AJAY KUMAR GARG ENGINEERING COLLEGE, GHAZIABAD
DEPARTMENT OF APPLIED SCIENCES & HUMANITIES

Sessional Test 2

Program: B.Tech
Session: 2024-25
Subject: Engineering Physics
Max. Marks: 50

Semester: II
Section: S11-S20
Subject Code: BAS201
Time: 2 Hours

OBE Remarks:

Q.No	1	2	3	4	5	6	7	8	9	10	11	12
CO No.	CO2	CO2	CO3	CO3	CO3	CO2	CO2	CO2	CO3	CO3	CO2	CO3
Bloom's Level* (L1 to L6)	L3	L3	L2	L4	L5	L3	L5	L5	L4	L5	L4	L5
Weightage CO2: 26.5						**Weightage CO3: 23.5**						

**Bloom's Level: L1: Remember, L2: Understand, L3: Apply, L4: Analyze, L5: Evaluate, L6: Create*

Note: Answer **all** the sections with all the questions

Section-A (2*5=10)

1. Write equation of continuity and give its physical significance.
2. Write the integral and differential form of Maxwell's equations.
3. Why can't light emitted from two independent sources be coherent in nature?
4. Why an excessively thin film will appear dark in reflected and bright in transmitted light?
5. Explain the similarity and difference in conduction current and displacement current.

Section-B (5*5=25)

6. Explain work energy theorem (Poynting theorem) in electromagnetic field theory. Also explain the physical significance of all the terms in this expression. The sunlight strikes the upper atmosphere of earth with energy flux 1.35kWm^{-2}. What will be the peak values of electric and magnetic field at the points?
7. Derive differential form of modified Ampere's law. For a conducting medium, $\sigma = 5.8 \times 10^{7}$ Siemens/m and $\varepsilon_r = 1$. Find out the conduction and displacement current densities, if the magnitude of electric field, E is given by E=150 sin(10^{10}t) Volt/m. (Where $\epsilon_0 = 8.85X10^{-12}C^2N^{-1}m^{-2}$).
8. Show that electromagnetic wave propagating in conducting medium is an attenuated wave. Derive an expression for skin depth. Find the skin depth δ at a frequency of 3MHz in Aluminium, where conductivity is 3.0 x 10^7 S/m and μ_r=1. (where $\mu_0 = 4\pi X10^{-7}H/m$)
9. Explain the formation of interference pattern in thin films of uniform thickness. Derive conditions of maximas and minimas
10. Find an expression for fringe width in a thin film of non-uniform thickness. Light of wavelength 5893Å falls normally on a wedge shaped film of refractive index 1.4 forming fringes that are 0.2cm apart. What is the angle of wedge in seconds?

Section-C (7.5*2=15)

11. Derive plane electromagnetic wave equations in free space and prove that velocity of electromagnetic wave in free space is equal to speed of light. Also prove that electromagnetic waves are transverse in nature.
12. Derive an expression for diameter of bright rings and dark rings in reflected light. Why the interference pattern in Newton's ring experiment is in the form of concentric circles or rings. Newton's rings are observed normally in reflected light of wavelength 6000Å. The diameter of 10th dark ring is 0.5cm. Find radius of curvature of lens and thickness of the film.

Dr. Bandana Sharma
Faculty Sign

HoD Sign