BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: I.M.SC. **SEMESTER : V**
BRANCH: PHYSICS **SESSION : MO/2025**

SUBJECT: PH307R1: EXPERIMENTAL TECHNIQUES

TIME: 02 HOURS **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1(a)	Distinguish between accuracy and precision in measurements.	[2]	1	1,2
Q.1(b)	What is a probability density function (PDF)? What are some fundamental probability distributions commonly applied in the physical sciences?	[3]	1	1
Q.2(a)	Explain the difference between standard deviation and standard error.	[2]	1	2
Q.2(b)	Two sets of resistance measurements (in ohm) for the same resistor are given below: Set-1: 50, 51, 52, 53, 54. Set-2: 48, 50, 52, 54, 56. Find the standard deviation for each set. Explain which set of measurements is more precise.	[3]	1	3
Q.3(a)	Define a signal. Mention the different classifications of signals.	[2]	2	1
Q.3(b)	With schematic, discuss the periodic and aperiodic signals.	[3]	2	2
Q.4(a)	Define an LTI (Linear Time-Invariant) system. Give an example of an electrical circuit that behaves like an LTI system.	[2]	2	1,2
Q.4(b)	State and briefly explain the two fundamental properties of an LTI system.	[3]	2	2
Q.5(a)	What is noise? Discuss the characteristics of 1/f noise (flicker noise).	[2]	2	1,2
Q.5(b)	Define signal-to-noise ratio. A communication system receives a signal with power Ps = 5 mW. The noise power at the receiver input is Pn = 0.5 mW. Calculate the Signal-to-Noise Ratio (SNR) in decibels (dB).	[3]	2	3

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