M503 – Answers to Overnight Questions Day 2

Question 1:
If a machine has fluctuating sound levels at the operator location, in other words, the sound level changes as the machine cycles, which of the following metrics is best to measure:

- ☐ The sound pressure level (SPL) or L_p.
- ☐ The equivalent-continuous sound level, L_{eq}.
- ☐ The maximum level, L_{max}.
- ☐ The peak level, L_{peak}.
- ☐ Both items b and c listed above
- ➢ *Both items b and d listed above*
- ☐ Items a, b, c and d

Question 2:
Assume the allowable noise exposure limit for an 8-hour day is 85 dBA, and a 3-dBA exchange rate is used. What is the allowable duration or time a person may be exposed to 88 dBA, assuming there is no additional noise exposure above 80 dBA for the remainder of the day?

- ☐ 3.2 hours
- ☐ 2.0 hours
- ➢ *4.0 hours*
- ☐ 0.5 hours

Question 3:
Assume the allowable noise exposure limit for an 8-hour day is 85 dBA, and a 3-dBA exchange rate is used. What is the $L_{Aeq,8hr}$ for a person exposed to the following sound levels for the noted durations, assuming there is no additional noise exposure above 80 dBA for the remainder of the day?

☐ 91 dBA for 60 minutes	*91 – 9 = 82*
☐ 87 dBA for 30 minutes	*87 – 12 = 75*
☐ 82 dBA for 6 hours	*82 – (approx)1 = 81 … actually 80.8*
☐ 70 dBA for 30 minutes	*70 – 12 = 58*

Question 4:
The noise level for a new pump is known to be 78 dBA.
The background noise level in the area is 82 dBA.
What is the overall noise level when the pump is operating?

Using Table 2.2
82-78 difference is 4 from the table a difference of 4 leads to 1.5 addition to the higher level
Therefore 82+1.5 = 83.5 dBA and rounding the total overall noise level is 84dBA

Using the simplified version of the table the overall noise level would be estimated at 82+1=83 dBA

Question 5:
The noise levels from 3 separate sources in the area are 80, 81 and 84 dBA. It has been suggested that it is easy to put an enclosure around the 81 dBA source to reduce its level to 71 dBA. What is your advice on this proposal?

Adding the noise levels in pairs -   80+81 gives a total of 83.5dBA
83.5+84 gives a total of 87 dBA

Adding the noise levels when 81 dA is reduced to 71 dBA
71+80 gives a total of 80.5 dBA
80.5 + 84 gives a total of 85.8 which would round off to 86 dBA
So although one source has been reduced by 10dB the overall effect is only 1dB reduction! Would be preferable to reduce the noise from the louder source first.

Question 6:
The noise levels at the ear of the worker on a metal punching machine have been found to be excessive by only 2 dB(A). It is proposed that hanging sound absorbing batts from the ceiling should be sufficient to reduce the noise. Do you agree?

No this will only reduce the noise marginally in the reverberant field, but have no effect on exposure for the worker who is in the near or direct field.

Question 7:
The sound pressure level measurements due to a noise source, made using a sound level meter fitted with an 1/1 octave band filter, are given below. The reported overall linear and overall A-weighted sound pressure levels were 90 dB and 89 dBA respectively. Perform an integrity check on this data and comment on the reported noise levels.

Frequency, (Hz)	63	125	250	500	1000	2000	4000
SPL (dB re 20µPa)	95	72	85	80	86	82	79
A weighting	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1

(Hint: add up the noise levels for each of the octave bands to give the overall dB value. Use the A weighting to determine the A weighted levels in each band and then the overall dBA value and compare this with the quoted value.)

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A weighting	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1
A Weighted	69	56	76.4	76.8	86	83.2	80

The linear is just plain wrong as the 95dB in the 63 hz range dominates and the sum cannot be less than 95 in fact the others add 1.3 dB.

As for the A weighted, it calculates out to 89.1 rounded to 89 dBA which agrees with the quoted value.