National Institute of Technology Hamirpur

Department of Chemical Engineering

End Semester Theory Examination

Subject: Analytical and Characterization Techniques

Class: M.Tech & Ph.D. 1st Year **Semester: 1st Course code: (CHD-612)** **(Total – 50 Marks)**
Time: 2h

All questions are compulsory
All questions carry equal marks
Write name, roll no and put signature at the end of each page of your answer sheet
Marks will be deducted for the late submission of answer script

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1. What is chemiluminescence spectroscopy? Show that rotational energy and vibrational energy in a molecule are quantized. Write a brief note on the interference filter. 1+7+2

2. What is population standard deviation and sample standard deviation? Explain relative standard deviation. How the speed of light will change as the light wave travels from air to glass? What are Geiger counter and Proportional counter? Write a brief note on Electrochemical Analysis. 1+1+1+1+4+2

3. What is an induced dipole moment? Prove that induced dipole moment is created at three different scattered frequencies. Why is salt bridge required in a potentiometer? How IR spectroscopy is different from Raman Spectroscopy? Write a short note on Bolometer. 1+3+2+2+2

4. Derive Bragg's Law? How crystallite size is to be calculated? Explain TGA analysis technique with a block diagram. 2+2+6

5. Describe the instrumentation of NMR. What is an NMR active atom? What is a shielded atom and D-shielded atom? Explain Chemical Shift. 5+1+3+1

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