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

Term-End Examination

June, 2013

BIEL-016 : MICROWAVE AND RADAR ENGINEERING

Time : 3 hours   *Maximum Marks : 70*

*Note :   Attempt **any seven** questions.*

1.   A rectangular waveguide has dimensions   **10**
      2.5×5 cms. Determine the guide wavelength (λ_g),
      phase constant β and phase velocity (v_p) at a
      wavelength of $\lambda = 4.5$ cms for the dominant mode.

2.   What is the basic purpose of using a circulator ?   **10**
      With the help of a neatly labelled diagram and a
      typical application of configuration, briefly
      describe its principle of operation.

3.   Give some applications of slotted line. Briefly   **10**
      describe the steps to be followed for measuring
      VSWR of a given device using a slotted line.

4.   Discuss briefly the limitations of conventional   **10**
      active devices at microwave frequencies.

5. Name two important microwave tubes that can **10** be used as microwave amplifiers. Briefly describe the principle of operation of each one of them, with neatly labelled diagrams.

6. Draw the V-I characteristics of a tunnel diode and **10** explain different regions. What is a Backward diode ?

7. (a) A radar transmits $1\mu s$ wide pulses at a **6** repetition rate of 1000 PPS. If the peak transmitted power is 100 kW, determine average power in dB and also the look energy for 20 target hits in one dwell period.

   (b) What do you mean by terms 'Range **4** Ambiguity' and 'Doppler Ambiguity' ?

8. (a) With a CW Radar transmitting a frequency **5** of 5 GHz, calculate doppler frequency seen by stationary radar when the target radial velocity is 90 kmph.

   (b) State the applications of M.T.I Radar. **5**

9. (a) Draw the block diagram of C.W. Radar. **5**

   (b) Explain briefly the performance **5** characteristics and application of TWT, (Travelling Wave Tube).

10. Write short notes on *any two* of the following :

2x5=10

    (a)   IMPATT DIODE and TRAPATT DIODE

    (b)   Phase shifters

    (c)   E - Plane Tee

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