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FACULTY OF SCIENCE AND TECHNOLOGY
Department of Civil Engineering

Subject: Construction materials 1 standard correction (L2GC and L2TP)

25/05/2025 duration: 1h30

Put a cross near to the correct answer

1. What is the practical classification of construction materials? 1pt

A. Natural materials (such as stone, wood, clay, sand) and Man-made or synthetic materials (such as cement, concrete, steel, plastics).
B. Metals (steel, aluminum), Non-metals (glass, plastic), and Ceramics (bricks, tiles) only.
C. Organic materials only (wood, rubber, petroleum-based products).
D. Structural materials (used for load-bearing elements) and Decorative materials (used only for finishes).

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2. What is the definition of density in the context of building materials? 1pt

A) The weight of a material per unit area
B) The mass of a material per unit volume
C) The volume of a material per unit mass
D) The hardness of a material under pressure

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3. What is the definition of bulk density in the context of building materials? 1pt

A) The mass of a material per unit volume excluding voids and pores
B) The ratio of the volume of voids to the total volume of a material
C) The mass of a material per unit volume including the voids and pores between particles
D) The weight of a material per unit surface area

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4. What is the definition of porosity in the context of building materials? 1pt

A) The ratio of the volume of voids or empty spaces to the total volume of the material
B) The weight of a material per unit volume
C) The ability of a material to resist mechanical stress
D) The surface roughness of a material

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5. What is the definition of moisture in the context of building materials? 1pt

A) The amount of water vapour present in the air around the material
B) The total quantity of water contained in the pores (voids) of a material, usually expressed as a percentage of the material's dry weight
C) The weight of a material when fully saturated with water
D) The ability of a material to repel water and remain dry

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6. What is the definition of deformation in the context of building materials? 1pt

A) The change in color of a material due to weathering
B) The change in shape or size of a material or structure caused by an applied load or force
C) The electrical conductivity of a material under stress
D) The chemical breakdown of a material over time

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7. What is the origin of the aggregates used in construction? 1pt

A) Aggregates are primarily natural materials extracted from pits, quarries, riverbeds, or marine deposits, including sand, gravel, and crushed stone.
B) Aggregates are synthetic materials produced exclusively in chemical laboratories.
C) Aggregates originate only from recycled plastics and polymers processed for construction.
D) Aggregates are exclusively obtained from biological sources such as coral reefs and shells.

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8. What is the granulometry of aggregates in the context of construction materials? 1pt

A) The distribution of particle sizes within an aggregate sample, indicating the proportions of different sized particles from fine to coarse.
B) The chemical composition of aggregates, specifying the mineral content and impurities.
C) The moisture content present in aggregates before mixing with cement.
D) The color and texture variations observed on the surface of aggregate particles.

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9. What is the Sand Equivalent test of aggregates in the context of construction materials? 1pt

A) A test that measures the relative proportions of clay-like fines to sand in fine aggregates, indicating the cleanliness and quality of the material.

B) A test that determines the compressive strength of aggregates under load.

C) A test that measures the moisture content in aggregates before mixing with cement.

D) A test that evaluates the thermal conductivity of aggregates used in concrete.

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10. What is the Los Angeles Abrasion test of aggregates in the context of construction materials? 1pt

A) A test that measures the percentage wear of aggregates caused by abrasion and impact in a rotating drum with steel balls, indicating their toughness and resistance to degradation.

B) A test that determines the moisture content of aggregates before mixing with cement.

C) A test that measures the chemical composition and mineral content of aggregates.

D) A test that evaluates the thermal conductivity of aggregates under high temperatures.

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11. What are the main operations typically carried out to produce crushed aggregates? 1pt

A. Extraction, primary crushing, secondary crushing, screening, washing, and optional tertiary crushing to achieve the desired particle size and cleanliness.

B. Extraction, chemical treatment to dissolve impurities, thermal expansion, and direct packaging without further size reduction.

C. Extraction followed by direct use of raw rock without any crushing or screening, relying solely on natural weathering for size adjustment.

D. Extraction, single-stage crushing, and immediate use without any screening, washing, or further size classification.

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12. Which of the following lists correctly identifies the main types of binders commonly used in civil engineering construction? 1pt

A. Portland cement, lime, gypsum, epoxy resins, bituminous binders, and geopolymer cements.

B. Portland cement, sand, gravel, water, and steel reinforcement.

C. Lime, clay, natural stone, wood, and glass fibers.

D. Asphalt emulsions, polymer adhesives, glass fibers, and natural fibers.

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13. What is the primary use of fat lime in the building industry?

A. Fat lime is mainly used as a rapid-setting hydraulic binder for high-strength concrete and underwater construction.

B. Fat lime is primarily employed for pointing in masonry works, foundation construction, providing strong and aesthetically pleasing finishes.

C. Fat lime is used chiefly as an additive in asphalt mixtures to improve cohesion and resistance to stripping and aging.

D. Fat lime is predominantly used to stabilize soils in road construction and airfield foundations due to its high silica and alumina content.

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14. What is the main chemical composition of Portland cement? 1pt

A. Approximately 60-65% lime (CaO), 17-25% silica (SiO_2), 3-8% alumina (Al_2O_3), 0.5-6% iron oxide (Fe_2O_3), 1-3% magnesia (MgO), and small amounts of calcium sulfate ($CaSO_4$), sulfur trioxide (SO_3), and alkalis.

B. Mainly calcium carbonate ($CaCO_3$) 90%, with minor amounts of silica, alumina, and iron oxide, without magnesia or sulfates.

C. Equal parts of lime, silica, alumina, and iron oxide, each about 25%, with no magnesia or sulfur compounds.

D. Primarily magnesium oxide (MgO) 50%, calcium sulfate 30%, silica 10%, and alumina 10%, with no lime or iron oxide.

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15. What is the correct definition of Specific Surface Area (Blaine fineness) in cement testing? 1pt

A. The total surface area of all cement particles in one kilogram of cement, measured by the time taken for air to flow through a compacted bed of cement, expressed in square meters per kilogram.

B. The percentage of cement particles larger than 90 microns retained on a standard sieve, expressed as a percentage by weight.

C. The volume of cement particles per unit weight, measured by displacement of liquid in a pycnometer, expressed in cubic centimeters per gram.

D. The chemical composition ratio of calcium oxide to silica in cement, expressed as a percentage of total weight.

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16. What is the typical composition of cement mortar used in masonry construction? 1pt

A. Pure Portland cement mixed only with water, without any sand or additives.

B. A blend of 50% coarse aggregate, 25% cement, and 25% water, without sand or lime.
C. A mixture of approximately 25% cement (or masonry cement), 75% graded fine sand, and water, sometimes including lime to improve workability and durability.
D. A combination of 40% lime, 40% clay, and 20% water, with no cement or sand.

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17. How does the flow table test measure mortar consistency? 2pts

A. By placing a freshly mixed mortar specimen on a flat circular table, compacting it, then rotating the table at a specified speed to cause the mortar to spread, and measuring the increase in diameter of the spread mortar.
B. By measuring the time taken for a fixed volume of air to pass through a compacted bed of mortar particles, indicating particle fineness.
C. By applying a vertical load on a mortar sample and measuring the depth of penetration of a plunger to assess stiffness.
D. By drying a mortar sample and measuring the weight loss to determine water content and consistency.

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18. What are the main types of cement classified according to their composition? 2pts

A. Natural cement (calcined limestone)-Puzzolona cement (with volcanic ash)-Slag cement (with blast furnace slag)-Portland cement (mainly clinker and gypsum
B. CEM I: Portland cement (92–100% clinker) -CEM II: Portland-composite cement (65–94% clinker with additions like limestone, fly ash, or slag)-CEM III: Blast furnace cement (5–64% clinker with high slag content)-CEM IV: Pozzolanic cement (45–89% clinker with pozzolanic materials)-CEM V: Composite cement (20–64% clinker with combinations of slag and pozzolana)
C. Ordinary Portland cement (Type I)-Modified Portland cement (Type II)-High-early-strength cement (Type III)-Low-heat cement (Type IV)-Sulfate-resistant cement (Type V)

White cement (pigmented)-Air-entraining cement (with organic additives)-Oil-well cement (special retarders for high temperature)-Waterproof cement (with water-repellent additives)