B. Tech. SEM -I (Computer Science & Business Systems) (CBCS 2018 Course) : WINTER - 2018

SUBJECT: FUNDAMENTALS OF PHYSICS

Day: Saturday **Time:** 10.00 AM TO 01.00 PM

Date: 01/12/2018 **W-2018-2258** **Max. Marks: 60**

NB.:

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 draw **WHEREVER** necessary.
5) Assume suitable data wherever necessary.

Constants:

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

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

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

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

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

Q.1 **a)** Define simple harmonic motion and derive the expression for time period. **(06)**

b) What mass should be hung on a spiral spring having a stiffness (k) constant of 89.2 N/m so that it vibrates with a periodic time of one second? **(04)**

OR

What is damped oscillation? Solve the differential equation and discuss the under damped oscillations. **(10)**

Q.2 **a)** In Newton's rings experiment prove that the diameter of dark ring is proportional to the square root of natural number. **(06)**

b) A parallel beam of light is incident on a grating having 4250 limes per cm and a second order spectral line is observed at or angle 30^0. Calculate the wavelength. **(04)**

OR

Derive the expression for the resultant motion when two SHM s are acting perpendicular to each other. Discuss different cases. **(10)**

Q.3 Derive the Energy Eigen value and wave function for a particle trapped in a potential well of infinite depth. **(10)**

OR

a) Give the properties of matter waves. **(06)**

b) An electron is confined to a box of length $1A^0$. Calculate the minimum uncertainty in its velocity. **(04)**

P.T.O.

Q.4 **a)** What is energy band? Explain formation of energy bond in Diamond. **(06)**

b) Draw the planes for following miller indices **(04)**

i) (0,1,1)

ii) (0,1,2)

OR

What is X-ray diffraction? Explain Debye – Scherrer method for studying crystals by using X-rays. **(10)**

Q.5 **a)** Explain the following terms **(06)**

i) Spontaneous emission

ii) Stimulated emission

iii) Metastable State

b) What are the properties of lasers which makes it different from ordinary light? **(04)**

OR

Explain the principle and mechanism of propagation of light in optical fibre. Also classify the optical fibre on the basis of mode of propagation of light. **(10)**

Q.6 What is Carnot engine? Explain the Carnot cycle. **(10)**

OR

a) What is entropy? Give the entropy in irreversible and irreversible processes. **(06)**

b) Give the integral form of Maxwell's equations. **(04)**

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