



DE-1347

M. Sc. (Physics) (Sem. I) Examination  
March / April - 2016

PH - 413 : Measurement & Experimental Planning

Time : Hours]

[Total Marks : 70

Instructions :

(1)

नीचे दृष्टवित निशानीवाणी विगतो उत्तरवडी पर अवश्य वपवी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="text" value="M. SC. (PHYSICS) (SEM. I)"/>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="text" value="PH - 413 : MEASUR. &amp; EXPERIMENTAL PLANNING"/>	<input type="text"/>
Subject Code No. : <input type="text" value="1"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="7"/>	<input type="text" value="Student's Signature"/>
Section No. (1, 2,...): <input type="text" value="Nil"/>	

- (2) Figures on extreme right indicate maximum marks.  
(3) Symbols have their usual meaning.  
(4) Assume data if required.

1. Write the Answer ANY TWO out of three of the following (7X2=14) (14)

- a. (i) Why is instrument calibration necessary? What is meant by Measure of precision?  
(ii) Give an acceptable format for listing references. What is the purpose of an abstract?
- b. Explain Nuclear Radiations, Discuss on Function and working of Geiger Muller Tube.
- c. (i) List some planning and conducting practical.  
(ii) In a student laboratory experiment a measurement is made of a certain resistance by different students. The values obtained were

Reading	1	2	3	4	5	6	7	8	9	10
Resistance k $\Omega$	12.0	12.1	12.5	11.8	13.6	11.9	12.2	11.9	12.0	12.3

Calculate the mean, standard deviation & probable error and variance for given data.

**2. Write the Answer ANY TWO out of three of the following (7X2=14) (14)**

- a. (i) Explain different arrangement of capacitive displacement transducer.  
(ii) Write the Advantages and Disadvantages of capacitive transducers.
- b. (i) Discuss on Magnetometer search coil.  
(ii) Write the function and limitation of photoconductive transducers
- c. (i) Define piezoelectric effect and photoelectric effects.  
(ii) A barium titanate pickup has the dimension of 5 mm x 5mm x 1.25mm . The force acting on it is 5N . The charge sensitivity of barium titanate is  $12 \times 10^6 \text{ N/m}^2$ , Calculate the strain . Also calculate the charge and the capacitance. Where  $\epsilon_0 = 1$  and  $\epsilon_r = 12.5 \times 10^{-9}$  .

**3. Write the Answer ANY TWO out of three of the following (7X2=14) (14)**

- a. Explain the ionization gage. How does it differ from the pirani gage?  
What disadvantages does it have?
- b. (i) Write the limits of pressure measurement for different types of gages.  
(ii) The effective radius of an air molecule is about  $1.85 \times 10^{-8} \text{ cm}$  Calculate the mean free path at  $70^\circ \text{ F}$  and the following pressures : 1 atm, 1 torr,  $1 \mu\text{m}$  and  $10^{-3} \mu\text{m}$ .
- c. (i) What are advantages of well-type manometer?  
(ii) A Mc-leod gage is available which has a volume  $V_B$  of  $15.0 \text{ mm}^3$  and a capillary diameter of 0.3 mm. Calculate the gage reading for a pressure of  $30 \times 10^{-6} \text{ m}$ .

**4. Write the Answer ANY TWO out of three of the following (7X2=14) (14)**

- a. Discuss on Resistance Temperature Detector .What are the advantages and disadvantages of RTD?write the application of RTD.
- b. (i) Write short note on pH measurement system .  
(ii) Discuss on Thermal conductivity measurement for liquid material.
- c. Define Thermoelectric effect. Calculate the temperature sensitivity for thermistor at  $100^\circ \text{ C}$ . Express the result in ohm-centimeters per degree Celsius: Take  $\beta = 4120^\circ \text{ k}$  and resistivity  $\rho = 110 \Omega^{-1}$  at  $100^\circ \text{ c}$ .

**5. Write the Answer ANY TWO out of three of the following (7X2=14) (14)**

- a. What is the main advantage of a semiconductor strain gage?. Explain Semiconductor strain gauges.
  - b. (i) How many temperature compensation be performed on resistance strain gages ?  
(ii) Obtain simplest relation for the delta rosette under the conditions that  $\epsilon_1 = \epsilon_{\max}$  that is  $\theta = 0$ .
  - c. (i) Define gage factor for strain gages. What is strain sensitivity?  
(ii) A rectangular rosette is mounted on a steel plate having  $E = 29 \times 10^6$  Psi and  $\mu = 0.3$ . The three strains are measured as  $\epsilon_1 = +500$   $\mu\text{in/in}$ ,  $\epsilon_2 = +400$   $\mu\text{in/in}$   $\epsilon_3 = -100$   $\mu\text{in/in}$  Calculate the principal strains, stresses and the maximum shear stress. Locate the axis of the principal stress.
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