سئوالات درس مایکروویو	سری سوم	تاریخ: ۲۰-۱-۹۲

1) A coaxial cable transmission line filled with air and of length 3cm is short circuited at one end and terminated with a capacitor C at the other end. Determine
   (a) The capacitor value to have lowest order resonance at 6 GHz.
   (b) If a 10K Ω resistor (loss) is placed in parallel with capacitor, obtain Q.

2) For a coaxial cable operating in TEM mode write down the expressions for the E and H fields.
   If the cable is of length $\lambda/2$ and short circuited at one end, obtain the new E and H fields.
   Show that the time average stored energy in the E and H fields are equal.

3) For a rectangular waveguide cavity of dimension a x b x d *(xyz)* obtain:
   - Expression for the field component by considering TE_z and TM_z
   - Expression for the field component by considering TE_y and TM_y
   - Expression for the field component by considering TE_x and TM_x

   Compare the results and give a conclusion.

4) For a rectangular cavity with lossy walls and filled with air, obtain an expression or the Q of the TM_{111} mode.

5) An air filled rectangular cavity has its first resonant modes at 5.2 GHz, 6.5 GHz and 7.2 GHz. Fine the dimensions of the cavity.

6) For a circular cavity operating in TM_{nm0} with both conductor and dielectric losses, obtain an expression for the Q of the cavity.
   Note : $\int_0^a J_n^2(kx)x\,dx = \frac{x^2}{2}\left[J_n'^2(kx) + \left(1-\frac{n^2}{k^2x^2}\right)J_n^2(kx)\right]$

7) A rectangular cavity operating in TE101 mode, has a slab material of thickness t and permeability μ_r placed at one end of the cavity along xy plane at $z=0$. Use perturbation theory to obtain an expression for the change in resonant frequency.