

2023

B.E. (Electronics and Communication Engineering)
Sixth Semester

EC-601: Microwave and Radar Engineering

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 (Section-A) which is compulsory and selecting two questions each from Section B-C.

x-x-x

Section-A		
1	i. What is phase focusing effect? Where it is used? ii. Differentiate a microwave twist and band. iii. Why magic Tee is called magic Tee? iv. What are the differences between avalanche devices and transferred electron devices? v. Define PRF of RADAR.	10
Section-B		
2	a) What are mode transitions? Convert TEM to dominant modes of circular and rectangular waveguide. b) Define Faraday rotation. Explain working of a four port circulator using the Faraday rotation.	5 5
3	a) Give the classification of microwave power. Explain the method for medium power measurement. b) Discuss the formation and properties of high field domain in Gunn diode.	5 5
4	a) The input power in a two holes directional coupler is 10 W. The coupler has a coupling coefficient of 20 dB and directivity of 60 dB. Calculate the power at all ports. b) With suitable diagram describe the operating principle of a TRAPATT diode.	5 5
Section-C		
5	a) A helix TWT is operated with a beam current 250 mA, beam voltage 4.5 kV and characteristics impedance 45 Ω . If a 50 dB gain is required at 9 GHz, calculate the helix length and propagation constants. b) How do you distinguish stationary and moving targets? Explain the principle working of MTI radar.	5 5
6	a) A reflex klystron operates at the peak of the $n = 2$ mode. The DC input power is 50 mW and $V_1/V_0 = 0.3$. Find out the power delivered to the load if 15% of the power delivered by the electron beam is dissipated in the cavity walls. b) Starting from the basic equation of the motion, find out an expression for the (a) Hull cut-off voltage for a fixed magnetic flux density and (b) Hull cut-off magnetic flux density for a fixed beam voltage for a cylindrical magnetron.	5 5
7	a) Show that the maximum achievable efficiency of a two-cavity klystron is 58%. b) Derive radar equation with pulse compression and also discuss losses in radar equation.	5 5

x-x-x