ANSWERS AND RATIOALE: QUANTITATIVE TECHNIQUES QUESTIONS – SAMPLE SET FOR MAY 27, 2020

1.1 **Answer:** (a)

Rationale:

Rear Legs – 2 legs * 5 mortises = 10

Front Legs – 2 legs * 3 mortises = 6

Centre Rail – 1 rail * 1 mortise = 1

Centre Bracket – 1 bracket * 2 mortises = 2

Arms – 2 arms * 1 mortise = 2

Therefore, total number = 10 + 6 + 1 + 2 + 2 = 21

1.2 **Answer:** (b)

Rationale:

Front Leg – 3 mortises and 1 tenon – 3:1

Arm – 1 mortise and 1 tenon – 1:1

Front Rail – 1 mortise and 2 tenons – 1:2

Centre Rail – 0 mortises and 3 tenons – No ratio is possible

1.3 **Answer:** (c)

Rationale:

The filler strips are fitted between two back slats, and the back slats are fitted on the crest and back rails, as depicted in the diagram.

Length of the back rail = 48 ½ inches…(i)

Extra for tenons = 2 inches [From superscript 2 in the table]…(ii)

Therefore, remaining length for the slats and filler strips to be fitted in = (i) – (ii) = 48 ½ - 2 = 46 ½ inches…(iii)

As there are 15 slats, 14 filler strips each will be required for the top and bottom (total 28). Additionally, we are told in the question that the gap between each rear leg and the adjoining back slat is the same length as a filler strip. Therefore, the length of 46½“ will be divided between the width of the back slats, and the length of 14 filler strips + 2 equivalent gaps = length of 16 filler strips.

Width of each back slat = 1 ¼ inches

Therefore, combined width of 15 back slats = 15 * 1 ¼ = 18 ¾ inches…(iv)

Therefore, remaining length of the rails for the filler strips and gaps = (iii) – (iv) = 46 ½ - 18 ¾ = 27 ¾ inches…(v)

Therefore, length of each filler strip = (v) / 16 = 27 ¾ / 16 = 111 / (4 * 16) = 111 / 64 = 1.73 inches

1.4 **Answer:** (d)

Rationale:

Length of each filler strip (from Answer to Q. 1.3) = 1.73" (= 111/64 inches)

Volume of 28 filler strip = 28 * (thickness * width * length) of each strip = 5/16 * 5/8 * 111/64 * 28 = 9.48 inches^3.

1.5 **Answer:** (c)

Rationale:

Volume of Centre Bracket = 1 ¼ * 3 ¼ * 10 = 650/16 inches^3

Volume of the 2 mortises = 2 * (½ * 1 ¼ * 1 ¼) = 25/16 inches^3

Volume of wood remaining = 650/16 – 25/16 = 625/16 inches^3

Percentage of wood remaining = (625/16 / 650/16) * 100 = 62500/650 = 96.15%

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