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TOPICS FOR INTERNAL ASSESSMENT ASSIGNMENTS: 2019-20

Course: M.Sc. PHYSICS (Previous)

Important Notes: *(1) Students are advised to read the separate enclosed instructions before beginning the writing of assignments. (2) Out of 20 Internal Assignment marks per paper, 5 marks will be awarded for regularity (attendance) to Counseling/ Contact Programme classes pertaining to the paper. Therefore, the topics given below are only for 15 marks each paper.*

Paper I: Mathematical methods and classical mechanics

1) A sphere of radius 'a' is centered at a point r_1,

a) Write out the algebraic equation for the sphere **4 Marks**

b) Write out a vector equation for the sphere

2) Find the residue of f(z)

Where f(z)=$\frac{z^2-2z}{(z+1)^2(z+4)}$ **3Marks**

3) Discuss the harmonic oscillator problem using Hamilton Jacobi method **3Marks**

Paper II: Quantum and Statistical Mechanics

1) With U and F thermo dynamical potentials, obtain the Gibb's Helmoltz equation? **2Marks**

2) Explain the scattering by an alternative square potential well. **4marks**

3) A particle is in an infinitely deep one dimensional well, determine the momentum distribution for the particle in the exited state n=2.? **4marks**

Paper III: Solid state physics

1) Draw a plane lattice and indicate two kinds of double cells and one triple cell in that lattice.

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3marks

2) Prepare an energy diagram representing an n-type and p-type semiconductor.

3marks

3) Find the energies of six lowest energy levels of a particle in cubical box. Which of the levels are degenerate? **4marks**

Paper IV: Electronics

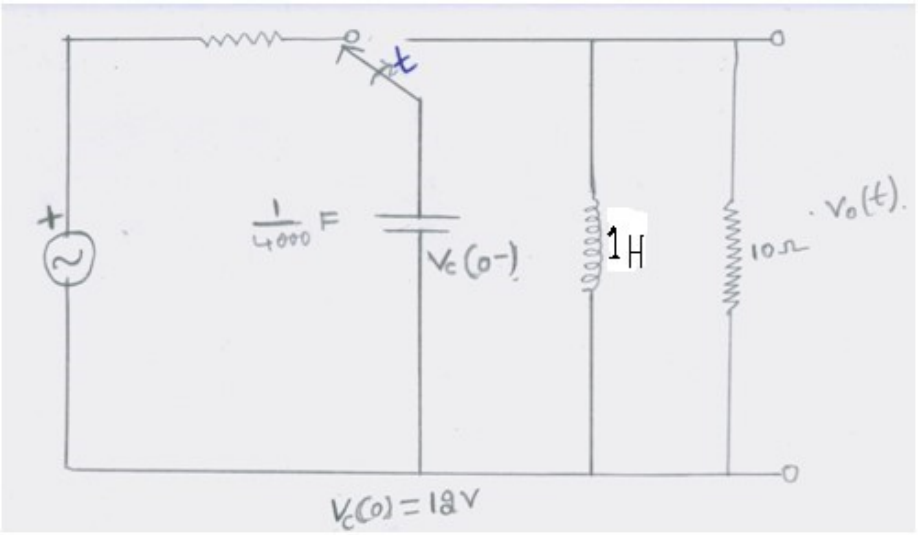
1) The electric field $\vec{E}$ and the magnetic field $\vec{H}$ in a source- free homogeneous, isotropic region are given as

$\vec{E}$ =100(j$\hat{x}$+2$\hat{y}$ -j$\hat{z}$)e^{jwt}

$\vec{H}$ = (-$\hat{x}$+j$\hat{y}$ -j$\hat{z}$)e^{jwt}

Obtain the average power density? **3marks**

2) Find v_0(t) for t>0 in the circuit of figure given below, if switch is changed at t=0 after having remained in the position shown for long time. **4marks**



3) Describe how an FET can be used as voltage variable resistor (VVR) **3marks**

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