

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

**CLASS: MTECH/PRE-PHD  
BRANCH: ECE**

**SEMESTER : I/NA  
SESSION : MO/18**

**SUBJECT: EC550 MICROWAVE AD MM-WAVE INTEGRATED CIRCUITS AND APPLICATIONS  
TIME: 3.00 HOURS 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) Compare and contrast MMIC over HMIC. [5]  
Q.1(b) Describe in details III-V HBT microstrip MMIC fabrication technology with a neat schematic diagram. [5]
- Q.2(a) Compare and contrast the gain, noise, power handling and linearity capabilities of bipolar and field effect devices. [5]  
Q.2(b) Identify the transmission lines for uniplanar MMICs along with their structure and functional details. State the principal advantages of coplanar form of transmission lines over microstrip form in MMICs. [5]
- Q.3(a) Describe in details the theory of classical stability and gain analysis of amplifiers along with practical implications. [5]  
Q.3(b) Design and analyse a single balanced 94 GHz diode mixer. [5]
- Q.4(a) Explain the reasons behind scattering parameter measurements in microwave and millimeterwave frequencies. Detail thermal and cryogenic measurements of MMIC designs. [5]  
Q.4(b) Describe in details the non-invasive MMIC measurement with the illustrations of various techniques. [5]
- Q.5(a) Assess the role of MMICs in Phased Array Radars with the help of necessary diagrams and theories. [5]  
Q.5(b) Illustrate the role of MICs in Monolithic MM-wave Transceiver with the help of necessary diagrams and theories. [5]

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