[Total No. of Questions: 09]

Uni. Roll No._____

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Program/Course: B Tech (Semester 4)
Subject: Material, Testing and Evaluation
Subject Code: PCCE-106
Paper ID: 16177

Time Allowed: 3 hours

MM: 60

NOTE:
1. Parts A and B are compulsory
2. Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
3. Any missing data may be assumed appropriately

Part – A

[Marks: 02 each]

Q1(a) Define material.

Q1(b) How does structural materials differ from functional materials?

Q1(c) Write a short note on calibration.

Q1(d) Differentiate shrinkage and creep. Give four points of differences.

Q1(e) What do you means by acceptance criterion?

Q1(f) Why crushing value is used to quantify strength of aggregates (instead of crushing strength)?

Part – B

[Marks: 04 each]

Q2. Describe the procedure to estimate the permeability of concrete.

Q3. Write and discuss the five stress-transfer mechanisms in the solids.

Q4. 5 kg sample of coarse aggregates passing 12.5 mm and those retained on 10 mm IS sieve is taken from a construction site. It is filled in the standard mould and a load of 14 kg is given free fall as per the prescribed procedure. The sample including the mould weighs 7.16 kg. The sample is sieved through 2.36 mm sieve and the residue is found to weigh 125.15 g. Compute the aggregate impact value and then, check the suitability of the aggregates for use in the concrete production.

Q5. How does the material microstructure influence its mechanical properties? Describe it.

Q6. Why do we prefer displacement-controlled machines to determine the material toughness?

Q7. Determine the characteristics strength of brick sample. Use the following test data:
{12.2, 11.2, 10.4, 9.7, 8.6, 11.7, 10.6, 7.4, 13.1, 8.4, 6.7, 9.4} (MPa)
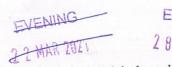
Part – C

[Marks: 12 each]

Q8. The maximum permissible displacement for a concrete cube of 150 mm size is 2 mm. What should be the highest magnitude of vertical load that can be applied to the concrete block? The stiffness of concrete used in the production of the block is 23500 N/mm. And, check whether the concrete if subjected to that much loading will crush it or not? The compression strength of the concrete is 20 MPa.

OR

Q8. Write a detailed note on acceptance criterion. Explain how does it help to ensure quality at any construction site? Tabulate a typical acceptance criterion for concreting work as per IS 456.

Q9. The cubes from some construction site are tested regularly and their compressive strength (in MPa) is listed found as: 24.89, 30.22, 25.78, 26.22, 23.11, 22.22, 21.33, 27.11, 23.56, 24.0, 20.0, 21.33, 26.22, 30.22, 26.67, 28.89, 30.22, 31.11, 22.67, 23.11, 21.78, 24.44, 25.33, 26.67, 28.89, 31.11, 17.33, 27.56, 29.78, 31.56, 27.56, 28.44, 24.89, 23.11, 25.78, 21.33, 17.33.
It pertains to various footings being poured at the site. Check whether the concrete is acceptable if the grade of the concrete is M20.

OR

Q9. The standard fiber reinforced concrete beams are tested under the 3-point loading conditions. A typical test data from the testing is tabulated below in the form of load-displacement response:

Displacement, mm	Load, kN	
	Sample-1	Sample-2
0	0	0
0.5	15.5	15.5
1.5	12.2	19.25
2.5	9.3	21.25
3.5	7.4	23.05

Calculate the material resilience, toughness, and modulus value from this data.

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