Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

SEVENTH SEMESTER B.TECH. (E & C) DEGREE END SEMESTER EXAMINATION
DECEMBER 2018/ JANUARY 2019
SUBJECT: RF & MICROWAVE ENGINEERING (ECE - 4102)

TIME: 3 HOURS **MAX. MARKS: 50**

Instructions to candidates
- Answer **ALL** questions.
- Missing data may be suitably assumed.

1A. Discuss any three applications of quarter wave transmission Line.

1B. A 50 Ohm lossless line connects a signal of 100 KHz to a load of 100 Ohm. The load power is 100mW calculate:
(a) Voltage reflection coefficient
(b) VSWR
(c) Position of first V_{min} and V_{max}
(d) Impedance at V_{min} and V_{max} and values of V_{min} and V_{max}

1C. Measurement on a terminated transmission line gave the following results: VSWR=3.2, Location of first V_{min} =0.237λ from the load, Characteristic impedance=50 Ohms. Calculate the terminating impedance with and without using smith chart.

(5+3+2)

2A. Determine the electric and magnetic field components for the rectangular waveguide for TE waves propagation.

2B. Show that $\lambda = \frac{\bar{\lambda}.\lambda_c}{\sqrt{\bar{\lambda}^2 + \lambda_c{}^2}}$ for the rectangular waveguide.

Where, λ= free space wavelength, λ_c= cutoff wavelength and $\bar{\lambda}$ = waveguide wavelength

2C. Define wave impedance in terms of electric and magnetic fields looking towards positive and negative directions of a rectangular coordinate system.

(5+3+2)

3A. Describe the working of 4 port Hybrid Tee with all ports perfectly matched. Solve for its S matrix. Mention two applications of it.

3B. A 3 port circulator with Insertion loss = 1dB, VSWR = 1.5 and Isolation = 30dB. Find its S Matrix.

3C. With necessary diagrams and S matrix, explain working of an Isolator.

(5+3+2)

4A. From the fundamentals and necessary diagrams, derive the expression for L_{opt}, efficiency and voltage gain in a two cavity klystron amplifier.

4B. Draw the diagram of a TWT amplifier and explain its working.

4C. Explain the working of cylindrical magnetron.

(5+3+2)

5A. Starting from fundamentals, derive the generalized voltage and current equations at any point on a two wire transmission line in trigonometric form.

5B. Discuss any two limitations of vacuum tubes at high frequency with proper justification.

5C. Explain the working of reflex klystron.

(5+3+2)