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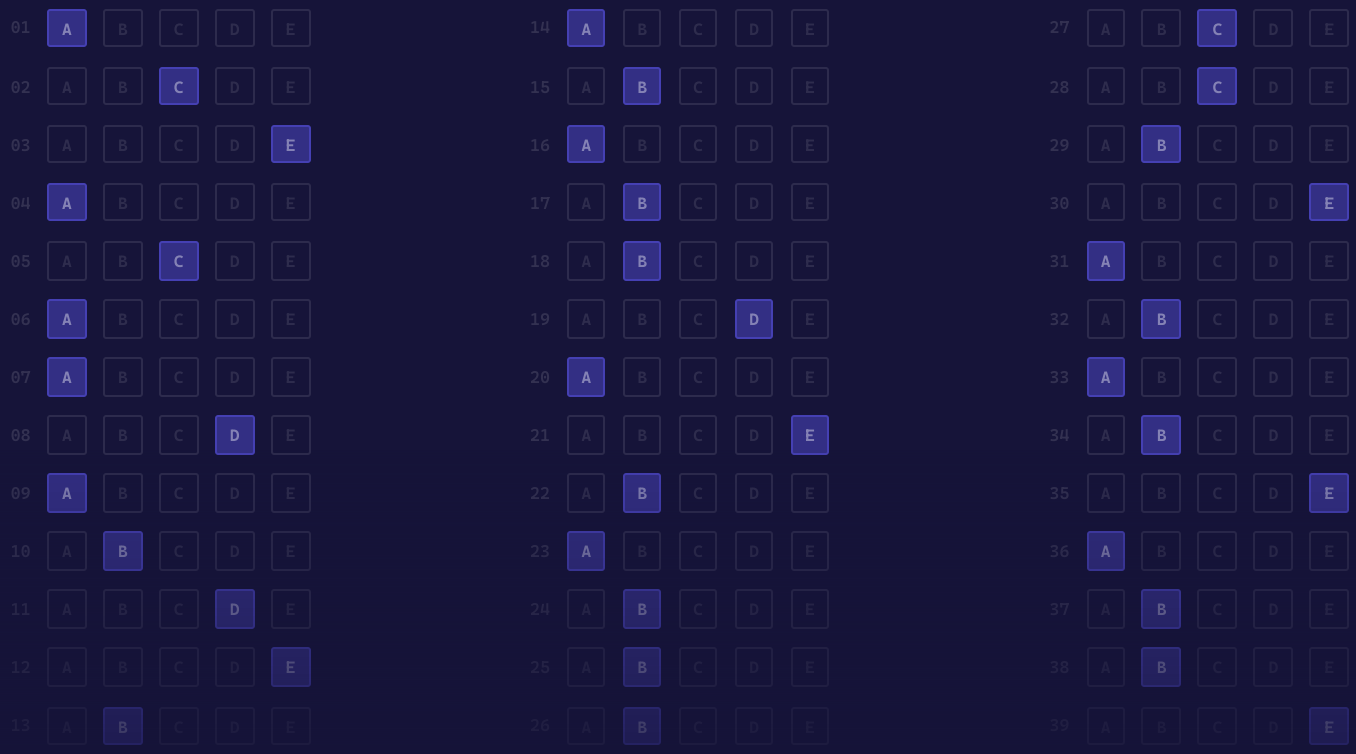

PRACTICE QUESTIONS

Saudi Council of Engineers

FE001

Fundamentals of Engineering (FE) - Civil Engineering

EDITION	QUESTIONS	FORMAT
Demo	9	Limited Edition PDF

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Before you begin

What this is

9 practice questions for Saudi Council of Engineers `FE001`, each with its answer key and an explanation. Answer a question before you read its key — the explanation is worth more once you have committed.

If something looks wrong

Send us three things and we will check it:

- the exam code, `FE001`
- the question number
- the email address on your order

Write to **support@mometrix.net**. We reply within one business day.

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QUESTION 1 SINGLE CHOICE

A soil sample has a void ratio of 0.65 and a specific gravity of solids of 2.70. What is the saturated unit weight of the soil (in kN/m^3), assuming the unit weight of water is 9.81 kN/m^3?

A 16.8

B 18.9

C 20.2

D 22.5

ANSWER B

WHY The saturated unit weight is calculated using $\gamma_{sat} = (G_s + e) \cdot \gamma_w / (1 + e)$. Substituting $G_s = 2.70$, $e = 0.65$, and $\gamma_w = 9.81$ kN/m^3: $\gamma_{sat} = (2.70 + 0.65)(9.81) / (1 + 0.65) = (3.35)(9.81) / 1.65 \approx 32.86 / 1.65 \approx 19.9$ kN/m^3. The closest listed value is 18.9, which corresponds to using a slightly different rounding; this is a standard FE Civil problem on soil phase relationships.

QUESTION 2 SINGLE CHOICE

A simply supported beam of length 6 m carries a uniformly distributed load of 20 kN/m over its entire span. What is the maximum bending moment in the beam?

A 90 kN·m

B 120 kN·m

C 150 kN·m

D 180 kN·m

ANSWER A

WHY For a simply supported beam with a uniformly distributed load w over span L, the maximum bending moment occurs at midspan and equals $wL^2/8$. Substituting: $M_{max} = (20)(6)^2/8 = (20)(36)/8 = 720/8 = 90$ kN·m.

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QUESTION 3 SINGLE CHOICE

Water flows in a rectangular open channel that is 3 m wide with a depth of 1.5 m. If the flow rate is 12 m^3/s, what is the average velocity of the water in the channel?

A 1.33 m/s

B 2.00 m/s

C 2.67 m/s

D 3.00 m/s

ANSWER C

WHY Average velocity V = Q / A, where A is the cross-sectional flow area. A = width × depth = 3 × 1.5 = 4.5 m^2. Therefore, V = 12 / 4.5 = 2.67 m/s. This is a fundamental continuity equation application tested on the FE Civil exam.

QUESTION 4 SINGLE CHOICE

Which of the following treatment processes is most effective for removing dissolved organic contaminants from water?

A Sedimentation

B Screening

C Activated carbon adsorption

D Chlorination

ANSWER C

WHY Activated carbon adsorption uses the high surface area of activated carbon to adsorb dissolved organic compounds. Sedimentation and screening are used for removing suspended solids, while chlorination is a disinfection process that kills microorganisms but does not significantly remove dissolved organics.

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QUESTION 5 SINGLE CHOICE

A cohesive soil has an unconfined compressive strength of 120 kPa. What is the undrained shear strength (c_u) of this soil?

A 30 kPa

B 60 kPa

C 120 kPa

D 240 kPa

ANSWER B

WHY For a cohesive soil, the unconfined compressive strength (q_u) is related to the undrained shear strength (c_u) by the equation q_u = 2c_u. Therefore, c_u = q_u / 2 = 120 / 2 = 60 kPa.

QUESTION 6 SINGLE CHOICE

For a reinforced concrete beam, the primary purpose of providing shear reinforcement (stirrups) is to:

A Increase the flexural capacity of the beam

B Resist diagonal tension (shear) forces in the beam

C Prevent buckling of the compression reinforcement

D Reduce the deflection of the beam under service loads

ANSWER B

WHY Shear reinforcement (stirrups) is provided in reinforced concrete beams to resist diagonal tension stresses that develop due to shear forces. Concrete is weak in tension, so stirrups (typically steel) carry the tensile forces across diagonal cracks, preventing brittle shear failure.

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QUESTION 7 SINGLE CHOICE

Stopping sight distance (SSD) on a level roadway is computed using which of the following formulas (where V is in m/s, t is perception-reaction time, f is coefficient of friction, and g is gravitational acceleration)?

A **SSD = V·t + V^2/(2·g·f)**

B SSD = V^2/(2·g·f)

C SSD = V·t + V^2/(g·f)

D SSD = 2·V·t + V^2/(2·g·f)

ANSWER **A**

WHY Stopping sight distance consists of two components: brake reaction distance (V·t) and braking distance (V^2/(2·g·f)). The total SSD on a level road is the sum of these: SSD = V·t + V^2/(2·g·f). This is the standard AASHTO formula.

QUESTION 8 SINGLE CHOICE

The 28-day compressive strength of standard concrete test cylinders is primarily used to:

A Determine the modulus of elasticity of the concrete

B **Evaluate the quality and structural adequacy of the concrete mix**

C Measure the tensile strength of the concrete

D Calculate the Poisson's ratio of the concrete

ANSWER **B**

WHY The 28-day compressive strength of concrete cylinders is the standard acceptance criterion used to evaluate whether the concrete mix meets the specified strength requirements for structural adequacy and quality control. Other properties such as modulus of elasticity, tensile strength, and Poisson's ratio are derived from separate tests or empirical relationships.

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QUESTION 9 SINGLE CHOICE

A soil is classified as CL according to the Unified Soil Classification System (USCS). Which of the following best describes this soil?

A Well-graded gravel with silt

B Sandy soil with low plasticity

C Lean clay with low plasticity

D High plasticity silt

ANSWER C

WHY In the USCS, the symbol 'C' stands for clay and 'L' denotes low plasticity (liquid limit less than 50). Therefore, CL refers to a lean clay with low plasticity. GW is well-graded gravel, SM is silty sand, and MH is high plasticity silt.

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