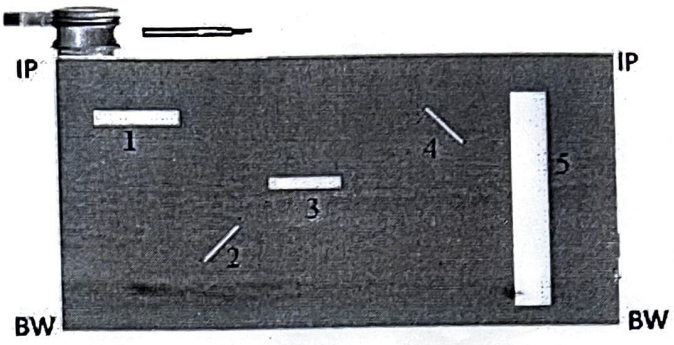
SHIV NADAR
UNIVERSITY
CHENNAI

(A State Private University)
Regulation 2021
CONTINUOUS INTERNAL ASSESSMENT -1

Name of the Programme : **B Tech AI & DS (A & B) &CSE (CS)**		Semester: **I**
Course code & Name:	**PH1001T Engineering Physics**	Date: **21.09.23**
Time: **8.10 AM – 9.00 AM**	**Answer all questions**	Maximum Marks: **25**

Q.No		Marks	CO	KL
1	What are the limitations of a magneto strictive ultrasonic generator.	2.0	CO1	K1
2	The difference in intensity levels between sound from the same source heard at 2 locations along the direction of propagation of sound is 6 dB (assume that there are no obstacles in between these locations). What is the relative distance between the 2 locations (rounded off to integers).	2.0	CO1	K1
3	You have a source emitting a constant intensity of sound in air. Which of the following techniques can be used appropriately to show that speed of sound is not a constant? I. Submerge the source underwater and switch it on II. Increase the temperature in the room and switch on the source of sound. III. Increase the pitch of source. (a) I only (b) I and II only (c) I, II and III (d) II and III only (e) III only	2.0	CO1	K2
4	If a woman needs an amplification of 5.0×10^{10} times the threshold intensity to enable her to hear at all frequencies, what is her overall hearing loss in dB?	2.0	CO1	K1
5	The intensity level of 4 sounds A, B. C & D at different frequencies are the same. Among the four, A is the loudest, B and D are of the same loudness and C has lowest loudness. Draw sample loudness curves and mark these 4 sounds on them.	4.0	CO1	K3
6	An ultrasonic scanner is being designed for medical imaging. If the velocity of sound through tissue is 1540 m/s, what is the minimum time resolution the scanner needs if it is supposed to resolve features at a depth of 3.6 cm and 3.5 cm from the surface? What is the role of couplant in these systems.	4.0	CO1	K2
7	An acoustic grating is formed in a liquid using a piezoelectric crystal operating at 6 MHz. At room temperature on a hot day in Chennai at 41°C, the first order diffraction spot is observed at an angle of 0.339 ° when a laser of 650 nm is used. In Sahara Desert at the temperature of 56° the first order diffraction for the same acoustic grating system was reported to be 0.346°. Estimate the change in velocity of the medium per unit degree rise in temperature.	3.0	CO1	K2

8	You are asked to do a B-mode scan using normal pulse-echo technique with a single element transducer for a metal test piece the client says is roughly 10 m thick. The actual cross-section of the test piece is as shown in the diagram. Here the white regions represent voids filled with air in the test piece and the lines indicate thin flaws. The ultrasonic velocity through the metal is 6000 m/s and that through air is 340 m/s. Assume that you have set the scanner such that the maximum energy launched into the test piece is sufficiently high to penetrate through multiple flaws and still generate detectable echoes of sufficient amplitude from the back wall of the test piece. Draw the B mode scan display if the time interval between the successive "pings" used during testing is (i) 5 ms and (ii) 60 ms 	6.0	CO1	K4

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