สำนักหอสมุด Seat No. ___

มหาวิทยาลัยเทคโนโลยีพระจอมเกล้าธนบุรี

King Mongkut's University of Technology Thonburi

Mid-Term Examination of the 1st/2010 Semester

Course: CPE4523 Selected Topics in Computer Eng. II (Acoustics of Musical Instrument and PA Systems)

Date : Thursday 29th July 2010

Time : 9.00 - 12.00 a.m.

For : CPE 3-4 (A-D)

Instruction : 1. Closed-Book Examination
2. A calculator is allowed.
3. A Sc.-Formulae is allowed.
4. There are 5 problems in 10 pages.
5. Do all problems for 30% keeping.

Student's Name : _____ (capital Letter)

Student's ID : _____

Problem 1 ____ (10 marks)

Problem 2 ____ (10 marks)

Problem 3 ____ (10 marks)

Problem 4 ____ (10 marks)

Problem 5 ____ (10 marks)

Assoc. Prof. Boonruk CHIPIPOP

Designer

(1) An octave band analysis of sound in a machine shop was made and the following results obtained:

Octave band Hz	20–75	75–150	150–300	300–600	600–1200	1200–2400	2400–4800	4800–10 000
S.P.L. in dB	68	72	90	87	86	88	90	84

Calculate the loudness in phons.

(2) Find the perceived noise level in PNdB of the analysis in Question (1).

(3) The noise level from a factory with ten identical machines measured near some residential property was found to be 54 dB. The maximum permitted is 50 dB at night. How many machines could be used during the night?

(4) Find the total sound pressure level in dB for a sound with the following analysis. Calculate also the total intensity in W/m^2.

Centre Frequency Hz	Level dB
125	55
250	63
500	71
1000	68
2000	59

(5) A motor car was found to produce the following noise. Calculate the total noise level in dB (linear) and dB (A).

Octave Band Hz	Level dB
20–75	95
75–150	84
150–300	80
300–600	68
600–1200	65
1200–2400	61
2400–4800	60
4800–10 000	60

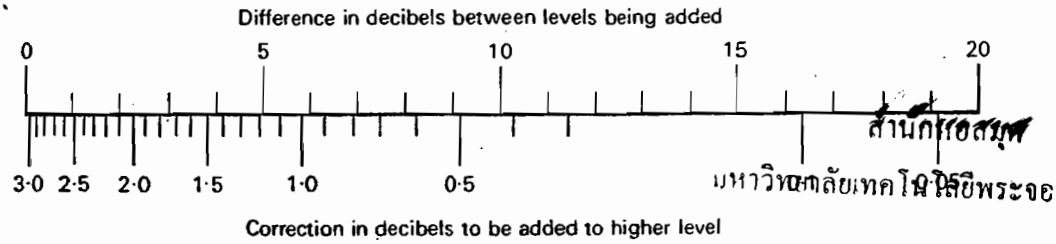


Fig. 1. Scale for combining sound pressure levels

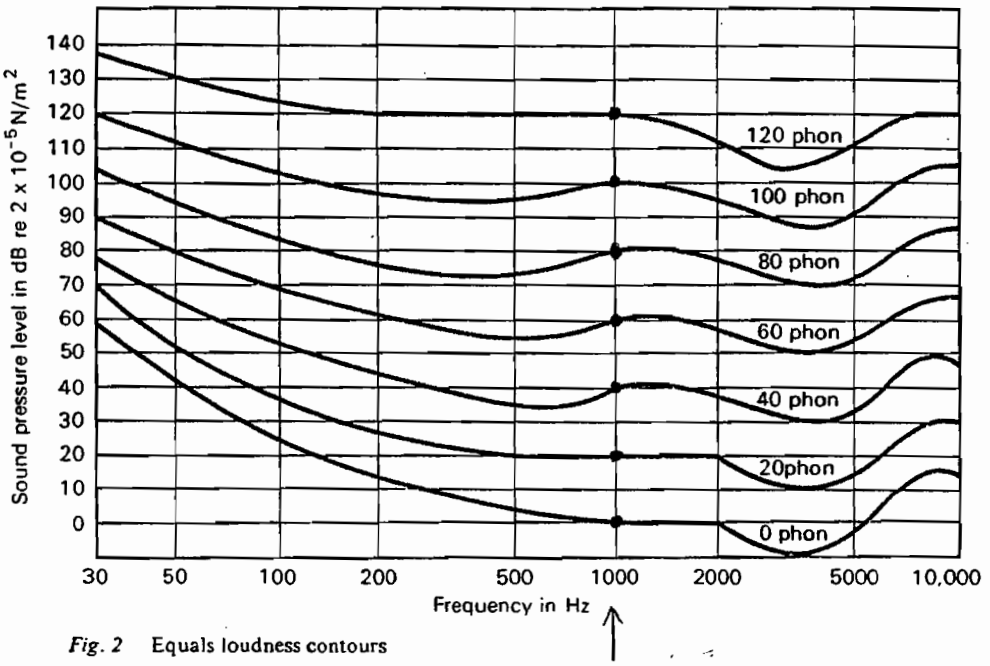
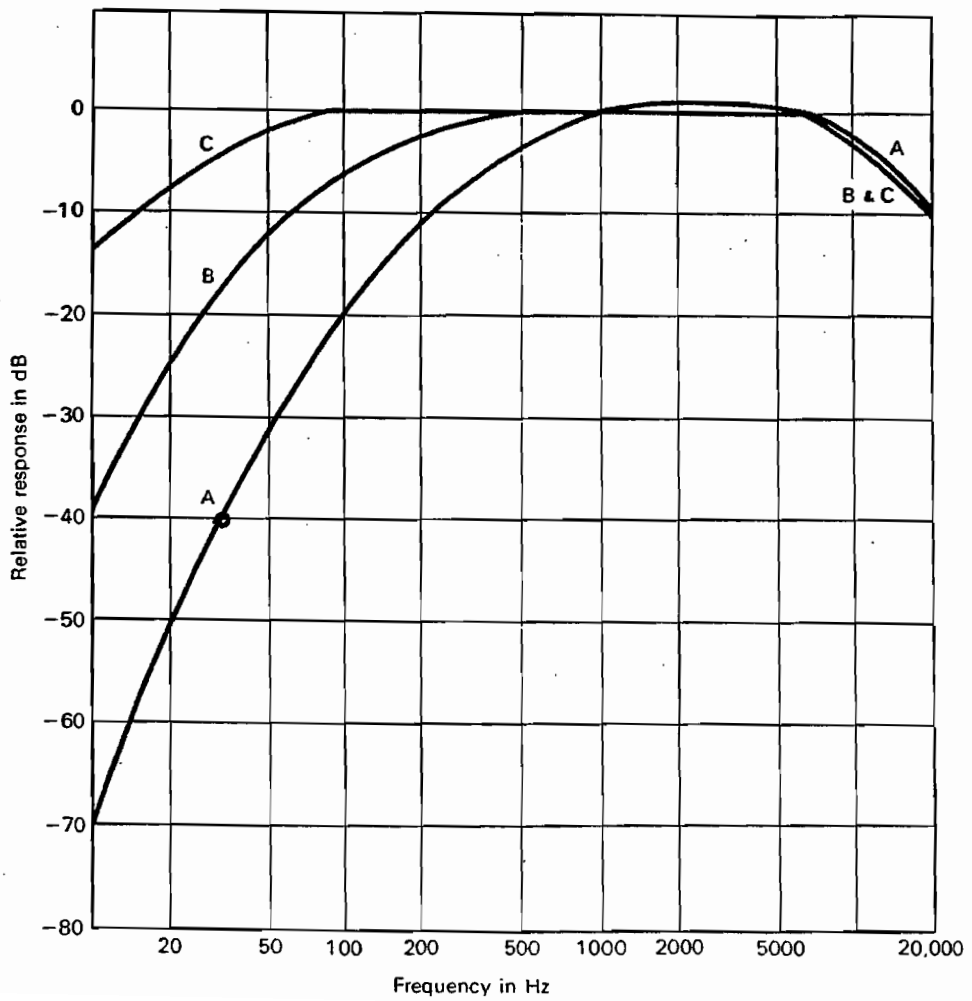


Fig. 2 Equals loudness contours



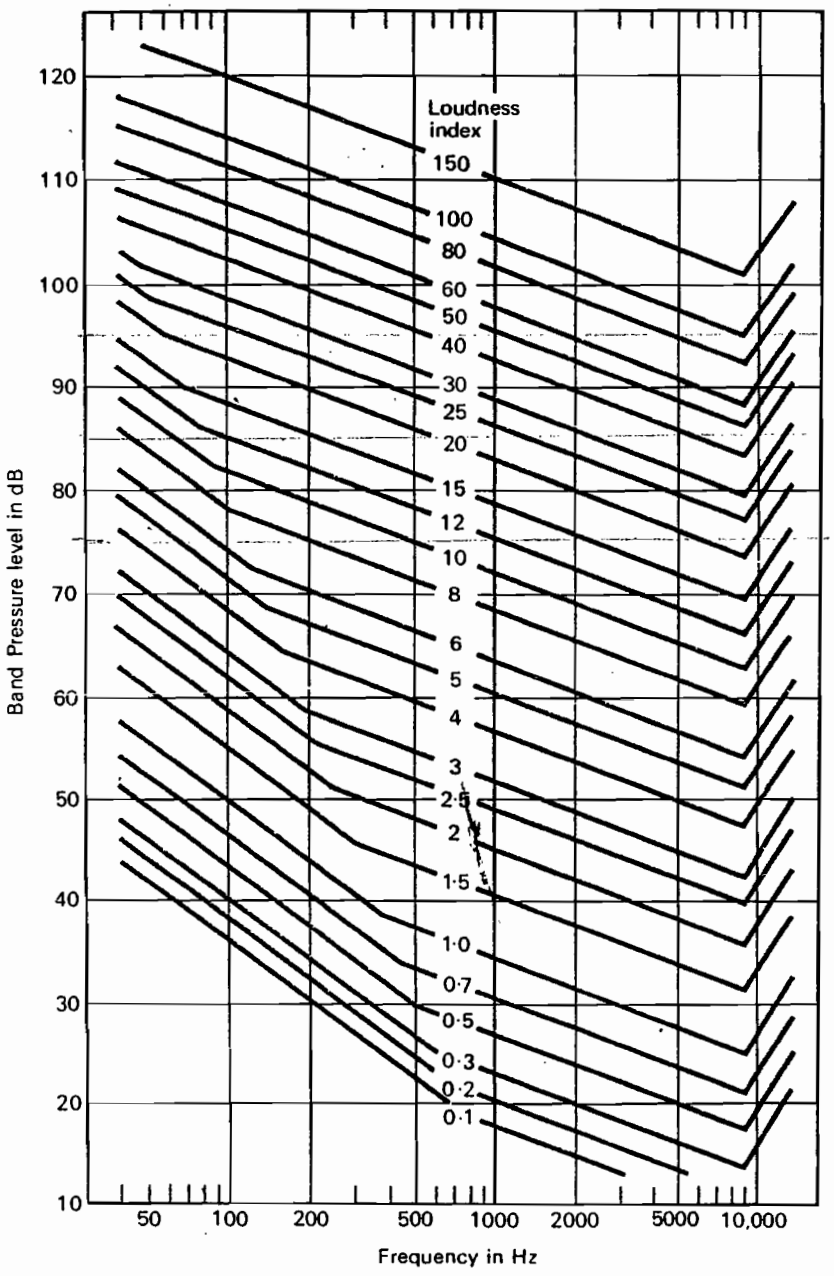


Fig. 4 Loudness index in sones from the S.P.L. of the frequency band dB

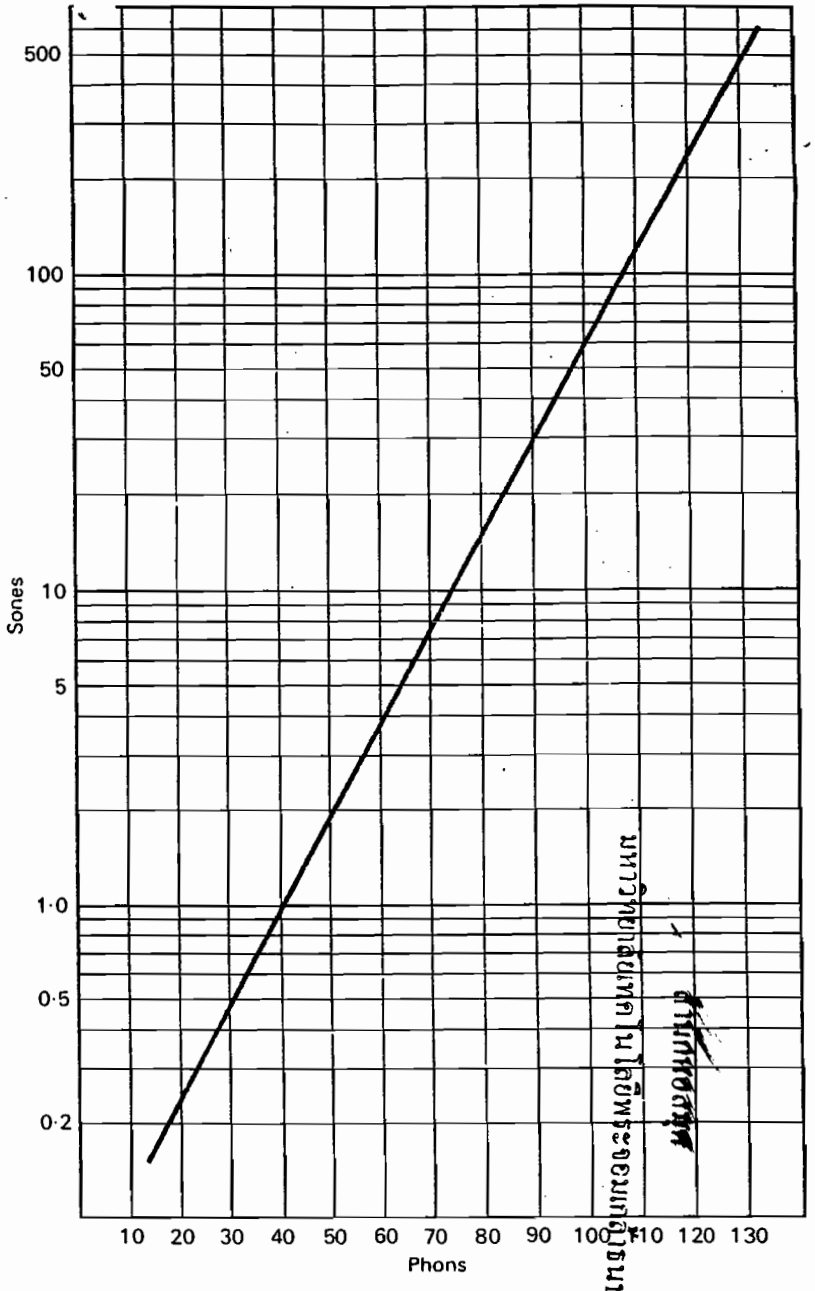


Fig. 5 Relationship between sones and phons

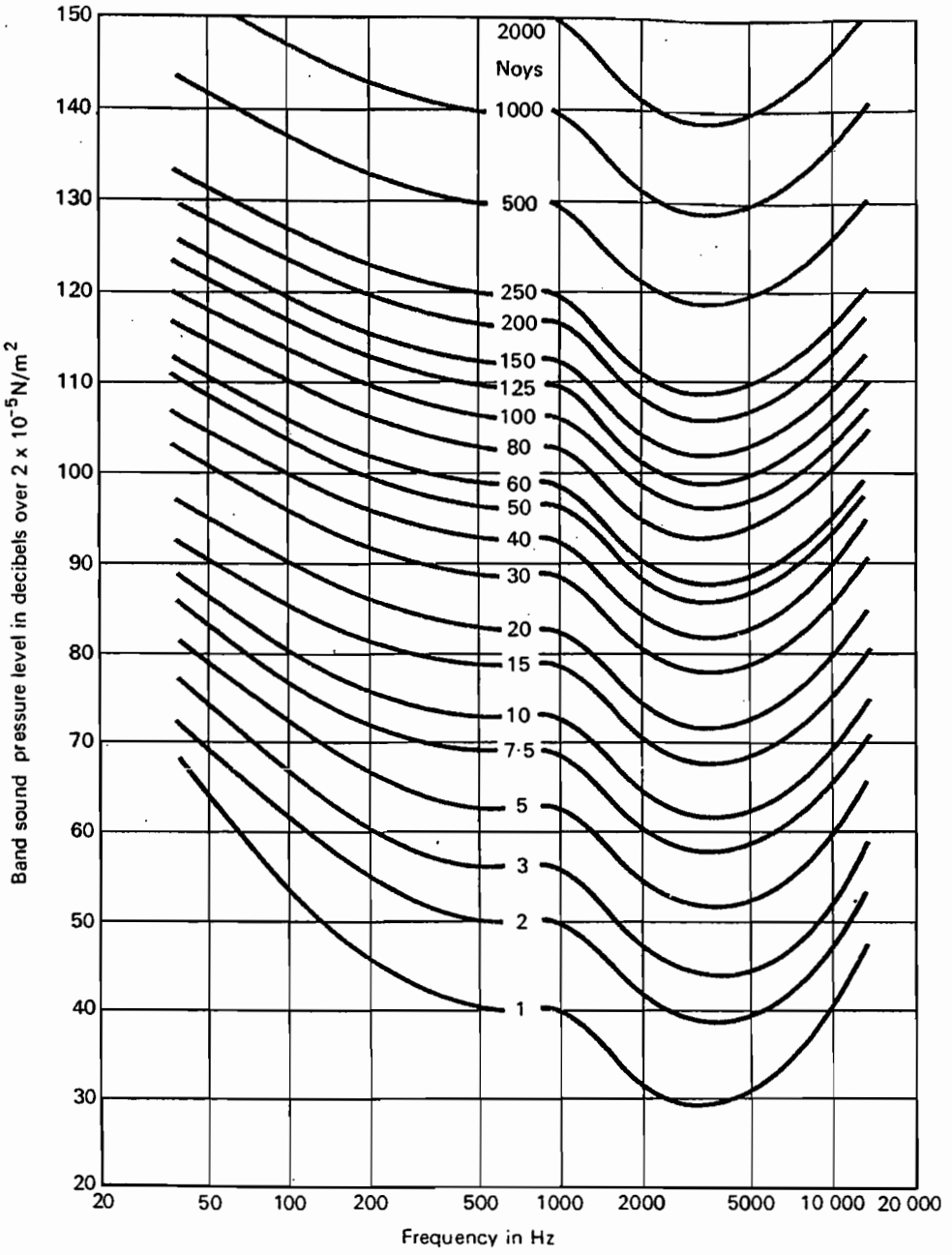


Fig. 6 Contours of perceived noisiness