Code No: 117FE **R13**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year I Semester Examinations, November/December - 2017
MICROWAVE ENGINEERING
(Electronics and Communication Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

Part- A

(25 Marks)

1.a) Mention the application of waveguides. [2]
b) Write short notes on power transmission and power losses of rectangular waveguide. [3]
c) List out the functions of various waveguide components and their applications. [2]
d) Explain any one application of Magic Tee. [3]
e) Classify microwave tubes. [2]
f) Differentiate two cavity klystron and Reflex klystron. [3]
g) Explain RWH theory. [2]
h) Mention the application of TED's. [3]
i) Explain the significance of scattering matrix. [2]
j) What is the need for an isolator in MW measurements and where it is placed? [3]

Part-B

(50 Marks)

2.a) Explain why TEM mode does not exist in a circular wave guide.
b) What is the significance of Q in resonant circuits? Derive a general expression Q for a series resonant circuit. What happens to Q when circuit is loaded? [5+5]

OR

3.a) Show that TM_{01} and TM_{10} modes does not exist in a rectangular waveguide.
b) A rectangular wave guide with dimension of 8×4 cm operates in the TM11 mode at 10Ghz. Determine the characteristic wave impedance. [5+5]

4.a) What is a cavity resonator? Discuss the applications of cavity resonator.
b) Derive the expression for Q-factor of rectangular cavity. [5+5]

OR

5. Write short notes on:
a) Wave guide phase shifter b) Hybrid ring [5+5]

6.a) Draw the mode curves of Reflex klystron and derive the relation between mode number and repeller in Reflex klystron.
b) In a two-cavity klystron the parameters are, input power=10mW, voltage gain=20dB, R_{sh} of input cavity =25KΩ, R_{sh} of output cavity =35KΩ, load resistance = 40 KΩ. Find input voltage, output voltage and the power to the load. [5+5]

OR

7.a) Explain the significance of slow wave structure in the amplification process. List out the major differences between TWT and klystron.
b) Explain how amplification takes place in Helix TWT? [5+5]

8. List and explain different types of magnetrons. [10]

OR

9.a) With a neat sketch explain the structure and principle of operation of TWT amplifier.

b) How is bunching achieved in a cavity magnetron? Explain. [5+5]

10.a) Give the measurement procedure for measuring Q factor of resonant cavity.

b) Define VSWR. Describe the methods for measuring high and low VSWR's. [5+5]

OR

11.a) Explain the procedure for measuring VSWR<10.

b) Explain the procedure for measuring attenuation with neat diagram. [5+5]

---ooOoo---