



# Vivekananda College of Engineering & Technology

[Sponsored by Vivekananda Vidyavardhaka Sangha, Puttur ®]

Affiliated to Visvesvaraya Technological University

Approved by AICTE New Delhi & Govt of Karnataka

CRMUO

Rev 1.0

FY- PHY

17/08/15

## INTERNAL ASSESSMENT TEST - 1

Dept: FY	Sem / Div: I / A, B, C & D	Sub: Engineering Physics	S Code: 15PHY12
Date: 20/08/2015	Time: 3.00pm – 4.30pm	Max Marks: 40	Elective: N
Note: (i) Answer any 2 full questions.			
(ii) Some constants: $e = 1.6 \times 10^{-19} \text{ C}$ ; $c = 3 \times 10^8 \text{ m/s}$ ; $h = 6.626 \times 10^{-34} \text{ Js}$ ; $k = 1.38 \times 10^{-23} \text{ J/K}$			

QN	Questions	Bloom's Level	Marks
1	a What is a perfect black body and explain characteristics of black body radiation spectrum with diagram?	L2	5
	b Explain quantum theory of radiation and reduce Planck's law to Wien's law and Rayleigh-Jeans law.	L2	7
	c State and explain Heisenberg's uncertainty principle and discuss its physical significance.	L2	4
	d Explain Compton effect.	L2	4
2	a Explain the limitations of Wien's law and Rayleigh- Jeans law of black body radiation.	L2	4
	b Explain dual nature of light.	L2	3
	c Explain the concept of phase velocity and group velocity and obtain the expression for group velocity.	L2	8
	d X-ray photons of energy 0.12 MeV undergo Compton scattering through $180^\circ$ . Calculate energy and wavelength of the scattered photon.	L3	5
3	a State de Broglie hypothesis and show that the de Broglie wavelength for an electron accelerated by a potential difference V volt is $\lambda = \frac{1.226}{\sqrt{V}} \text{ nm}$	L2	7
	b Derive the relation between group velocity and phase velocity and show that group velocity is equal to particle velocity.	L2	8
	c Compute the de Broglie wavelength for a neutron moving with one tenth part of the velocity of light. Given: Mass of neutron is $1.674 \times 10^{-27} \text{ kg}$	L3	3
	d If the group velocity of a particle is $3 \times 10^6 \text{ m/s}$ , find its phase velocity.	L3	2

Prepared by:

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