Total No. of Questions: 8]	Total No. of Printed Pages : 2
----------------------------	--------------------------------

https://www.rgpvonline.com

Roll No	Roll No		
---------	---------	--	--

## EC-7001 (CBGS) B.E. VII Semester

Examination, November 2018

## Choice Based Grading System (CBGS) Microwave Engineering

Time: Three Hours

Maximum Marks: 70

Note: i) Attempt any five questions out of eight questions.

- ii) All questions carry equal marks.
- iii) Assume suitable data, if required.
- a) List out various applications of Microwave and briefly explain any two of them.
  - b) An open wire transmission line has the following primary constants  $R = 4\Omega/km$ , L = 2.5 mH/km, C = 0.009  $\mu$ F/km, G = 0.29  $\mu$ mho/km and frequency of operation is 1kHz. Determine the following parameters
    - i) Z0

ii) a

iii) β and

- iv) Phase velocity
- a) A rectangular waveguide with dimension of 3 x 2 cms operates in TM11 mode at 10GHz. Determine the characteristic wave impedance.
  - b) Draw the structure and explain the velocity modulation process in two cavity klystron amplifier.
- 3. a) For the dominant mode of operation in an air filled circular waveguide of inner diameter 4 cms. Find:
  - i) Cut off wavelength https://www.rgpvonline.com
  - ii) Guided wave length
  - iii) Cut off frequency

- b) Discuss the dominant and higher order modes in strip line structure. https://www.rgpvonline.com
- a) List different types of Magnetron. Explain mechanism of oscillations of Magnetron oscillator with diagram.
  - b) An air-filled circular waveguide has a radius of 2cm and is to carry energy at a frequency of 10GHz. Find all the TEnp and TMnp modes for which energy transmission is possible.
- 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.
- a) Mentioned the basic principal of IMPATT and TRAPATT diodes.
  - What is standing wave? Derive the equation of Voltage Standing Wave Ratio (VSWR) in terms of reflection coefficient.
- a) Discuss the reasons due to which the measurement of Z,
   Y, h and ABCD parameter are difficult at microwave frequencies. Elaborate the S-parameters for the multi-
  - port network along with any two properties.
  - b) The S-parameters of a two-port network are given by  $S11 = 0.2 < 0^{\circ}$ ,  $S22 = 0.1 < 0^{\circ}$ ,  $S12 = 0.6 < 90^{\circ}$ ,  $S21 = 0.6 < 90^{\circ}$  https://www.rgpvonline.com
    - i) Prove that the network is reciprocal but not lossless.
    - Find the return loss at port 1 when port 2 is shortcircuited.
- Write short note (any four):
  - a) MASER

b) Tuned Detectors

c) BARITT

- d) Microwave resonators
- e) TWT Amplifier

\*\*\*\*\*