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**B. Tech. IN ELECTRONICS AND  
COMMUNICATION ENGINEERING (BTECVI)**

**Term-End Examination**

**December, 2012**

**BIEL-016 : MICROWAVE AND RADAR  
ENGINEERING**

*Time : 3 hours*

*Maximum Marks : 70*

**Note :** (i) Attempt *any seven questions*.

(ii) Use of scientific calculator is *allowed*.

1. When the dominant mode is propagated in an air filled rectangular waveguide, the guide wavelength for a frequency of 9000 MHz is 4 cm. Calculate breadth of the guide ? 10
2. Explain the operation of a Hybrid Tee junctions and also Derive the scattering matrix. 10
3. (a) Explain the double minimum method for measuring VSWR. 2x5=10  
(b) Two identical directional couplers are used in a waveguide to sample the incident and reflected powers. The output of two couplers are found to be 2.5 mW and 0.15 mW. Find the value of VSWR in the waveguide.

4. (a) Describe the factors responsible for making bipolar junction transistors unusable at microwave frequencies. 6  
(b) What do you mean by standing waves ? Give its pattern. 4
5. What are slow wave structures ? Explain how a helical TWT achieves amplification. 10
6. Explain the tunnel diode characteristics with the aid of energy band diagram. 10
7. (a) A Pulse Doppler radar operating at 3 cm wavelength has a PRF of 1000 Hz. Determine the maximum radial speed of the target which this radar can unambiguously measure. 6  
(b) What do you mean by "Range Ambiguity" and "Doppler Ambiguity" ? 4
8. (a) A radar transmits  $1\mu\text{s}$  wide pulses at a repetition rate of 1000 PPS. If the peak transmitted power is 100 kW, Determine the average power in dB. 5  
(b) Discuss briefly the "Duplexers Radar antenna". 5

9. (a) Draw the block diagram of Pulse radar receiver. 5
- (b) In an open-ended transmission line, the incident voltage is 20 V and the reflected voltage is 12.5V. Find the percentage of reflected power. 5
10. Write short notes on *any two* of the following :  $2 \times 5 = 10$
- (a) Wave equation in rectangular co-ordinates.
- (b) Attenuators
- (c) BWO
- (d) Varactor diode
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