

INTERNAL ASSESMENT 2022
KANDI RAJ COLLEGE
DEPARTMENT OF PHYSICS
SEMESTER: 6th STREAM: Honours (Core)

PHY-HCC-T-13 (Electromagnetic Theory)

Answer any two questions

2X5=10

1. Let $\vec{A}(\vec{r}, t)$ and $V(\vec{r}, t)$ satisfy eqs, $\vec{E} = -\nabla V - \frac{\partial \vec{A}}{\partial t}$ and $\vec{B} = \nabla \times \vec{A}$. For electric and magnetic fields, \vec{E} and \vec{B} , are the potentials \vec{A} and V determined uniquely? If not, explain.
2. Write down the Lorenz Gauge condition. Show that $\nabla^2 V - \mu_0 \epsilon_0 \frac{\partial^2 V}{\partial t^2} = -\frac{\rho}{\epsilon_0}$ and $\nabla^2 \vec{A} - \mu_0 \epsilon_0 \frac{\partial^2 \vec{A}}{\partial t^2} = -\mu_0 \vec{J}$.
3. Why does the electromagnetic field need to carry linear momentum? Derive an expression for the same.

PHY-HCC-T-14 (Statistical Mechanics)

Answer any two questions

2X5=10

1. What do you mean by micro state and macro state? How do you connect statistical mechanics with thermodynamics? What do you mean by phase space?
2. Calculate different thermodynamic properties of a system of N classical distinguishable harmonic oscillators with frequency ω with the help of micro canonical ensemble?
3. Find out thermodynamic properties of an ideal gas in view of canonical ensemble.

PHY-H-DSE-T-03 (Communication Electronics)

Answer any five questions:

5×2=10

1. What do you understand by means of a analog and digital signal?
2. What are the differences of AM and FM?
3. What are the different types of SSB modulation?
4. Derive the expression for Amplitude modulated signal? What is modulation index?
5. We need to send 265 kbps over a noiseless channel with a bandwidth of 20 kHz. How many signal levels do we need?
6. What is super heterodyne receiver? Draw the schematic diagram and the waveform.
7. Write down the differences between ASK and FSK ?

PHY-H-DSE-T-04 (Bio-Physics)

Answer any five questions:

5×2=10

1. What do you mean by life?
2. What is casimir interactions?
3. Write down the heat equation.
4. Explain second law of thermodynamics.
5. What do you mean by thermodynamic equilibrium?
6. Write down the postulates of Maxwell-Boltzman statistics.