
% of water	26	25.5	25	24.5	24	23.5
Initial reading (mm)	40	40	40	40	40	40
Final reading (mm)	18	16	14	12	10	8

   (b) Compute the missing values in the following data table. [CO2, C3] [02]

Age	Specimen No	Crushing Load (lb)	Specimen Area (in^2)	Compressive Strength (psi)	Average Compressive Strength (psi)
28	1	?	4	4755	4710
	2	?	4	?	
	3	18613	4	4653	

4722

   (c) Compute Fineness modulus for the following fine aggregate sample. [CO2, C3] [05]

Sieve Opening (mm)	4.75	2.36	1.18	0.6	0.3	0.15	0.075	Pan
Materials Retained (gm)	0	11.6	74	190.5	153	40.9	28.5	0.7

   (d) Compute the height of the bucket for a unit weight and void in aggregate test from the following data. Given, Specific gravity of the aggregate 1.6, % void = 2.3%, weight of bucket + material = 6.5 kg, weight of bucket = 2.4 kg and diameter of the bucket= 300mm. [CO2, C3] [05]

   (e) Splitting tensile strength of two cylindrical (4"x8") concrete specimens are given in the following table. Compute the missing value in the datasheet. [CO2, C3] [03]

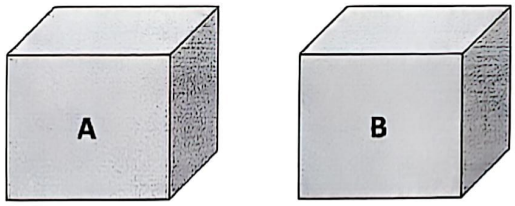
Specimen ID	Applied load (kN)	Splitting tensile strength (psi)	Average splitting tensile strength (psi)
1	?	?	270
2	?	250	

(f) Compute the missing values in the following table. [CO2, C3] [02]

Weight of OD sand, A (gm)	490
Weight of pycnometer +water, B (gm)	1315.5
Weight of pycnometer+ sand +water, C (gm)	1620
Weight of SSD sand, S (gm)	500
Bulk Specific Gravity (SSD)	?
Apparent Specific Gravity	?

3. (a) 1101 g of cement is mixed with 220.3 g of water. The normal consistency of the cement is 26%. Demonstrate whether this mix achieves normal consistency or not. If not, estimate how much additional water is required to attain it. [CO3, C2] [03]

(b) Compare the strength characteristics between the mortar block (2″ × 2″ × 2″) A and B. [CO3, C2] [02]



W/C ratio = 0.45 W/C ratio = 0.35

4. A 4090 g coarse aggregate sample was tested using the Los Angeles abrasion machine. After sieving, the following results were obtained. Calculate the Abrasion Value and explain whether this aggregate is suitable for coating and road surface treatment. [CO4, C3] [04]

Sieve Opening (mm)	Materials retained (gm)
4.75	500
2.36	835
1.70	1200
1.18	900
0.60	800