Dr. MMG
Prepared by

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MANIPAL UNIVERSITY

DEPARTMENT OF SCIENCES

THIRD SEMESTER MSc – END SEMESTER EXAMINATION (DEC - 2016)

SUBJECT: EXPERIMENTAL METHODS IN PHYSICS (PHY-705) – Make up

(CREDIT SYSTEM)

TIME: 3 HOURS MAX. MARKS: 50

ANSWER ANY FIVE FULL QUESTIONS

1. (a) Estimate the maximum propagated error in case of following functions [a, b & c are constants].
   (i) $u = axy$ (ii) $u = ax^{-1}y$ (iii) $u = cx^a$ (iv) $u = cx^ay^b$
   (b) How to do least square fit for the function $y = ae^{bx}$? Explain.

   [6 + 4]

2. (a) Explain working principle of penning gauge.
   (b) Explain the working of diffusion pump with necessary diagram.

   [5 + 5]

3. (a) The voltage across a capacitor discharging through a resistance is given by $V(t) = V_0e^{-t/RC}$. The initial voltage is 9.00 ±0.01 V, R = 120±10% MΩ and C is 2μF. You complete the circuit, wait for 100±1 seconds, and then disconnect it. What is the final voltage, V±δV ?
   (b) With reference to oscilloscope, explain delay line and electrostatic focussing.

   [4 + 6]

4. (a) A resistance strain gauge with a gauge factor of 2.4 is mounted on a steel beam whose modulus of elasticity is 2×10^6 kg/cm^2. The strain gauge has an unstrained resistance of 120 Ω and the beam is subjected to stress of 650 N/m^2. Calculate the change in resistance.
   (b) Derive expression for Hall coefficient.

   [5 + 5]

5. (a) For certain crystal, x-ray diffractogram has shown peaks at 2θ values 40°, 49.52° and 72.64 Identify the corresponding crystal planes by assuming primitive cubic structure.

(b) Explain AFM with the help of block diagram and distinguish different modes of operation

[5 + 5]

6. (a) Explain the estimation of thermal conductivity of given material in steady state.

(b) What is differential scanning calorimeter (DSC)? How to estimate specific heat of given material by DSC? Explain.

[5 + 5]

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