1.a)Write the frequency values of different polarizations in dielectrics.

b)A problem was given based on the equation $\frac{N\alpha}{3\varepsilon_0} = \varepsilon_r - 1, \eta = \sqrt{\varepsilon_r}$ in this problem, refractive index was given.

2. A particle of mass m is in a central force, $r = r_0 e^{-i\theta}$.
   a. Is the angular momentum is conserved.
   b. Find the law of force.
   c. Find the total energy.
   d. ?

3. O^{15} decays by positive beta decay into N^{15} fine the E_{max} interms of their columbic attractions delta(E_{coul}) .

4. Rotational partition function problem: Energy is given from that values we have to find the bond lengths. A). j=2. B)j = 4 to j =2 etc.

5. It is practically proved that the Hydrogen atom contributes to the rotational energies at 100K.Using this data find the
   Bond length of Hydrogen.

6. f(z) = tanh z; fine the singularities, natures of singularities and residues.

7. One problem on quark theory.

8. One problem on Fermi – gold transitions, where the transitions are valid or not.

9. A problem on particle decay combined with quantum mechanics.

10. A particle falling from a height (?) onto to a square plane sheet of charge density(?), find the force on the particle.

11. A wave function is given. From schrodinger equation we have to fine the energy eigen values.

12. 5Kg ice at 273K is connected to a sink which is at 373K
   a. Find the change of entropy of ice.
   b. Find the change of entropy of sink
   c. Find the change of entropy of universe.

13. Problem on experimental technique: an experimental technique regarding emission of electrons by heating a coil
   With a high potential difference to emit electrons from the target material. Role of different parts & their names.

14. A differential equation $u^2 \frac{d^2y}{du^2} + u \frac{dy}{du} + y = 0$; assuming u = log x ; find the solution of the above differential eqn.

15. A hexagonal & isosceles triangle is given we have to find the magnetic induction.

16. v(x) = x $x \geq 0$;∞ $x < 0$; $\oint \sqrt{2(E+V)}\, dx = \left(n + \frac{1}{2}\right) h\pi$; find the energy values using WKB approximation..

17. Draw the diagrams of $K^+ + P^+ \rightarrow \pi^0 + \Lambda^0$ & $\Lambda^{++} \rightarrow P^+ + \pi^-$

18.Probablities : Two particles of mass m_1 and m_2 having the probabilities $P_1(m_1) = \frac{e^{-\alpha}\alpha^{n1}}{n_1!}$, $P_2(m_2) = \frac{e^{-\beta}\alpha^{n2}}{n_2!}$

Find the probabilities of the function P(n) = $\sum_{n1,n2=0}^{\infty} P_1(n_1) + P_1(n_2 - n_1)$

19. A problem to reduce a logic circuit to a 3input form.

20. Three particles with energies –ε , 0 , +ε, find the partition function in MB,BE and FD statisitics.