

**GURU NANAK DEV ENGINEERING COLLEGE
GILL PARK, GILL ROAD, LUDHIANA**

MST-I

Subject Name:-Physics (BSC-18101)

Max. Marks: 24

Section:- CE12,CE56

Semester-2nd

Time: 90 Minutes

Note:- (i) All questions are compulsory.

(ii) Marks for each question are shown in the brackets.

(iii) Use of calculator is allowed.

Q.1. Write Maxwell's Electromagnetic equations for vacuum. (2)

Q.2. What makes laser light different from normal? (2)

Q.3. A step-index fiber has a core index of refraction 1.425.

The cut-off angle for light entering the fiber from air is found to be 8.50° .

(a) What is the numerical aperture of the fiber?

(b) What is the index of refraction of its cladding?

(c) Find the Fractional Refractive Index change.

(d) If the fiber were submersed in water, what would be the new cut-off angle at the launching end of fiber? (4)

Q.4. Explain the working of a Continuous Wave (CW) laser. (4)

Q.5. Derive Maxwell's Electromagnetic equation from Faraday's Law of EM Induction. (4)

Q.6. (a) Write the statements of Gauss Divergence Theorem and Stoke's Curl Theorem. (2)

(b) Give brief significance of Einstein coefficients and show how they are related. (3)

(c) What causes most fiber optic attenuation and propagation losses? (3)

Guru Nanak Dev Engineering College, Ludhiana			
Department of Applied Sciences			
Program	B.Tech.(ME1,ME2, ME5,ME6)	Semester	2
Subject Code	BSC-18101	Subject Title	Engg. Physics
Mid Semester Test (MST) No.	1	Course Coordinator(s)	Dr Harpreet Kaur Grewal
Max. Marks	24	Time Duration	1 hour 30 minutes
Date of MST	23 rd February, 2019	Roll Number	
Note: Attempt all questions			
Q. No.	Question		Marks
Q1	Differentiate Stimulated Emission and Spontaneous emission?		2
Q2	In LASER, in place of 'A', it should be 'O' Why?		2
Q3	Explain the terms Acceptance angle and Figure of Merit. What do you mean by single mode and multimode fiber?		4
Q4	An optical fiber has NA of 0.15 and cladding refractive index is equal to 1.50.Find NA of the fiber in a liquid of refractive index 1.30.		4
Q5	Discuss the variation of Fermi Level with temperature for extrinsic semiconductor.		4
Q6	(a) Explain the energy level diagram of He- Ne Laser and what is the role of helium in He-Ne Laser?		6
	(b) What do you mean by Extrinsic Semiconductor?		2

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Semester-2nd

Time: 90 Minutes

Note:- (i) All questions are compulsory.

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Q.1. What is meant by Inverted Population in laser? (2)

Q.2. Calculate the de-Broglie wavelength of a virus particle accelerated by a potential difference of 30,000V. (2)

Q.3. Describe the construction and working of Helium Neon laser. (4)

Q.4. Show that how group velocity is related to phase velocity. (4)

Q.5. Write a note on attenuation & propagation loss mechanisms in fibres. (4)

Q.6. (i) Define acceptance angle for an optical fibre. Show that it is related to numerical aperture. (5)

(ii) An optics fibre is made of glass with refractive index 1.55 and is clad with another glass of refractive index 1.51. The fibre has a core of diameter 50 μ m and is used at a light wavelength of 0.8 μ m.

Determine:

(a) Numerical aperture (b) Acceptance angle (c) V-number for the fiber. (3)

Guru Nanak Dev Engineering College, Ludhiana			
Department of Applied Sciences			
Program	B.Tech.(CE34)	Semester	2
Subject Code	BSC-18101	Subject Title	Physics
Mid Semester Test (MST) No.	1	Course Coordinator(s) Subject Expert	Dr Harpreet Kaur Grewal Dr Randhir Singh
Max. Marks	24	Time Duration	1 hour 30 minutes
Date of MST	23 rd Feb, 2019	Roll Number	

Note: Attempt all questions

Q. No.	Question	Marks
Q1	A vector field is given as : $\vec{A} = xy\hat{i} + yz\hat{k}$. Find $\vec{\nabla} \times \vec{A}$ and tell whether the field is conservative or not.	2
Q2	Define Poynting vector. Give its significance.	2
Q3	Define Meissner effect and differentiate type-I, type-II superconductors.	4
Q4	Derive London equations and give their significance.	4
Q5	The critical magnetic field for a superconductor at absolute zero is $9 \times 10^4 \text{ Am}^{-1}$ and at 6K is $5 \times 10^4 \text{ Am}^{-1}$. Find the critical temperature and energy required to break Cooper pair at absolute zero.	4
Q6	(i) Show that for plane electromagnetic waves propagating in vacuum, electric field is perpendicular to magnetic field as well as to direction of propagation. (ii) Write Maxwell's equations and give their significance.	5 3

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Subject Code	BSC-18101	Subject Title	Physics
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Max. Marks	24	Time Duration	1 hour 30 minutes
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Q. No.	Question	Marks
Q1	A vector field is given as : $\vec{A} = xy\hat{i} + yz\hat{k}$. Find $\vec{\nabla} \times \vec{A}$ and tell whether the field is conservative or not.	2
Q2	Define Poynting vector. Give its significance.	2
Q3	Define stress and strain and give their types.	4
Q4	Discuss briefly, the motion of a lightly damped oscillator.	4
Q5	The displacement of a particle executing SHM is changing with time as $x=A\cos\omega_0 t$. Find the displacement at which kinetic energy of the particle is equal to its potential energy.	4
Q6	(i) Show that for plane electromagnetic waves propagating in vacuum, electric field is perpendicular to magnetic field as well as to direction of propagation. (ii) Write Maxwell's equations and give their significance.	5 3