

M.Tech. Electronics & Communication Engineering (CBCS Pattern) Semester-II
PECS243 - Microwave Devices & Amplifier Design

P. Pages : 1

Time : Three Hours



GUG/S/25/11036

Max. Marks : 70

- Notes :
1. All questions carry equal marks.
 2. Assume suitable data wherever necessary.
 3. Illustrate your answers wherever necessary with the help of neat sketches.
 4. Attempt **any five** questions.

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| 1. | a) | Write short notes on the applications of varactor diodes in microwave circuits. | 7 |
| | b) | Derive the expressions for the field components due to TM waves in rectangular wave guide. | 7 |
| 2. | a) | Explain following terms (i) Gyrator (ii) Isolator. | 7 |
| | b) | Define Cavity Resonator. Draw Diagrams of Rectangular & circular cavity Resonators. | 7 |
| 3. | a) | Explain the working principle of a Gunn diode based on the negative differential Resistance region. | 8 |
| | b) | Compare the operation of TRAPATT and IMPATT diodes with respect to breakdown mechanism. | 6 |
| 4. | a) | Explain following terms (i) Guide wavelength (ii) Phase Velocity (iii) Group Velocity. | 7 |
| | b) | Derive the expression for the S-matrix of a 2-port network. Interpret each S-parameter. | 7 |
| 5. | a) | Derive the bunching condition and modulation process in a two-cavity klystron amplifier. How does it lead to amplification? | 7 |
| | b) | What are slow wave structures? Explain how a helical TWT achieve amplification. | 7 |
| 6. | a) | Discuss the construction and working of a Low Noise Amplifier (LNA) used at microwave frequencies. What parameters define its quality? | 6 |
| | b) | Sketch the input and output stability circles of microwave amplifier and relate the condition for unconditional stability. | 8 |
| 7. | a) | With a suitable illustrations and scattering matrices, explain the operation of direction Coupler and power divider. | 7 |
| | b) | Design a differential FET mixer and explain how it achieves frequency translation. | 7 |
| 8. | a) | Discuss on broadband amplifiers and derive the necessary equation. | 7 |
| | b) | Write note on i) Image Reject Mixer ii) Microwave Oscillators. | 7 |
