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DEPARTMENT OF SCIENCES, III SEMESTER M.Sc (PHYSICS) END SEMESTER EXAMINATIONS, DECEMBER 2018 (MAKE UP)

SUBJECT: EXPERIMENTAL METHODS IN PHYSICS [PHY-5105] (REVISED CREDIT SYSTEM-2017)

Time:	3 Hours	Date: 29-12-2018	MAX. MARKS: 50
Note:	(i) Answer ALL question	S	
	(ii) Draw diagrams, and w	rite equations wherever nece	ssary
1.			
a) W	With a necessary diagram, e	explain the working principle	of a rotary pump. What are
	its drawbacks?		[5]

b) Explain the working principle of a cold cathode ionization gauge. [5]

2.

a) Using the method of least squares, fit the following equation $y = ax^b$ to the data in the following table: [5]

x _i	<i>y</i> _{<i>i</i>}
1	0.5
2	1.7
3	3.4
4	5.7
5	8.4

b) For a metallic bonded strain gauge derive an expression for the gauge factor. [5]

3.

a) Derive the four-point probe equation for an 3D semi-infinite material with the four electrodes equally spaced and aligned along a straight line [5]

- b) Write a note on frequency generator
- b) Consider $S = x \cdot \cos(\theta)$ for $x = (2.0 \pm 0.2)$ cm, $\theta = (53 \pm 2)^\circ = (0.9250 \pm 0.0035)$ rad. Find S and its uncertainty. [2]

4.

- a) With a neat diagram, explain the working of atomic force microscope. [5]
- b) Explain Hall effect and derive an expression for the Hall coefficient [5]

5.

- a) List the important interactions that occur when an electron beam strikes the specimen and explain the conditions under which they occur. Which types of these are used in SEM?
- b) With a necessary diagram, explain the secondary ion mass spectrometry. [5]

[3]