

UNITED COLLEGE OF ENGINEERING & RESEARCH		Department of Applied Sciences & Humanities		Sections: H, I, J, K, L, M – CS + CE
1 st SESSIONAL EXAM	SEMESTER: 1 st	January 2021		
TIME: 2Hrs	SUBJECT: PHYSICS	Paper code: KA5101	MM: 30	
READ ALL INSTRUCTIONS AND QUESTIONS VERY CAREFULLY				

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SECTION A (Attempt ALL questions) Very short answer

			[6]	CO	Blooms Taxonomy Level
1	a	What was the objective of conducting Michelson – Morley experiment?	[1]	1	Remember(L1)
1	b	Show that the rest mass of photon is zero? -1	[1]	1	Apply(L3)
1	c	Give Max Born's interpretation of wave function.	[1]	3	Understand(L2)
1	d	State de Broglie hypothesis. 0.5	[1]	3	Remember(L1)
1	e	Define interference.	[1]	4	Remember(L1)
1	f	Two independent sources could not produce interference. Why? -1	[1]	4	Understand(L2)

SECTION B (Attempt Any THREE questions) Short answer

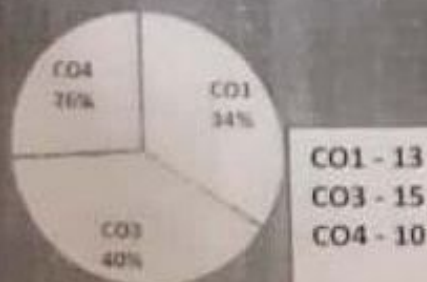
			[9]		
2		Obtain the expression for the addition of the relativistic velocities. Show that c is invariant.	[3]	1	Apply(L3)
3		Derive an expression for the variation of mass with velocity. How fast must an electron move in order that its mass equals the rest mass of the proton.	[3]	1	Apply(L3)
4		Derive Schrodinger time independent wave equation.	[3]	3	Understand(L2)
5		Discuss the formation of interference fringes due to a wedge shaped thin film.	[3]	4	Understand(L2)

SECTION C (Attempt ANY THREE question) Long answer

			[15]		
6	a)	Derive Einstein's mass-energy relation $E=mc^2$.	[5]	1	Apply(L3)
	b)	Find the velocity of a particle if it's kinetic energy is three times it's rest mass energy. 2			
7	a)	Derive an expression for Compton shift.	[5]	3	Understand(L2)
	b)	A photon recoils back after striking an electron at rest. What is the change in the wavelength of the photon? $2(-)$			
8	a)	A particle of mass m is confined to a one-dimensional box of length L. Derive an expression for wave function and energy.	[5]	3	Apply(L3)
	b)	Lowest energy of an electron trapped in a potential well is 38 eV. Calculate the width of the well.			
9	a)	Describe the phenomenon of interference of light due to thin films and find the condition of maxima and minima.	[5]	4	Understand(L2)
	b)	Show that the interference patterns of reflected and transmitted monochromatic source of light are complementary. 4 -2.5			

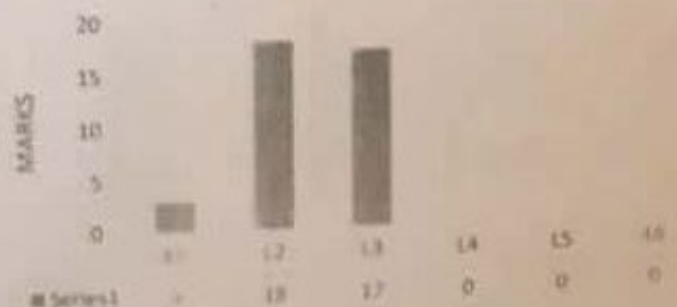
END OF PAPER

GO MARKS DISTRIBUTION



CO1 - 13
CO3 - 15
CO4 - 10

Bloom's Taxonomy Distribution



$K.E = 3m_0c^2$ $ROC_K = m_0c^2 - m_0c^2$ $m = m_0$

$\sqrt{1 - \frac{v^2}{c^2}} = \frac{1}{\gamma}$