GIET MAIN CAMPUS AUTONOMOUS GUNUPUR – 765022

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Registration No: | | | | | | | | | | |

Total Number of Pages : 2 **B.TECH**

2nd Semester Regular Examination-April-May 2019

BBSBS1021 Engineering Physics

(Regulations 2018) Common to CIVIL/ECE/EE/EEE/BIOTECH/IT/CHEM/AEIE ENGG.

Time : 3 Hours **Maximum : 100 Marks**

Answer ALL Questions

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions) 10 x 2=20 Mark

Q.1. Answer *All* Questions.

a. Does the law of conservation of energy hold good in interference phenomenon? [CO1] [PO1]
i) Yes ii) No iii) Depends upon the type of interference iv) Depends upon the experimental arrangements

b. Newton's ring illustrate the phenomenon of [CO1] [PO1]
(i) Interference ii) Diffraction iii) Polarization iv) Dispersion

c. Which of the following phenomena are not observed in case of matter wave? [CO1] [PO1]
(i) Interference ii) Polarization iii) Diffraction iv) None of the above

d. Which of the following represent a three level laser? [CO1] [PO1]
(i) He-Ne laser ii) Semiconductor laser iii) Ruby laser iv) All of these

e. A set of equivalent planes is represented by [CO2] [PO1]
(i) [hkl] ii) {hkl} iii) (hkl) iv) <hkl>

f. For a cubic structure [CO2] [PO1]
i) a=b=c ii) a≠b≠c iii) a=b≠c iv) a≠b=c

g. Which of the following is zero? [CO3] [PO1]
(i) Grad div ii) Div curl iii)Curl grad iv) Div grad

h. What is the major factor for determining whether a medium is free space, lossless dielectric, lossy dielectric or a good conductor? [CO3] [PO1]
(i) Attenuation constant iii) Constitutive paramaters(σ, μ, ε)
(ii) Loss tangent iv)Reflection coefficient

i. Which of the following conservation principle is violated during pair production? [CO4] [PO1]
(i) Momentum ii) Charge iii) Energy iv) None of the above

j. Two particles of masses m_1 and m_2 move with the same momentum. The ratio of their deBroglie wavelengths will be [CO4] [PO1]
(i) 0 ii) 1 iii) 3 iv) 4

PART – B: (Short Answer Questions) 10x2=20 Marks

Q.2. Answer *ALL* questions

a. Differentiate between Fresnel diffraction and Fraunhofer diffraction. [CO1] [PO1]

b. What are the characteristics of a laser? [CO1] [PO1]

c. What is the number of lattice points per unit cell for a BCC unit cell? [CO2] [PO1]

d. State and explain Bragg's Law. [CO2] [PO2]

e. Write the physical significance of the Maxwell's equations? [CO3] [PO1]

f. Give a comparison between conduction current and displacement current. [CO3] [PO1]

g. Explain Black Body Radiation. [CO4] [PO1]

h. What do you mean by orthogonal and orthonormal wave functions [CO4] [PO1]

i. Write down the statement of Heisenberg's uncertainity relation. [CO4] [PO1]

j. A particle is in a one dimensional infinitely deep potential well of width L. Write the dependence of ground state energy on the width of the well. [CO4] [PO1]

PART – C: (Long Answer Questions) 4x15=60 Marks

Answer *ALL* questions

Q.3			
a.	Discuss the formation of Newton's ring by reflected light. Describe the experimental arrangement and give necessary theory.	8	[CO1] [PO1]
b.	Explain with the help of a neat diagram the working of a ruby laser	7	[CO1] [PO1]
	OR		
c.	Describe the construction, theory and working of Fresnel's biprism experiment to find the wavelength of light.	8	[CO1] [PO1]
d.	What is an optical fibre? Define and explain the terms (i) Acceptance angle (ii) Numerical aperature	7	[CO1] [PO1]
Q.4			
a.	What is the concept of miller indices? Derive the formula for the distance between two adjacent plains of simple cubic lattice.	8	[CO2] [PO1]
b.	What is Bravais lattice? Explain different types of Bravais lattices in three dimensions.	7	[CO2] [PO1]
	OR		
c.	What do you mean by packing factor? Determine the packing factor for simple cubic, BCC and FCC structures	8	[CO2] [PO2]
d.	Differentiate between metals, semiconductors and insulators using band theory.	7	[CO2] [PO1]
Q.5			
a.	State and prove Gauss's theorem in electostatic. Derive the differential form of this theorem.	8	[CO3] [PO1]
b.	(i)Find the value of grad(r) where $\mathbf{r}=x\,\mathbf{i}+y\,\mathbf{j}+z\,\mathbf{k}$ (ii) prove that $\text{div}(\mathbf{A}+\mathbf{B})=\text{div}\,\mathbf{A}+\text{div}\,\mathbf{B}$	7	[CO3] [PO2]
	OR		
c.	Starting from Maxwell's equations in free space, obtain the wave equation's in terms of scalar and vector potentials .	8	[CO3] [PO2]
d.	Evaluate curl **A,** where $\mathbf{A}=\mathbf{i}\,xy+\mathbf{j}\,yz+\mathbf{k}\,zx$	7	[CO3] [PO2]
Q.6			
a.	Solve the Schrodinger's time independent equation to find the energy eigen values of a free particle	8	[CO4] [PO2]
b.	Calculate the energy difference between the ground state and the first excited state for an electron in one dimensional rigid box of length 10^{-8} cm. *(Mass of electron is 9.1 x 10^{-31} kg and h= 6.63 x 10^{-34} js.)*	7	[CO4] [PO2]
	OR		
c.	By applying uncertainty principle, explain non-existence of electrons in atomic nucleus.	8	[CO4] [PO2]
d.	Find the smallest possible uncertainty in position of the electron moving the velocity 3 x 10^{7} m/s. (*Mass of electron is 9.1 x 10^{-31} kg and h= 6.63 x 10^{-34} js.)*	7	[CO4] [PO2]

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