

**B.TECH. SEM -I (CHEMICAL/ CIVIL/ ELECTRICAL/
MECHANICAL/ PRODUCTION) 2014 COURSE (CBCS) : WINTER -
2017**

SUBJECT: ENGINEERING PHYSICS

Day: **Thursday**
Date: **18/01/2018**

W-2017-1999

Time: **10.00 AM TO 01.00 PM**
Max Marks: **60**

N.B:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use to the non-programmable **CALCULATOR** is allowed.
- 4) Neat diagram must be drawn **WHEREVER** necessary.
- 5) Assume suitable data wherever necessary.

Constants:

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

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

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

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

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

- Q.1** a) Explain the methods by which the electrons can be focused. (06)
- b) In a nuclear fusion reaction 1.00×10^{-3} kg of Hydrogen is converted into 0.90×10^{-3} kg of Helium. Calculate the energy released in eV. (04)
- OR**
- Q.2** a) Give principle, construction and working of Betatron. Derive formula for Betatron condition. (06)
- b) Calculate the linear separation of Ne^{20} and Ne^{21} when analyzed using Bainbridge class spectrograph. (04)
Given: $E=100 \text{ kV/m}$
 $B= 0.5 \text{ Wb/m}^2$
- Q.3** a) What is superconductivity? Explain it on the basis of BCS theory. (06)
- b) Draw IV characteristics of solar cell and explain the terms short circuit current and open circuit voltage. (04)
- OR**
- Q.4** a) Derive the formula for conductivity in semiconductors. (06)
- b) Explain Meissner's effect. (04)
- Q.5** a) Define nanoparticles? State and explain any three properties which makes them different from its bulk counterpart. (06)
- b) State and explain third law of thermodynamics. (04)
- OR**
- Q.6** a) What are different steps involved in Carnot cycle? (06)
- b) Explain physical method of synthesis of nanoparticles. (04)
- Q.7** a) Derive the formula for path difference in the film of uniform thickness. (06)
- b) Light of wavelength 6000 \AA falls on a narrow slit. The screen is at a distance of 1m from slit, if the first minimum is located at 1 mm from center, calculate the width of slit. (04)
- OR**
- Q.8** a) What is Rayleigh's criterion of minimum resolution? Derive formula for resolving power of diffraction grating. (06)
- b) White light falls normally on a soap film whose thickness is $5 \times 10^{-5} \text{ cm}$. Which color will be reflected most strongly? (04)

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- Q.9** a) Explain double refraction on the basis of Huygen's theory. (06)
b) Give the properties of lasers which makes it different from ordinary light. (04)

OR

- Q.10** a) With energy level diagram, explain the construction and working of Ruby laser. (06)
b) Calculate the thickness of a quarter wave plate, given that. (04)
 $\mu_e = 1.533$, $\mu_o = 1.544$ and $\lambda = 6500 \text{Å}$

- Q.11** a) Derive Schroedinger's time independent wave equation. (06)
b) A class rooms has volume of 1500m^3 . It is required to have reverberation time of 1.5 sec. What should be the total absorption in the hall? (04)

OR

- Q.12** a) What are factors affecting acoustics of a building. Give their remedies. (06)
b) Derive the lowest energy value for an electron confined in a potential well of length $2A$. (04)

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