Department of Civil Engineering
Institute of Technical Education & Research, SOA University

Mid-Semester Examination, October-2016
Civil Engineering Materials (CVL3211)

Semester: 5th Branch: Civil Engineering

Full mark: 30   Time: 2 Hours

All questions carry equal marks. All bits of each question carry equal marks.

Subject Learning Outcome (Student will able to)	*Taxonomy Level	Question number	Marks
Illustrate the behaviour of cement based on its raw material and chemical composition.	L2	3(a), 3(b), 3(c)	6
Interpret a material based on its stress-strain behavior and calculate various physical quantities related to stress-strain behavior.	L3	1(a), 1(b), 1(c), 2(a), 2(b), 2(c)	12
Show the effects of different admixtures on properties of cement concrete and compute composition of a concrete mix.	L4	5(a), 5(b), 5(c), 4(a), 4(b), 4(c)	12

*Blooms taxonomy levels: Knowledge (L1), Comprehension (L2), Application (L3), Analysis (L4), Evaluation (L5), Creation (L6)

Answer all five questions.

Question 1		
a.	Compute modulus of resilience of a material shown in Figure 1 given on page 2.	2
b.	Compute Yield stress based on offset method for Figure 1.	2
c.	Assuming Yield stress is equal to rupture stress in Figure 1, Compute toughness.	2
Question 2		
a.	Describe how does Young's modulus of a material becomes zero?	2
b.	Describe behavior of viscoelastic materials under constant strain. How is it different than constant stress behavior?	2
c.	Write down any two mathematical models are used to describe viscoelastic materials? Draw stress-strain curve of anyone.	2
Question 3		
a.	A cement mix was gauged with more water than required. To compensate for that some more cement was added after gauging. Describe what is wrong in this process?	2
b.	A chemical was added to concrete causes same workability at lower water content. Describe category of this chemical?	2

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c.	Show a graph for water cement ratio and strength of cement. Show and Describe strength behavior in graph at water cement ratio lower than standard consistency?	2
Question 4		
a.	Three concretes A, B, C with proportions M20, M25, M30 are given. Describe which will require more curing?	2
b.	Describe what will happen if size of aggregates is increased keeping concrete proportion constant?	2
c.	Concrete mix was tested for strength in materials testing lab of ITER and five samples fail at 80, 60, 90, 75, 100 (all loads in KN). Calculate 95% characteristic strength ($k_{95} = 1.96$).	2
Question 5		
a.	$0.25m^3$ of M20 concrete with water cement ratio of 0.5 and air content 3% is to be formed, given specific gravities of cement sand and aggregates are 3, 2.6, 2.7. Calculate volume of solids and air in mix.	2
b.	Solve the volume balance equation and find weight of cement required.	2
c.	Calculate the weight of sand (fine aggregates) and coarse aggregates required.	2
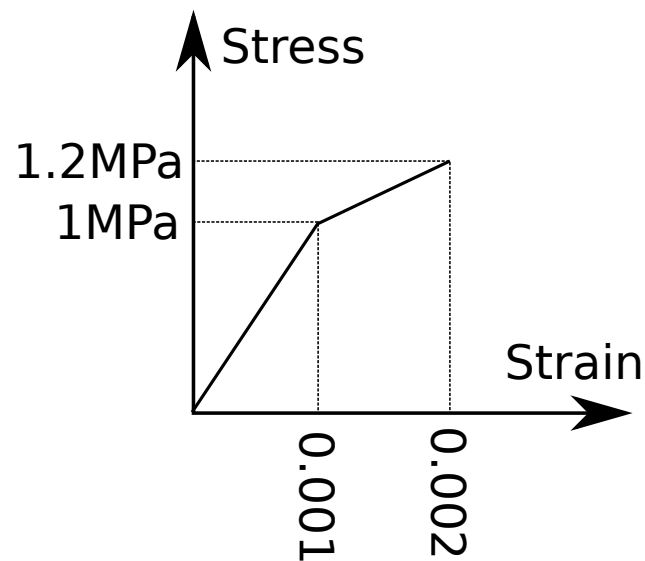
Figure 1: Stress-strain curve for Question 1