3/5/19 (E)

Exam.Code:0930
Sub. Code: 6917

(11)

1059

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. I (Section-A) which is compulsory and selecting two questions each from Section. B-C.*

x-x-x

Q. No.	Question (All questions are compulsory)	Marks
	Section-A (attempt all questions)	
1	a) Differentiate a waveguide twist and bend. b) What is a magic Tee? Why it called so? c) Compare frequency pulling and pushing in magnetron. d) Classify the microwave power and list methods used for their measurement. e) What are negative resistance devices? Why such devices are used for power amplification.	10
	Section-B (Do any two questions)	
2	a) The input power in a two-hole directional coupler is 1 mW. The coupler has a coupling coefficient of 15 dB and directivity of 50 dB. Calculate the power at all ports.	5
	b) Define mode transition. Convert a TEM (coaxial) to dominant mode in circular and rectangular waveguide.	5
3	a) Explain construction and working of a precision rotary phase shifter. Also discuss its electric vector-phasor diagram to explain working.	5
	b) An 8 μm long Si BARRIT diode has relative dielectric constant of 12.5. Calculate the breakdown electric field of the diode for $3.2 \times 10^{22}/m^3$ donor concentration.	5
4	a) Two identical directional couplers are placed in a waveguide to sample the incident and reflected power. The meter reading show that power level of reversed coupler is 10 dB down from the level of the forward coupler. What is the value of VSWR on the waveguide?	5
	b) Discuss the formation of high filed domain in TEDs. Derive the condition for negative resistivity in two valley semiconductors.	5
	Section-C (Do any two questions)	
5	a) How do you distinguish stationary targets and moving targets? Explain the principle and working of MTI radar.	4
	b) A TWT operates with following parameters, beam current 50 mA, beam voltage 2.5 kV, characteristics impedance of helix 7.75 ohms, circuit length N=45 and frequency is 8 GHz. Determine the output power gain in dB and all propagation constant.	6
6	a) Compare active and passive augmentation in radar. Derive the expression for equivalent radar cross section of active augmentor.	4
	b) A reflex klystron operates at the peak of the n=2 mode. The DC power input is 40 mW and $v_1/v_0=0.278$. If 20% of the power delivered by the beam is dissipated in the cavity wall, find the power delivered to the load.	6
7	a) Derive an expression for the cut-off magnetic flux density with reference to a cylindrical cavity magnetron.	5
	b) A pulsed radar operating at 9 GHz has an antenna gain 30 dB, transmitter power 2.5 kW, and minimum detectable signal -100 dBm. The target is a cabin curser that has an RCS 10 m^2. Calculate the maximum range.	5

x-x-x