

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI  
(END SEMESTER EXAMINATION)

CLASS: MSC.  
BRANCH: PHYSICS

SEMESTER : II  
SESSION : SP/19

SUBJECT: EC597 FUDAMENTALS OF MICROWAVES

TIME: 3.00 Hrs.

FULL MARKS: 50

**INSTRUCTIONS:**

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
  2. Attempt all questions.
  3. The missing data, if any, may be assumed suitably.
  4. Before attempting the question paper, be sure that you have got the correct question paper.
  5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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- Q.1(a) What are microwaves? What is the reason for using microwaves? [5]
- Q.1(b) Illustrate the applications of microwaves in microwave oven and in remote sensing. [5]
- Q.2(a) (i) Determine the expression of input impedance of uniform transmission line (parallel two wire). What is the input impedance for a short circuited and an open circuited transmission line. [5]  
(ii) A transmission line of characteristics impedance  $100\Omega$  is connected to a load of  $200\Omega$ . Find the reflection co-efficient and standing wave ratio.
- Q.2(b) Determine the expression for cut off frequency and cutoff wave length of rectangular wave guide compare different modes associated with wave guides. [5]
- Q.3(a) Compare E plane and H plane Tees. Explain Magic tee with a neat diagram. Mention one applications. [5]
- Q.3(b) Explain S matrix properties for reciprocal and lossless network. [5]  
An Incident power to a directional coupler is 80watts. The directional coupler has coupling factor of 20dB, directivity of 30 dB and insertion loss of 0.5 dB. Find the output power at (i)main arm ii) coupled iii) isolated ports.
- Q.4(a) Explain the principle of operation (with a neat diagram) and Applegate diagram of two cavity Klystron. Determine the expression for velocity modulation of of two cavity Klystron Amplifier. [5]
- Q.4(b) Explain working principle of TRAPATT diode with suitable diagram. Mention one of its applications. [5]
- Q.5(a) Construct the experimental set up of microwave bench and explain the function of each block. [5]
- Q.5(b) Explain the working principle of Vector Network Analyzer with the help of suitable diagram. List the steps required for measurement of Scattering parameters. [5]

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