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Roll No

EC-7001-CBGS

B.E. VII Semester

Examination, December 2020

Choice Based Grading System (CBGS)

Microwave Engineering

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.

ii) All questions carry equal marks.

1. a) What are different types of modes that exists in hollow rectangular wave guide? What is meant by the term dominant mode?
b) An air filled rectangular waveguide of inside dimensions 7×3.5 cm operates in dominant mode TE_{10} .
 - i) Find the cut off frequency
 - ii) Determine the phase velocity of the wave in the guide at a frequency of 3.5GHz
 - iii) Determine the guided wavelength at the same frequency.
2. a) How are waveguide different from normal two wire transmission lines.
b) Explain dominant mode of a rectangular waveguide.
3. For the dominant mode of operation in an air filled circular waveguide of inner diameter 4 cms. Find:
 - i) Cut off wavelength
 - ii) Guided wave length
 - iii) Cut off frequency

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4. a) Explain the working of isolator in brief.
b) What is PIN diode? Explain its properties and applications.
5. a) Explain the coupling factor and directivity of the four ports directional coupler. Also derive the S-matrix for completely matched four-port directional coupler.
b) Mentioned the symbol and schematic diagram of microwave circulator. Explain the working of the same using geometry containing two magic tee and one phase shifter along with its simplified s-matrix.
6. a) A TWT operate under the following parameters beam voltage $V_0 = 3\text{kV}$, beam current $I_0 = 30\text{mA}$ characteristic impedance of helix $Z_0 = 10\Omega$ circuit length $N = 50$, Frequency $f = 10\text{GHz}$ determine
 - i) The gain parameter C
 - ii) The output power gain A_p in decibels
 - iii) All four propagation constants
b) What are the limitations of conventional tubes at microwave frequencies?
7. a) Discuss bolometer method of microwave power measurement.
b) Write short notes on following:
 - i) VSWR measurement
 - ii) Wave guide impedance measurement
8. Write short note (any four):
 - a) MASER
 - b) Tuned Detectors
 - c) BARITT
 - d) Microwave resonators
 - e) TWT Amplifier

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