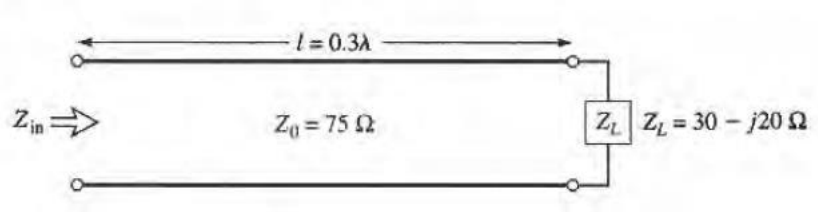
**Benha University**
**Faculty of Engineering at Shoubra**
**Electrical Engineering Department**

**Microwave fundamentals**
**3rd Year Communications**
**(2018-2019)**

**Sheet 2**

1. A lossless transmission line of electrical length $l = 0.3\lambda$, is terminated with a complex load impedance as shown below. Find the reflection coefficient at the load, the SWR on the line, the reflection coefficient at the input of the line, and the input impedance to the line.




2. A 75 Ω coaxial transmission line has a length of 2.0 cm and is terminated with a load impedance of 37.5 + j75 Ω. If the dielectric constant of the line is 2.56 and the frequency is 3.0 GHz, find the input impedance to the line, the reflection coefficient at the load, the reflection coefficient at the input, and the SWR on the line.

3. A lossless transmission line with $Z_0 = 60\ \Omega$ is being operated at 60 MHz. The velocity on the line is $3 \times 10^8$ m/s. If the line is short-circuited at z = 0, find Zin at:
z = -1m,-1.25m,-2m,-2.5m

4. A lossless transmission line having $Z_0 = 120\ \Omega$ is operating at $\omega = 5 \times 10^8$ rad/s. If the velocity on the line is $2.4 \times 10^8$ m/s and $Z_L$ is represented by an inductance of 0.6µH in series with a 100 Ω resistance. Find reflection coefficient at the load and SWR

5. A certain lossless transmission line has $Z_0 = 50\ \Omega$; A load $Z_L = 60 + j80\ \Omega$ is located at z = 0.

6. What is the shortest distance from the load to a point at which $Z_{in} = R_{in} + j0$? $\lambda g = 10$m

7. The incident voltage wave on a certain lossless transmission line for which $Z_0 = 50\Omega$ and vph = $2 \times 10^8$ m/s is $V^+(z, t) = 200 \cos(\omega t - \pi z)$ V, the line is terminated with load impedance ZL = 50 + j30 Ω at z = 0. Find $I^+(z, t)$, reflection coefficient at the load, $V^-(z)$, V (z=-2.2 m)

*Good Luck* *Dr. Gehan Sami*