EXTC - (02)

Paper / Subject Code: 42404 / Microwave & Radar Engineering

(3 Hours) Max Marks: 80

1. Question No. 1 is compulsory.
2. Out of remaining questions, attempt any three questions.
3. Assume suitable additional data if required.
4. Figures in brackets on the right hand side indicate full marks.

Q.1

(a) What factors limit transistor use at microwave frequencies? [5]
(b) Explain Doppler shift and its role in CW radar. [5]
(c) Explain the working of Phase shifter. [5]
(d) Explain the principle of working of quarter wave transformer. [5]

Q.2

(a) Explain how avalanche devices operate. Name three devices that use the avalanohe mode for their operation. [10]
(b) Design single-stub (short circuit) shunt tuning networks to match a load impedance $Z_L = 60 - j80\ \Omega$, to a 50 Ω line. Assuming that the load is matched at 2 GHz [10]

Q.3

(a) Explain the working of a negative resistance parametric amplifier. [10]
(b) Explain the concept of velocity modulation. Also explain the working of cylindrical magnetron. [10]

Q.4

(a) Derive equation for phase velocity, cutoff frequency, cutoff wavelength and field equations for rectangular waveguide. [10]
(b) Explain how avalanche devices operate. Name three devices that use the avalanche mode for their operation. [10]

Q.5

(a) Derive the Radar range equation as governed by minimum detectable signal to noise ratio. [10]
(b) Draw the functional block diagram of an MTI Radar system and explain its operation. Define the terms blind speed and MTI improvement factor. [10]

Q.6

(a) Instrument landing system. [5]
(b) Ferrite device Isolator [5]
(c) Hybrid ring [5]
(d) Modes in Gunn diode [5]