Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.Tech (ECE)/SEM-1/MCE-104/2010-11

2010-11

ADVANCED MICROWAVE COMMUNICATION ENGINEERING

Time Allotted : 3 Hours | Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Short Answer Type Questions)

1. Answer the following questions : 5 × 2 = 10

   i) Define coupling co-efficient and directivity of a directional coupler.

   ii) Vacuum tubes fail at microwave frequencies because

   a) noise figure increase

   b) transit time become too short

   c) shunt capacitive reactances become too large

   d) series inductive reactances become too small.

   iii) What is the purpose of slow wave structures used in TWT ?

   iv) Why is Magnetron called as crossed field device ?

v) The effective height of an antenna is slightly greater than physical height because

a) Wave velocity in antenna is less than its velocity in free space.

b) Wave velocity in antenna is more than that of free space.

c) Resistance of antenna is less than that of free space.

d) None of these.

GROUP – B

(Long Answer Type Questions)

Answer any *four* of the following : 4 × 15 = 60

2. Discuss the following properties of '*S*' matrix : 5 + 5 + 5

a) Symmetry property

b) Unitary property

c) Phase shift property.

3. a) What is quantum tunneling phenomenon ?

b) With complete energy band diagram, explain the quantum tunneling phenomenon.

c) Describe different modes of operation for Gunn diode. 2 + 6 + 7

4. What is meant by the term, 'impedance Matching' ? Why is it necessary to match an antenna to its feeder ? What are the various methods employed to effect matching ? Explain how a single stub matching system is designed. 2 + 2 + 2 + 9

5. a) Derive the expression for the various radiated fields from a small loop antenna.

   b) Using those entire equations find out the total radiated power and the radiation resistance of that same antenna. 8 + 7

6. a) What are the limitations of conventional vacuum tubes ?

   b) What is the function of a cavity resonator ? Derive the expression of resonance frequency of a Reentrant cavity resonator.

   c) Describe the velocity modulation process. Derive the expression of modulated frequency. 3 + 6 + 6

7. Write explanatory notes on any *two* of the following topics : $7\frac{1}{2}+7\frac{1}{2}$

   a) Waveguide slot antenna

   b) Phase shifters

   c) Friis transmission formula

   d) Troposcatter Propagation.