



KUVEMPU UNIVERSITY
OFFICE OF THE DIRECTOR
DIRECTORATE OF DISTANCE EDUCATION



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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 \mathbf{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 Helmolz 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 excited 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

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

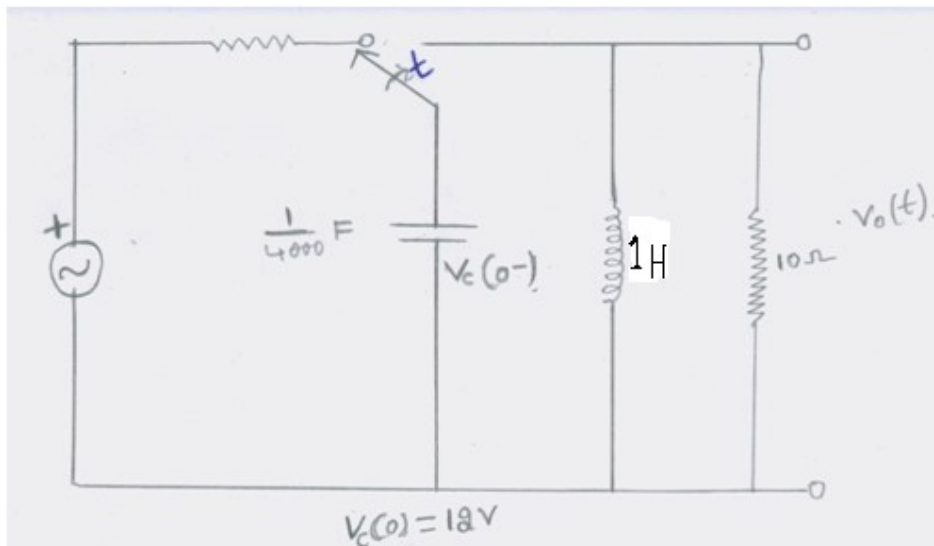
$$\vec{H} = (-\hat{x} + j\hat{y} - j\hat{z})e^{j\omega t}$$

Obtain the average power density?

3marks

- 2) Find $v_o(t)$ 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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TOPICS FOR INTERNAL ASSESSMENT ASSIGNMENTS: 2019-20

Course: M.Sc. PHYSICS (Final year)

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-V: Electrodynamics, Optics and Molecular spectroscopy

- 1) Obtain the expression for potential at a point due to uniformly charged disc? **4Marks**
- 2) Assuming that the charge 'q' is uniformly distributed in a spherical volume of radius 'R'. Discuss the variation of
 - a) Electric intensity
 - b) Potential as the field point is moved from the centre of the sphere to infinity? **4Marks**
- 3) Discuss the population inversion. **2Marks**

Paper-VI: Nuclear, cosmic rays & particle physics

- 1) Why is it that only α - particles are emitted by radioactive nuclei, while protons and neutrons are not? **2Marks**
- 2) Why is it possible to produce the fission of U^{235} with slow neutrons where as it is necessary to use fast neutrons to produce the fission of U^{238} . **2Marks**
- 3) Calculate the average energy per revolution and find energy by electron in a betatron to which is applied a maximum magnetic field of 0.5 tesla operating in a stable orbit of diameter. **3Marks**
- 4) a) Experimentally the study of p-p scattering is capable of much higher accuracy than n-p scattering, why?
 - b) What are the similarities between (nn) & (pp) forces? **3Marks**

Paper-VII: Solid State Physics - I

- 1) One gram molecule of a certain polar substance is dissolved in to 1000 cm^3 of a non –polar liquid. The liquid itself has a dielectric constant of 3.0 at 27° , where as the solution has a dielectric constant of 3.2 at the temperature, calculate the dipole moment of the polar molecules..

4Marks

- 2) Show that the expression for the average energy of a system can be given by the relation $(E) = KT^2 d(\log z)/dT$

Where z-Partition function for classical one dimensional system and is given

3Marks

$$\text{by } z = \iint d.p . dx . \exp\left\{\frac{-E(P,X)}{KT}\right\}$$

- 3) What is dielectric break down? Summaries the various factors contributing to down in dielectrics.

3Marks**Paper-VIII: Solid State Physics - II**

- 1) Magnetic susceptibility of copper is 0.5×10^{-5} . Calculate the magnetic moment per unit volume of copper, when it is subjected to a magnetic field of 10^4 G. If the material is in the crystalline form, how will the susceptibility be affected?

4Marks

- 2) Calculate the maximum wavelength of microwave radiation that will absorbed at 0 k in a) pb, $T_C = 7.19$ k

b)Al, $T_C = 1.2$ k

4Marks

- 3) Write a note on susceptibility?

2Marks
