CONFIDENTIAL

SET A

UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
SEPTEMBER 2014 SESSION

SUBJECT CODE	:	**FCB30502**
SUBJECT TITLE	:	**APPLIED ACOUSTICS**
LEVEL	:	**BACHELOR**
TIME / DURATION	:	**3.30 PM – 6.30 PM** **(3 HOURS)**
DATE	:	**31 DECEMBER 2014**

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.

2. This question paper is printed on both sides of the paper.

3. Please write your answers on the answer booklet provided.

4. Answer should be written in blue or black ink except for sketching, graphic and illustration.

5. Answer all questions.

6. Answer all questions in English.

7. All documents authorized (open book examination).

THERE ARE 5 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

Question 1

Refer to Figure Q1.

The size of an un-occupied and un-furnished room below is 8.0m (L) x 9.0m(W) x 3.0m(H). There is one door and four (4) glazing windows located on the walls. The glazing window has a size of 1m x 1.5m and the door has a size of 1m x 2m.

It is found that the reverberation time of this closed room is T_R=0.7sec. The Sound Power Level (SWL) of the split unit air-conditioner is measured, L_w= 55dB. The receiver standing at 3m distance away from the unit and receiving the Sound Pressure Level (SPL); L_p of 45dB. Calculate and choose either location A or B as the best place to install the split unit.
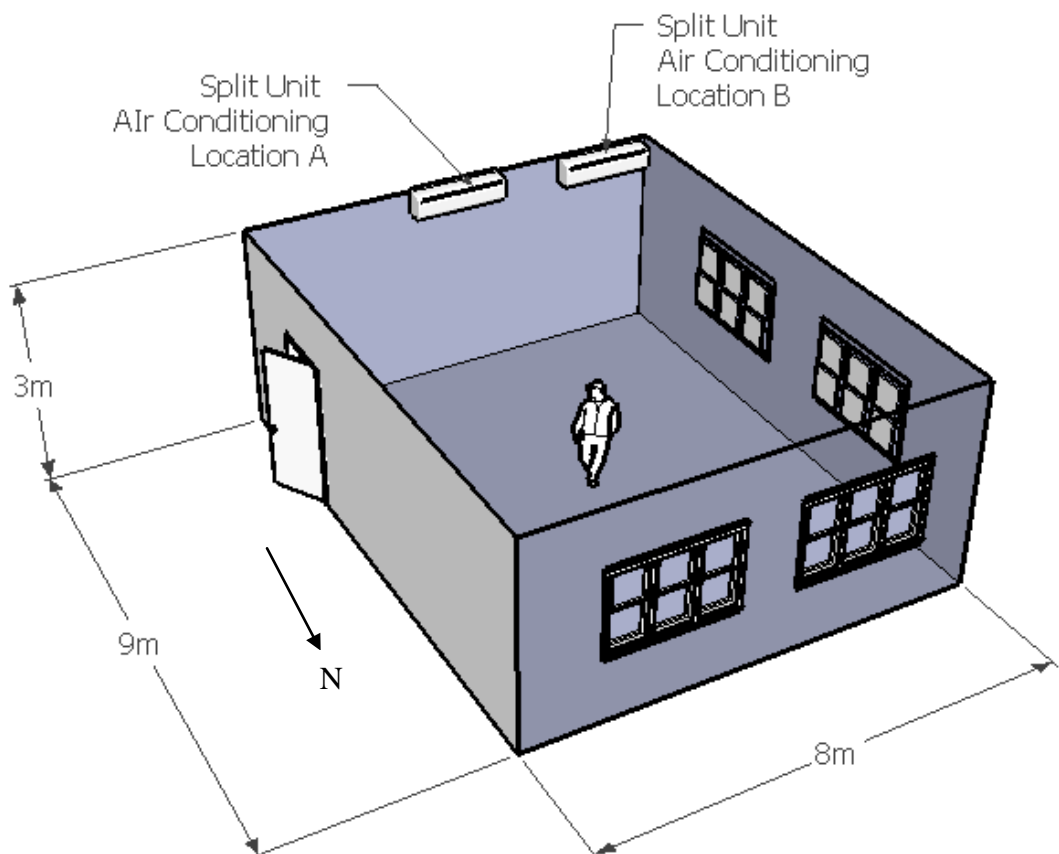
(10 marks)

Figure Q1: Sound propagation of split unit air-conditioner in a closed room

Question 2

Refer to Table Q2(a),Q2(b) Figure Q2(a) and Q2(b).

You are given the Air Handling Unit (AHU) specification as below Table Q3(a):

Table Q2(a): AHU specification

Octave band Freq	(Hz)	63	125	250	500	1000	2000	4000	8000
L_w	dB	88	90	76	79	76	68	60	58

The rooms are constructed with concrete wall, hard floor, windows and door corresponding to the absorption coefficient as below Table Q2(b).

The door size is 1m x 2m while the window size is 2m x 1m and an acoustic lining 'sound proof' of 1m x 4m. There is a ceiling 3m above the floor.

Table Q2(b): sound absorption specification:

Structure / Freq	Sound absorption coefficient, α							
	63	125	250	500	1 000	2 000	4 000	8 000
Fair-faced concrete wall	0.01	0.01	0.02	0.03	0.04	0.08	0.03	0.05
Windows, glass facade	0.04	0.05	0.08	0.05	0.05	0.08	0.02	0.03
Doors (timber)	0.06	0.05	0.10	0.08	0.08	0.08	0.08	0.08
Hard floor coverings	0.01	0.02	0.03	0.04	0.08	0.07	0.06	0.07
Suspended plasterboard ceiling	0.03	0.02	0.15	0.10	0.07	0.06	0.05	0.06
Acoustic lining 'Sound proof'	0.30	0.35	0.40	0.35	0.40	0.45	0.40	0.30

(a)   Calculate the total sound Pressure Level L_p (dBA) for **500Hz and 1 000Hz frequency band** received by a receiver standing 2m away from the diffuser in Room A. The diffuser is an oblique incidence type, concealed in the wall.

(20 Marks)

(b)   By complying Noise Criteria NC35 specification, design the room by installing the minimum required silencer system. Plot your data on the NC Chart provided in the Appendix, detach and submit together with your answer sheet.
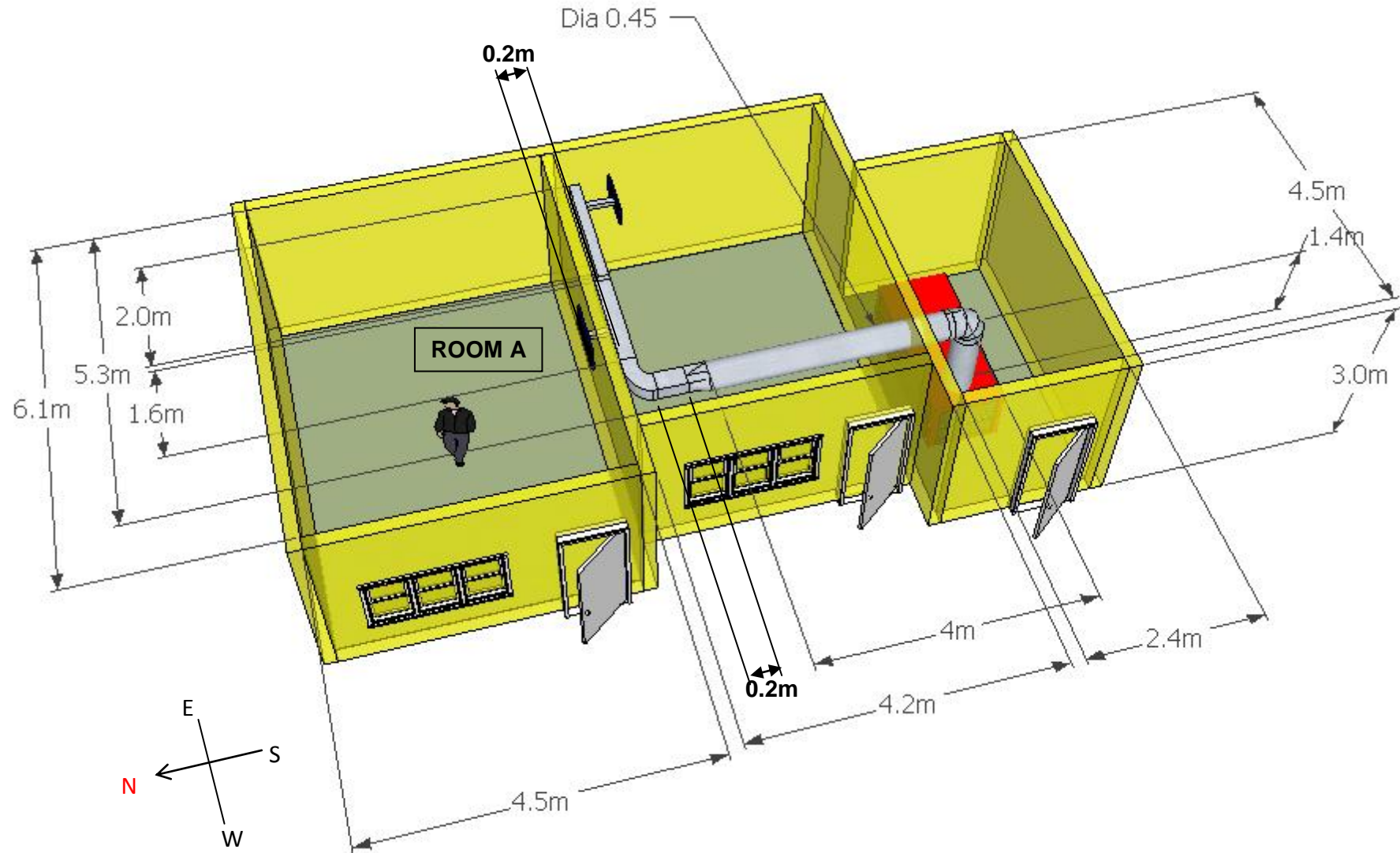
(10 Marks)
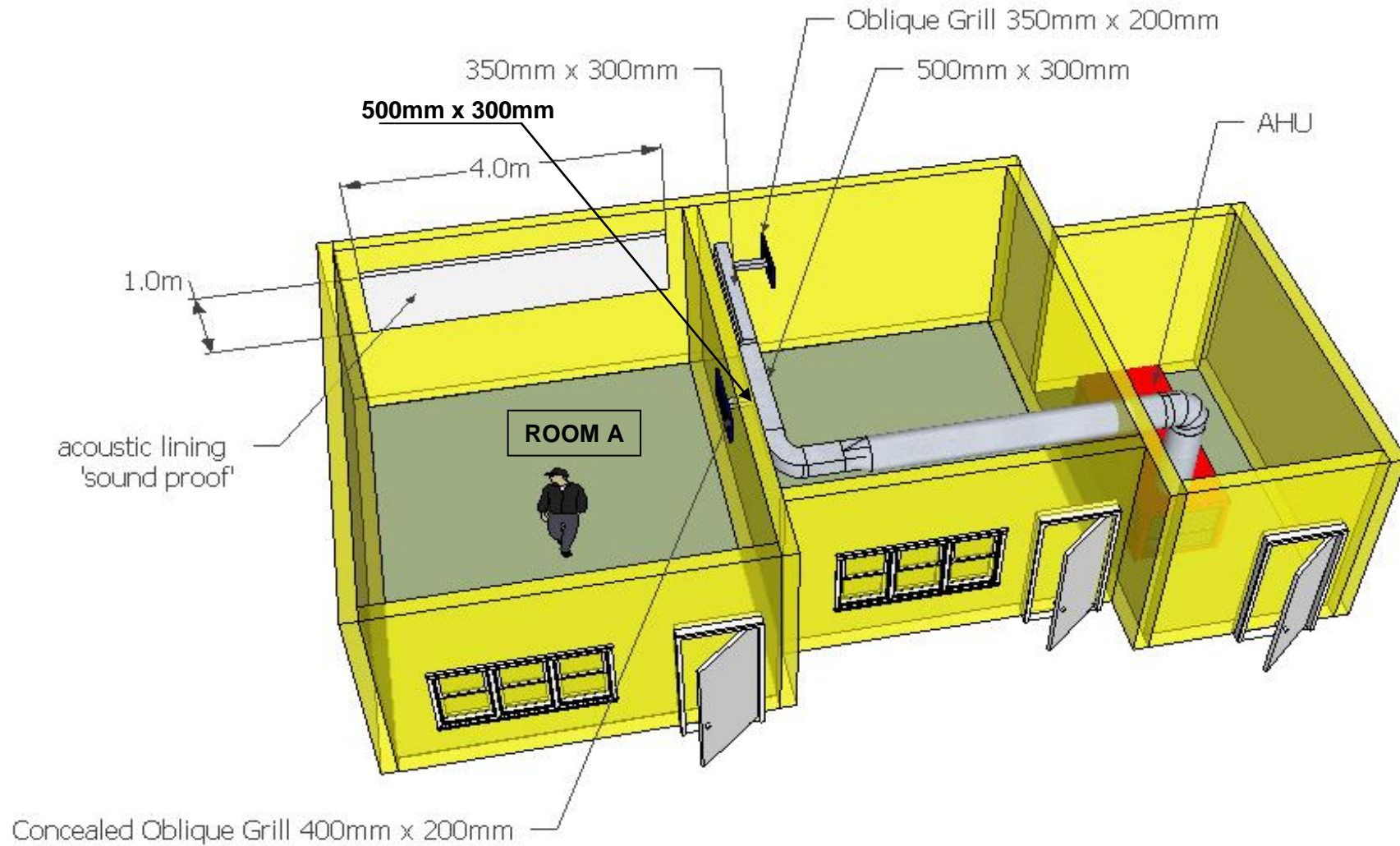
Figure Q2(a): Perspective view (detail dimensions)

Figure Q2(b): Perspective view (detail dimensions for all ductings)

END OF QUESTION
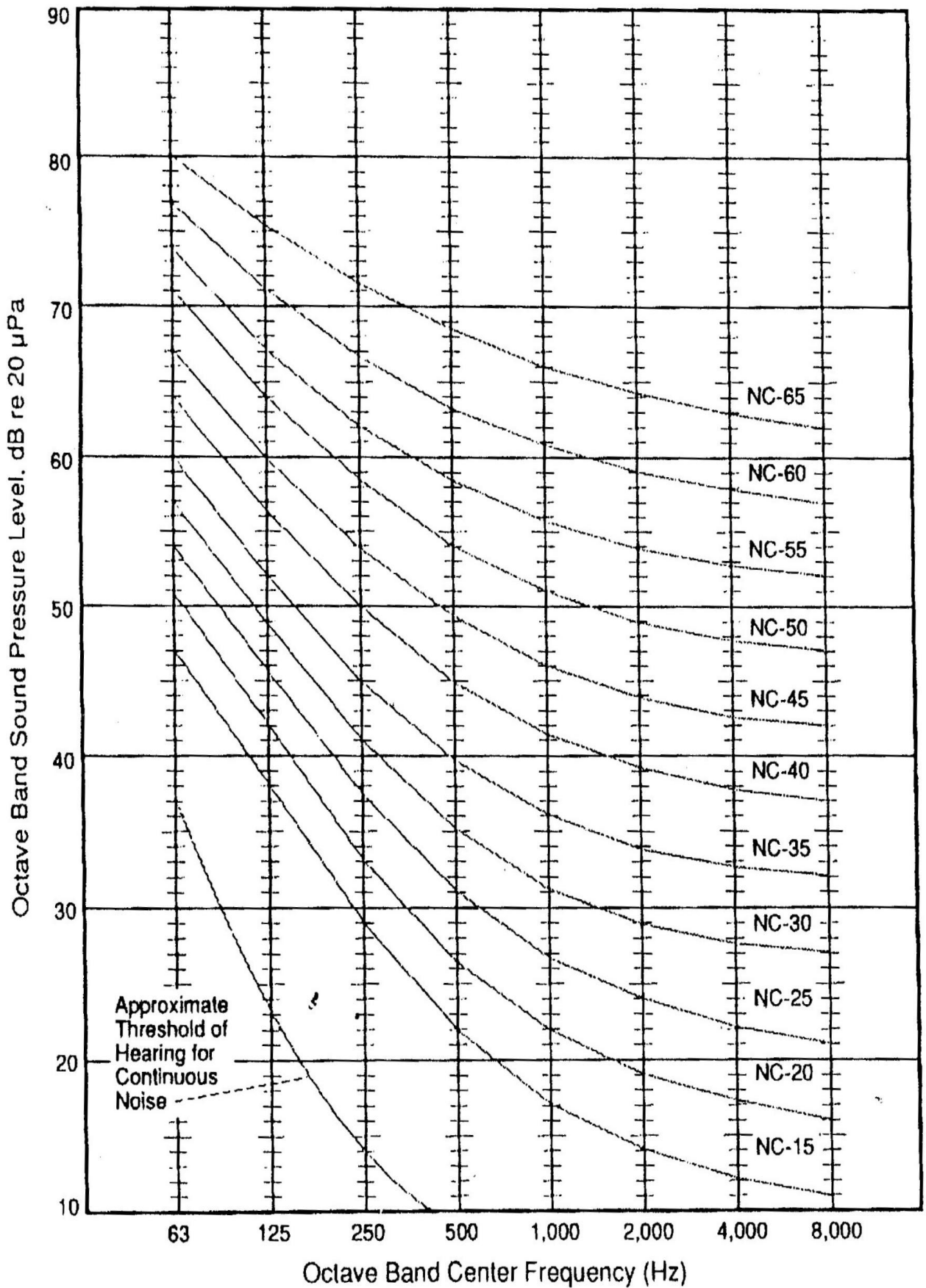
Appendix: (Please detach and submit with your answer paper)

Figure Q3 : NC Chart