Total No. of Questions : 8] *[Total No. of Printed Pages : 1*

Roll No .....

MEMT-301(A)

M.E./M.Tech., III Semester Examination, December 2017

Microwave Measurements

(Elective - I)

Time : Three Hours

Maximum Marks: 70

Note: i) Attempt any five questions.
ii) All questions should be attempted at one place.

1. What are the microwave detectors? Explain detector characteristics. What is law of detection? Draw the structure of
   a) Schottky diode
   b) Point contact diode with encapsulation
   c) Waveguide mounting
   d) Co-axial mounting
   e) Equivalent circuit of mounted microwave diode and explain each.

2. What are microwave attenuators? Write its various types and explain. How does mismatch of a detector affect its sensitivity? Find the mismatch loss and percentage reduction in sensitivity if mismatch rise to a VSWR=4.0

3. Why reflectometer techniques are used in microwave measurements? Explain basic reflectometer setup with a block diagram. What are the errors observed in this technique? Give utility of reflectometer principle for measuring VSWR of a load under test:
   a) Equipment b) Procedure
   c) Block diagram d) Observation chart
   e) Calculations

4. A rectangular resonator is designed from waveguide 4.8×2.2 cm^2 with the waveguide operating in the TE_{101} mode. The resonator is filled in with polyethylene $\varepsilon_r = 2.25$ and $\tan\delta = 4.0\times10^{-4}$ and resonates at 5.0GHz. Find the length of the resonator for P=1 and P=2 modes. if $\sigma = 5.813\times10^7$ sm^{-1}, determine Q for the TE_{101}mode? Explain excitation and tuning of microwave resonators with necessary diagrams.

5. Write and explain various methods for measurement of microwave frequency with block diagram and mathematical equations.

6. Discuss procedure for antenna impedance measurement.

7. Write a note on utility of spectrum analyzer and network analyzer in microwave measurements.

8. What are the steps involved in measuring the scattering parameters of a Magic Tee? Explain in the following:
   a) Bolometers
   b) Power bridges
   c) Calorie meters

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