CEP CERTIFICATION STUDY GUIDE BOOK

Below you will find the solved problems for the book CEP Certification Study Guide first edition, 2013.

QUESTION 1.1 PAGE 21

PROJECT	CREW HOURS/CY
1	0.375
2	0.680
3	0.420
4	0.481
5	0.555
6	0.621
7	0.587

$$Avg\ Production\ rate = \frac{\sum(crew\ hours/cy)}{Number\ of\ Projects}$$

$$Avg\ Production\ rate = \frac{(\ 0.375 + 0.680 + 0.420 + 0.481 + 0.555 + 0.621 + 0.587)}{7}$$

$$Avg\ Production\ rate = \frac{(\ 3.719)}{7}$$

$$Avg\ Production\ rate = 0.531\ crew\ hours/cy$$

QUESTION 1.2 PAGE 21

Using the crew hours/cy provided on question 1.1 is possible to calculate the total crew hours by project.

PROJECT	CY PLACED	CREW HOURS/CY	TOTAL CREW HOURS
1	1,200	0.375	450.00
2	426	0.680	289.68
3	391	0.420	164.22
4	288	0.481	138.53
5	61	0.555	33.86
6	55	0.621	34.16
7	126	0.587	73.96
TOTAL	2547		1184.40

$$Weighted\ Avg\ Production\ rate = \frac{Total\ crew\ hours}{Total\ Cy\ Placed}$$

$$Weighted\ Avg\ Production\ rate = \frac{1184.4}{2547}$$

$$Weighted\ Avg\ Production\ rate = 0.465\ crew\ hours/cy$$

QUESTION 1.4 PAGE 21

To solve this question we need to calculate the standard deviation (S) of the production rate (crew hr/cy) provided on question 1.1.

$$Standard\ deviation\ = S \qquad Variance\ = S^2$$

$$S = \sqrt{S^2}$$

$$S^2 = \frac{\sum x^2 - nz^2}{n-1}$$

z = Average Production Rate, it was calculated on question 1.1

$$z = 0.531$$

n = Number of occurrences, the number of occurrences in that case is the number of projects.

$$n = 7$$

x = Production rate, the production rates have been provided on question 1.1

$$\sum x^2 = ((0.375)^2 + (0.680)^2 + (0.420)^2 + (0.481)^2 + (0.555)^2 + (0.621)^2 + (0.587)^2)$$

$$\sum x^2 = 2.048$$

$$S^2 = \frac{2.048 - 7(0.531)^2}{7-1}$$

$$S^2 = 0.01238$$

$$S = \sqrt{0.01238}$$

$$\text{Standard Deviation} = 0.111$$

So, another way to express the production rate accuracy is to add and subtract the standard deviation from the average production rate.

$$Z \pm S$$

$$0.531 \pm 0.111$$

Accuracy of production rates is 0.421 to 0.642

QUESTION 1.5 PAGE 21

In my opinion this questions has 2 correct answers. Both options A & D falls out of the defined range calculated on the questions 1,4.

QUESTION 1.5 PAGE 43

Equipment quote = $60,000

Lang Factor = 3.15

$$Lang\ Factor = \frac{Total\ Installed\ Project\ Cost(TIC)}{Total\ equipment\ cost}$$

$$3.15 = \frac{Total\ Instaled\ Project\ Cost(TIC)}{60{,}000}$$

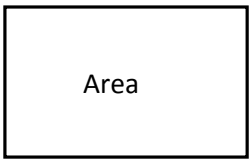
Total Installed cost = $189,000

QUESTION 2 PAGE 49

Erroneous scale 1" = 100'

Correct scale 1" = 200'

Area 100*100 = 10,000



Area 200*200 = 40,000

$$Correction\ factor\ = \frac{40{,}000}{10{,}000}$$

$$Correction\ factor\ = 4$$

QUESTION 4 PAGE 49

Cube dimensions: 10.50 x 10.50 x 10.50 = 1,157.625

Cube dimensions rounded to 2 significant digits: 1,331

Calculation the percentage difference.

$$\%Difference = \frac{(rounded\ cube\ volume - cube\ volume)}{Cube\ volume}$$

$$\%Difference = \frac{(1{,}331\ - 1{,}157.625)}{1{,}157{,}625}$$

$$\%Difference = 14.977\% \simeq 15\%$$

QUESTION 5 PAGE 56

$$Hand\ factor = \frac{Direct\ Cost}{Equipment\ cost}$$

1- Hand factor = 4.44
2- Hand factor = 4
3- Hand Factor = 4

$$Avg\ Hand\ factor = \frac{(4.44 + 4 + 4)}{3}$$

$$Avg\ Hand\ factor = 4.15$$

QUESTION 6 PAGE 57

Gross floor area = 4,500sqft

Avg Partition Height = 10ft

Partition Density Factor (PDF) = 9.2

Cost of interior partition = 5.5$/sqft

To calculate the cost of interior partition we need to calculate its area, once the height was provided we need to find the total length.

$$PDF = \frac{Total\ lenght\ of\ interior\ partition}{Gross\ floor\ area}$$

$$9.2 = \frac{Total\ lenght\ of\ interior\ partition}{4{,}500}$$

$$Total\ lenght\ of\ interior\ partition = 9.2 * 4{,}500 = 41{,}400ft$$

$$Total\ area\ of\ partition = Total\ lenght\ of\ interior\ partition * Avg\ partition\ height$$

$$Total\ area\ of\ partition = 41{,}400 * 10$$

$$Total\ area\ of\ partition = 414{,}000sqft$$

$$Total\ cost = (Total\ area\ of\ partition) * (Cost\ of\ interior\ partition)$$

$$Total\ cost = 414{,}000 * 5.5 = \$2{,}277{,}000$$

QUESTION 1 PAGE 65

	New Hospital	Old Hospital
Location	B	Other location
R. S Means City Index	0.890	0.981
ENR Building cost index	5210	4369
Cost	??	$17,400,000

$$City\ Index\ Adjustment = \frac{0.890}{0.981} = 0.91$$

$$ENR\ Index\ Adjustment = \frac{5210}{4369} = 1.19$$

The estimated cost of the new hospital is calculated based on the adjusted indexes:

$$New\ Hospital\ Cost = 17{,}400{,}000 * (0.91) * (1.19)$$

$$New\ Hospital\ Cost = \$18{,}842{,}460 \simeq \$18{,}800{,}000$$

Note: To get $18,824,606, as calculated in the book, you need to use the adjusted indexes with more significant digits.

QUESTION 2 PAGE 71

Concrete volume = 270 cy

Slab thickness = 4 in

Waste 5%

Slab area = ?

Calculating the net volume of concrete.

$$Net\ Volume = \frac{270}{1.05} = 257.14cy$$

$$Area = \frac{Volume}{Thickness}$$

$$Slab\ Area = \frac{9073{,}94}{0.33} = 27{,}514\ sqft$$

QUESTION 4 PAGE 77

	HOURS	$/Hr	$
SR. PM	1,000	120	120,000
PM	3,000	100	300,000
Scheduler	1,000	110	110,000
Tech	5,000	95	475,000
Total	10,000		1,005,000

$$Composite\ Rate = \frac{Total\ Cost}{Total\ Hours}$$

$$Composite\ Rate = \frac{1{,}005{,}000}{10{,}000} = 100{,}5\$/Hr$$

QUESTION 6 PAGE 88

Note: This questions is wrong. The book ask for a solution in square meters, in that case the correct answer is 34,000,000 sqm, but you do not have this option. Please see below the solution of this question for the area in acres.

1 arpent = 3,400 sqm

Parking lot area = 10,000 arpents

Converting arpents into sqm:

$$\frac{1\ arpent}{10{,}000\ arpent} = \frac{3{,}400\ sqm}{Area\ sqm}$$

Parking lot area in square meters:

$$Parking\ lot\ Area\ sqm = 34{,}000{,}000\ sqm$$

Converting sqm into acres:

$$\frac{1\ sqm}{34{,}000{,}000\ sqm} = \frac{0.0002471 acres}{Area\ Acres}$$

Parking lot area in acres:

$$Parking\ lot\ Area\ acres = 8{,}402\ acres$$

QUESTION 3 PAGE 94

Daily Rate = $ 320,000 MOB/DEMOB = $ 200,000

Installation time = 5 days

$$Total\ cost = (\ Daily\ Rate) * (Installation\ Time) + MOBDEMOB$$

$$Total\ cost = (\ 320{,}000) * (5) + 200{,}000$$

$$Total\ cost = \$\ 1{,}800{,}000$$

QUESTION 4 PAGE 94

Crew of 2 welders and one welding machine.

$$Crew\ cost = 2 * 60 + 220 = \$340/hr$$

20 welds = 40 hours

$$Total\ cost = 40 * (340) = \$13{,}600$$

QUESTION 5 PAGE 94

	Qty	$/Hr	Total $
Carpenters	3	30	90
Laborers	2	20	40
Foreman	1	35	35
Total	6		165

$$Hourly\ Crew\ Rate = \frac{165}{6} = 27.5\$/hr$$

QUESTION 9 PAGE 101

Note: The question says that $14,500,000 is the total investment. If you use this amount you will not find the correct answer.

$$Total\ return = (\ anuual\ return) * (5number\ of\ years)$$

$$Total\ return = (\ 2{,}750{,}000) * (5) = \$13{,}750{,}000$$

$$ROI = \frac{Total\ Return - Total\ Invested}{Total\ Invested}$$

$$ROI = \frac{13{,}750{,}000 - 12{,}500{,}000}{12{,}500{,}000}$$

ROI = 10%

QUESTION 10 PAGE 101

Note: The question says that $20,000 is the fixed cost. If you use this amount you will not find the correct answer.

X = Production = 4,000 units/hr

FC = Fixed Costs = $200,000

VC = Variable Cost 0,5$/unit

Bottle price = 1,5 $/unit

Breakeven point

$$SP * (X) = (\ VC) * (X) + FP$$

$$1.5 * (X) = 0.5 * (X) + 200{,}000$$

X = 200,000 units

QUESTION 1 PAGE 107

This question is similar to question 3 Page 94, the difference is that the 3s Rule apply.

3s Rule means: Weekly rate = 3 times the daily rate.

$$Total\ cost = (\ Daily\ Rate) * (Installation\ Time) + MOBDEMOB$$

$$Total\ cost = (\ 320{,}000) * (3) + 200{,}000$$

$$Total\ cost = \$1{,}160{,}000$$

QUESTION 2 PAGE 107

Base Rate = $22/hr

Burden 45%

Production Rate – 4 units/hr

Productivity = 6 hours worked in 8 hour shift.

$$Productivity = \frac{6}{8} = 0.75$$

$$Total\ prodution\ hours = \frac{400\ units}{4\ units/hr} = 100hrs$$

$$Appliyng\ productivity = \frac{100}{0.75} = 133.33hrs$$

$$Total\ unburdened\ cost = (\ 133.33) * (22) = \$2{,}933$$

If the question have asked for the total burdened cost the correct answer was going to be:

$$Total\ burdened\ cost = (\ 2{,}933) * (1.45) = \$4{,}252.85$$

QUESTION 1 PAGE 149

Embankment = 420,000CY

Total Embankment direct cost = $4,400,000

Total direct costs = $17,500,000

Total indirect plus overhead cost = $3,080,000

Calculating the % of indirect plus overhead over the direct cost:

$$\% = \frac{3{,}080{,}000}{17{,}500{,}000} = 0.176\%$$

Applying the indirect and overhead cost to the total direct embankment cost we will find:

$$Total\ enbankment\ cost = (4{,}400{,}000) * (1.176) = \$5{,}174{,}400$$

$$Embankment\ unit\ cost = \frac{5{,}174{,}400}{420{,}000} = \$12.32$$