



SEVENTH SEMESTER B. TECH. (INSTRUMENTATION AND CONTROL ENGG.)

END SEMESTER DEGREE EXAMINATIONS, DECEMBER – 2018

SUBJECT: ANALYTICAL AND OPTICAL INSTRUMENTATION [ICE 4101]

TIME: 3 HOURS

MAX. MARKS: 50

Instructions to candidates

- Answer **ALL** questions.
- Missing data may be suitably assumed.

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| 1A | Give a broad discussion on the instrumental and chemical causes of Beer's Law deviation. | 5 |
| 1B | Differentiate between AES and AAS Spectrometry. | 3 |
| 1C | Explain the working principle of Golay detector used in IR spectroscopy. | 2 |
| 2A | Protein presence in hen egg white lysozyme can be analysed by either using metal chelate affinity chromatography, or by using gel filtration chromatography or using ion exchange depending on the protein structure. Explain how the technique can be selected and discuss the advantage of each method over the others. | 5 |
| 2B | What are the advantages for using Dual-headed Reciprocating Pumps in Liquid chromatography over single head pumps? | 2 |
| 2C | Explain the construction and working of Laser Desorption based Quadrupole Mass Spectrometer. | 3 |
| 3A | Explain the principle of laser generation and discuss the importance of population inversion during the process. | 5 |
| 3B | With neat schematic diagram explain the process of X-Ray generation. | 3 |
| 3C | How does dye lasers differ from solid laser? | 2 |
| 4A | With neat schematics, explain the working of a Michelson's interferometer. | 5 |
| 4B | How are holograms produced? Explain. | 3 |
| 4C | List the different fibre-fibre coupling losses during optical fibre communication. | 2 |
| 5A | Explain the working principles of oxygen and hydrogen analysers in industrial environments. | 5 |
| 5B | Briefly explain different detectors used in fibre optical communication. | 3 |
| 5C | Discuss the causes and effect of photochemical smog. | 2 |
