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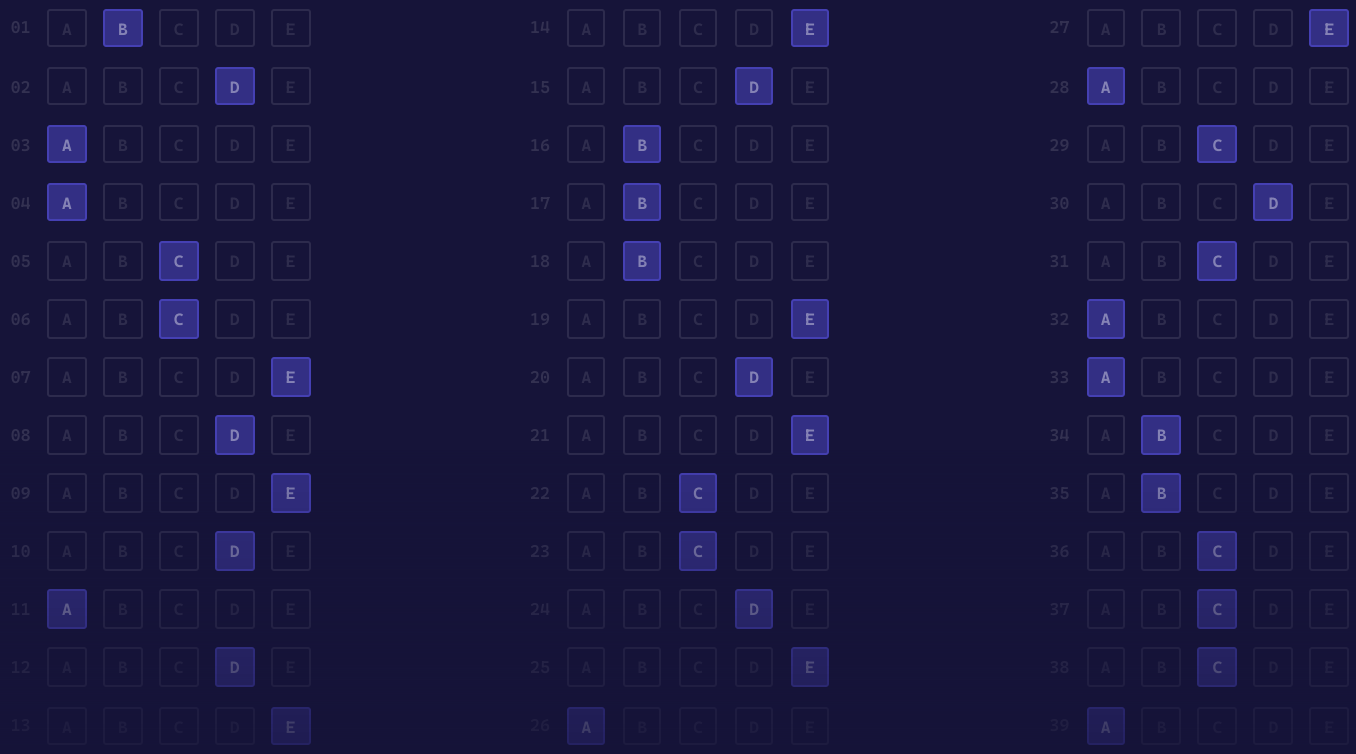

PRACTICE QUESTIONS

American Society of Mechanical Engineers (ASME)

18Sen

GDTP (Y14.5 - 2018 Edition) Exam - Senior Level

EDITION	QUESTIONS	FORMAT
Demo	9	Limited Edition PDF

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Before you begin

What this is

9 practice questions for American Society of Mechanical Engineers (ASME) `18Sen`, 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, `18Sen`
- 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

On a part dimensioned with ASME Y14.5-2018, a feature of size is located by a datum feature symbol and three mutually perpendicular linear dimensions referencing three mutually perpendicular datums. How many degrees of freedom are constrained by the datum reference frame?

A Three translational degrees of freedom only

B **Two rotational and three translational degrees of freedom**

C Three translational and two rotational degrees of freedom

D All six degrees of freedom

ANSWER **B**

WHY Per ASME Y14.5-2018, a primary datum constrains 3 degrees of freedom (1 translation and 2 rotations), a secondary datum constrains 2 more (1 translation and 1 rotation), and a tertiary datum constrains the final translation. Three mutually perpendicular datums therefore constrain 2 rotational and 3 translational degrees of freedom, for a total of 5.

QUESTION 2 SINGLE CHOICE

Per ASME Y14.5-2018, which geometric tolerance, when applied as a maximum material condition (MMC) requirement to an external feature of size, guarantees a minimum clearance fit between mating parts?

A Concentricity at MMC

B **Position at MMC**

C Circular runout at MMC

D Straightness at MMC

ANSWER **B**

WHY Position tolerance applied at MMC on an external feature of size (RFS is not required, M is specified) provides a bonus tolerance that grows as the feature departs from MMC. Because the virtual condition equals MMC minus the geometric tolerance, controlling position at MMC ensures minimum wall thickness and, when applied to a hole-shaft pair, guarantees minimum clearance when mating parts are at their respective virtual conditions.

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QUESTION 3 SINGLE CHOICE

According to ASME Y14.5-2018, what is the relationship between a datum feature and a datum feature simulator?

A The datum feature simulator is the theoretical reference used to establish the datum axis.

B **The datum feature simulator is a physical surface, fixture, or gage used to establish the datum from a datum feature.**

C The datum feature simulator is another name for the secondary datum.

D The datum feature simulator is the same as the primary datum feature.

ANSWER B

WHY ASME Y14.5-2018 defines a datum feature simulator (e.g., a gage, fixture surface, or precision pin) as the physical means used to establish the simulated datum from the actual datum feature. The datum feature is the actual feature on the part; the simulator is what contacts or restrains it to create the repeatable reference used in manufacturing and inspection.

QUESTION 4 SINGLE CHOICE

Which statement correctly distinguishes circular runout from total runout per ASME Y14.5-2018?

A Circular runout controls the entire surface of the toleranced feature along the part datum axis.

B Total runout is measured at a single circular cross-section of the toleranced feature.

C **Circular runout controls a single circular element at any stated position along the feature, while total runout controls the entire cylindrical surface simultaneously.**

D There is no difference; the terms are interchangeable in ASME Y14.5-2018.

ANSWER C

WHY ASME Y14.5-2018 defines circular runout as controlling the deviation of a single circular element of a feature at a specified position along the datum axis. Total runout requires the indicator to traverse the entire toleranced surface while the part rotates one revolution, so it controls form, taper, lobing, and other variations across the entire feature.

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QUESTION 5 SINGLE CHOICE

Under the ASME Y14.5-2018 envelope principle (Taylor's principle), a pin with a stated diameter of 25.00 ± 0.05 mm and no geometric tolerance called out must not exceed what maximum actual local size?

A 25.00 mm

B 25.05 mm

C 25.10 mm

D There is no limit under the envelope rule for an unspecified pin.

ANSWER C

WHY Per the envelope rule in ASME Y14.5-2018, a feature of size must not violate its maximum envelope of perfect form at MMC. For a 25.00 ± 0.05 mm external feature, the MMC is 25.05 mm, so no two-point measured diameter may exceed 25.05 mm; this is the maximum actual local size allowed.

QUESTION 6 SINGLE CHOICE

A single, planar datum feature that is contacted by three non-collinear supports in a fixture establishes which of the following per ASME Y14.5-2018?

A A primary datum that constrains three translational degrees of freedom.

B A primary datum that constrains one translational and two rotational degrees of freedom.

C A primary datum that constrains all six degrees of freedom.

D A secondary datum by definition.

ANSWER B

WHY When a planar datum feature is contacted by three non-collinear supports (the 3-2-1 principle), the resulting primary datum constrains one translation (normal to the plane) and two rotations (about two axes in the plane). This is the standard primary datum convention for a face datum in ASME Y14.5-2018.

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QUESTION 7 SINGLE CHOICE

A profile tolerance of a surface is applied without specifying any datum references and is shown as a bilateral tolerance with equal offsets. Per ASME Y14.5-2018, what is the default tolerance zone?

A A unilateral zone extending outside the true profile only

B A symmetric zone distributed equally inside and outside the true profile

C A zone applied as a radius (R) regardless of profile character

D A zone limited to one side of the true profile by default

ANSWER B

WHY ASME Y14.5-2018 specifies that when a profile tolerance is given as a single value without further qualification, the tolerance is bilateral with equal disposition about the true profile, meaning the zone is equally distributed inside and outside the true profile by default.

QUESTION 8 SINGLE CHOICE

An MMC symbol placed in the feature control frame of a geometric tolerance modifies the tolerance and the boundary of the feature of size. Per ASME Y14.5-2018, what boundary is established by applying position tolerance at MMC to an internal feature (hole)?

A An inner boundary of size equal to MMC minus the position tolerance

B An outer virtual boundary of size equal to MMC plus the position tolerance

C An outer virtual condition of size equal to MMC plus the geometric tolerance

D A boundary of size equal to least material condition

ANSWER C

WHY For an internal feature (hole) toleranced at MMC, the virtual condition is calculated as MMC + the geometric tolerance (in the absence of any other modifier). This defines the outer virtual boundary that a mating pin must not exceed to ensure assembly, which is the basis of fixed and floating fastener assembly studies per ASME Y14.5-2018.

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QUESTION 9 SINGLE CHOICE

Per ASME Y14.5-2018, which statement correctly describes a datum feature simulator?

A A datum feature simulator is the theoretical perfect geometric reference established by the datum feature itself.

B **A datum feature simulator is the physical tool, gage, or surface used to establish the simulated datum from the datum feature.**

C A datum feature simulator is a separate datum axis derived from the intersection of two datum planes.

D A datum feature simulator is another term for the datum target when applied to a non-rigid part.

ANSWER **B**

WHY ASME Y14.5-2018 defines a datum feature simulator as the physical tool, gage, or surface (such as a surface plate, a precision cylinder, or a chuck jaw) that is used to simulate the geometric reference established by the datum feature. The datum itself is theoretical; the simulator is the tangible element that contacts the datum feature.

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