Code: 15A04703 **R15**

B.Tech IV Year I Semester (R15) Regular & Supplementary Examinations November/December 2019

MICROWAVE ENGINEERING

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) What is a dominant mode?
(b) Define group velocity.
(c) Mention the applications of a circulator.
(d) Mention the applications of E plane TEE junction
(e) Mention the limitations of conventional tubes at microwave frequencies.
(f) What is velocity modulation?
(g) List out different types of magnetrons.
(h) Mention the applications of microwave semiconductor devices.
(i) What is a scattering matrix?
(j) List the types of microwave impedance measurement.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 Explain the propagation of TE waves in a rectangular waveguide with suitable equation and field patterns.

OR

3 (a) Explain how waveguide acts as a high pass filter.
(b) Derive expression for resonant frequency in a circular cavity resonator.

UNIT – II

4 (a) Explain the construction and working of E-H plane (Hybrid or magic) TEE junction.
(b) Explain about the tuning screws and ports.

OR

5 (a) What is Faraday rotation? Explain how it is utilized in the construction of 4 port circulator.
(b) Explain about the Rotary vane waveguide attenuator.

UNIT – III

6 (a) Explain the construction and working of travelling wave tube.
(b) Differentiate between electronic and mechanical tuning of reflex klystron.

OR

7 (a) Explain the construction and working of reflex klystron with Applegate diagram.
(b) Explain the amplification process in travelling wave tube.

UNIT – IV

8 (a) What is magnetron? Explain the principle of operation with a neat sketch.
(b) Write a note on Varactor diode.

OR

9 Explain the constructional details of a Gunn diode. Explain different modes of operation of Gunn diode and characteristics of Gunn diode.

UNIT – V

10 (a) A slotted line is used to determine SWR value of wave guide. The adjacent null positions are located at 13.31 & 15.45 cm, if the separation between twice the minimum power point is 2 mm. What is the new value of VSWR?
(b) Derive the scattering matrix of Isolator.

OR

11 (a) What is a scattering matrix? What is the significance of scattering matrix?
(b) Derive the scattering matrix of directional coupler.

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