

**Vivekananda College of Engineering & Technology, Puttur**  
 [A Unit of Vivekananda Vidyavardhaka Sangha Puttur ®]  
 Affiliated to VTU, Belagavi & Approved by AICTE New Delhi

CRM08

Rev 1.9

<BS>

<11/12/2019>

**CONTINUOUS INTERNAL EVALUATION - 3**

Dept: FY	Sem / Div: I/A, B, C	Sub: Engineering Physics	S Code: 18PHY1
Date: 16/12/2019	Time: 3:00pm to 4:30pm	Max Marks: 50	Elective: N

Note: Answer any 2 full questions, choosing one full question from each part.

Q/N	Questions	Marks	RBT	CO	
<b>PART A</b>					
1	a	Mention the three different vibrational modes of CO <sub>2</sub> molecule. With a neat energy level diagram explain the construction and working of CO <sub>2</sub> laser.	10	L2	CO
	b	Define population inversion and metastable state and obtain an expression for energy density of radiation in terms of Einstein coefficients.	10	L1 & L2	CO
	c	An electron is bound in a one dimensional potential well of width $1A^0$ , but infinite wall height. Find its energy values in the ground state and in the first two excited states.	5	L3	CO
<b>OR</b>					
2	a	Define eigen function and eigen value. Setup one-dimensional time independent Schrodinger wave equation.	10	L1 & L2	CO
	b	With a proper energy level diagram explain the working of semiconductor laser. Explain the working of laser range finder.	10	L2	CO
	c	A pulsed laser emits photons of wavelength 780nm with	5	L3	CO

	20mW average power/pulse. Calculate the number of photons contained in each pulse if the pulse duration is 10ns			
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**PART B**

3	a	Define semiconductor and explain its types. Derive an expression for electrical conductivity in intrinsic semiconductor.	10	L1&L2	CO
	b	What is Hall effect? Obtain the expression for Hall coefficient, and express Hall voltage interms of Hall coefficient.	10	L1&L2	CO
	c	Find the temperature of which there is 1% probability that a state with an energy 0.5eV above the Fermi energy is occupied.	5	L3	CO

**OR**

4	a	What is Fermi energy? Derive an expression for Fermi Energy at zero Kelvin for a metal.	10	L1&L2	CO
	b	Write the assumptions of quantum free electron theory. Explain the temperature dependence of Fermi factor $f(E)$ with neat diagram.	10	L1&L2	CO
	c	The intrinsic charge carrier concentration of germanium is $2.4 \times 10^{19}/m^3$ , calculate its resistivity if mobility of electrons and holes respectively are $0.39m^2/Vs$ and $0.19m^2/Vs$ .	5	L3	CO

*Thejaswini*  
12/12/15

Prepared by: Ms. Thejaswini L P

*fly*  
12/12/15

HOD:Dr. Mahesh K K