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Question Paper Code : 80711

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2025.

Fifth/Sixth Semester

Electronics and Communication Engineering

CEC 341 — MICs AND RF SYSTEM DESIGN

(Common to : Electronics and Telecommunication Engineering)

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. State the difference between RF FETs and BJTs in terms of frequency response.
2. List any two advantages of impedance matching in RF circuits.
3. Define the quality factor (Q) of a resonator.
4. Mention any two special filter realizations used in RF design.
5. List any two applications of S-parameters in microwave circuits.
6. Differentiate between microstripline and stripline.
7. State the function of a circulator in MICs.
8. Define an isolator and state one of its applications.
9. List any two types of integrated antennas.
10. What is a probe station for measurements?

PART B — ($5 \times 13 = 65$ marks)

11. (a) Explain the operation of RF diodes and their applications in RF front-end circuits.

Or

- (b) Design a biasing network for a Class-A RF amplifier using BJT. Show the steps involved.

12. (a) Derive the design equations for a low-pass filter using a Smith Chart approach.

Or

- (b) A coupled filter is explain to be designed with center frequency 2 GHz and bandwidth 50 MHz. Explain the design steps and key parameters.
13. (a) Explain the ABCD parameters and their role in analyzing microwave integrated circuits.

Or

- (b) With neat diagrams, compare different planar transmission lines: Microstrip, Slotline, and Coplanar Waveguide (CPW).
14. (a) Explain the working principle of microstrip circulator. Derive the condition for non-reciprocity.

Or

- (b) Design considerations for a microstrip isolator for a frequency of 5 GHz. State assumptions clearly.
15. (a) Discuss photonic bandgap antennas and their advantages in MIC system.

Or

- (b) Explain thermal and cryogenic measurement techniques for integrated antennas with suitable examples.

PART C — (1 × 15 = 15 marks)

16. (a) Design an RF band-pass filter operating at 3 GHz with 100 MHz bandwidth using microstripline technology. Show all necessary steps and approximations. Comment on insertion loss and return loss.

Or

- (b) A micro-machined antenna is to be designed for 60 GHz applications in 5G systems. Propose the design methodology, including choice of substrate, integration with MICs, and measurement strategy. Justify with reasoning.