

BE 6th Semester (ETC) Final Examination 2012

Microwave & Radar Engineering

ET-601

Answer Question number 1 and 6 and two more from each group

Time: 3 hrs.

F.M.: 70

Group : A

1. (a) Write down some of the important features of microwave.
(b) Why two cavity Klystron oscillator is not usually constructed?
(c) Write down 'ISM' applications of microwave.
(d) Why S-parameter is used to specify a microwave passive component?
(e) What is the role of resonant cavity in a microwave source?

[5 × 1=5]

2. Explain the principle of velocity modulation in a Klystron amplifier by using Applegate diagram. How an amplifier Klystron differs from an oscillator Klystron? With a neat schematic explain the operation of a Klystron amplifier. Write down different methods for tuning a Klystron oscillator.

[4+2+6+3]

3(a). Find out an expression for 'critical magnetic field' to start the operation of a magnetron. What is mode jumping in magnetron and it can be avoided?

(b) What is a slow wave structure and mention its role in the operation of a traveling wave tube.

[(8+3)+(2+2)]

4.(a) What is a junction Tee? How an E-plane Tee differs from an H-plane Tee? Using S-parameter analysis prove that an H-plane Tee can work as a power divider.

(b) With a neat schematic explain the operation of a precision rotary type attenuator and mention its drawback.

[(1+1+8)+(4+1)]

5(a). Define the following terms related to a directional coupler:

(i) directivity, (ii) isolation, (iii) insertion loss, (iv) coupling factor
With a neat diagram explain the operation of a multi-hole directional coupler.

(b) Explain different methods for coupling of microwave power in a waveguide.

[(4+6)+5]

Group : B

6. (a) Why Wattmeter-Calorimeter method of power measurement is not suitable for the measure of low power microwave signal?

(b) Why VSWR measurement of a microwave transmission line system is very important?

(c) What is 'blind speed' for a radar?

(d) Why it is very difficult to achieve an open or a short over a wide range of microwave frequencies?

(e) How a radar can differentiate different types of targets?

[5 × 1 = 5]

7(a). Why slotted waveguide is not used for the measurement of VSWR in an industrial environment? With a neat schematic explain an alternative method for measurement of VSWR of a transmission line other than a slotted waveguide technique..

(b) What is 'Bolometer'? Explain with a neat schematic the technique for measurement of low microwave power.

[(2+6)+(2+5)]

8. Mention the factors on which the selection of materials for the fabrication of MICs are based on.

~~Make a comparative study between different planar transmission lines.~~

[7+8]

9. Find out an expression for maximum detectable range of a target by radar. Mention the factors that affect the range equation of radar.

Write a note on radome. What is the difference between a radome and a rotadome?

[(6+2)+(5+2)]

10. (a) With the help of a block diagram explain the operation of a MTI radar.

(b) What do you meant by the term 'missed detection' and 'false alarm'? What is clutter?

[9 +(2+2+2)]