

**B.TECH. SEM -I (2007 COURSE) (ALL BRANCHES) : WINTER -  
2017**

**SUBJECT: ENGINEERING SCIENCES – I**

Day: **Saturday**  
Date: **13/01/2018**

Time: **10.00 AM TO 01.00 PM**  
Max. Marks: 80

**W-2017-2343**

**N.B.:**

- 1) **Q. No. 1 and Q. No. 5 are COMPULSORY.** Out of the remaining attempt any **TWO** questions from each section.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written **SEPARATE** answer book.
- 4) Draw neat labeled diagrams **WHEREVER** necessary.

**SECTION-I**

Constants:

$$e = 1.6 \times 10^{-19} C$$

$$m_e = 9.1 \times 10^{-31} Kg$$

$$h = 6.63 \times 10^{-34} J - s$$

$$m_p = 1.66 \times 10^{-27} kg$$

$$N_a = 6.025 \times 10^{23} \text{ atom/gm-mole}$$

- Q.1**
- a) What is diffraction? Derive the formula for intensity distribution when the light is diffracted from a single slit. **(05)**
  - b) With energy level diagram. Explain the working of He- Ne laser. **(05)**
  - c) State and explain Meissner effect. **(04)**
- Q.2**
- a) What is interference? Derive the formula for path difference for a thin film of non-uniform thickness. **(05)**
  - b) Give difference between Fraunhofer's and Fresnel's diffraction. **(04)**
  - c) Calculate the thickness of ARC when the wavelength of the light is  $5893 \text{ \AA}$  and the refractive index is 1.22. **(04)**
- Q.3**
- a) What is double refraction? Give Huygen's theory of double refraction. **(05)**
  - b) What is holography? Give construction and reillumination of hologram. **(05)**
  - c) Give difference between positive and negative crystals. **(03)**
- Q.4**
- a) What is piezo electric effect? Explain the construction and working of piezo electric oscillator. **(05)**
  - b) Write a short note on Josephson's effect. **(04)**
  - c) State and explain normal and anomalous Zeeman effect. **(04)**

**P. T. O.**

## SECTION-II

- Q.5** a) What are the causes of hardness of water? How will you distinguish between temporary and permanent hard water. (05)
- b) State and explain Ostwalds' s dilution law. (05)
- c) Define Fuel. How the fuels are classified? (04)
- Q.6** a) What are the boiler scales? Explain the causes of formation of boiler scales. (05)
- b) Write a note on i) priming and Foaming      ii) Caustic embrittlement. (04)
- c) A completely exhausted zeolite softner needs 150 liters of 10% brine solution for regeneration. How many liters of hard water of hardness 400 ppm can be softened by this softner? (04)
- Q.7** a) State and explain Arrhenius ionic theory of ionization? (05)
- b) Explain the concept of pH and pOH. (04)
- c) Write a note on concentration cell. (04)
- Q.8** a) Explain the principle, construction and working of Boy's gas calorimeter. (05)
- b) Explain origin, composition and refining of petroleum. (04)
- c) What are the characteristics of good Fuel? (04)

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