M.Tech. Electronics & Communication Engineering (CBCS Pattern) Semester - II

PECS24C / PECS243 - Microwave Devices & Amplifier Design

P. Pages : 1 **GUG/S/23/11036**

Time : Three Hours * 1 2 6 4 * Max. Marks : 70

Notes : 1. All questions carry marks as indicated.
3. Answer **any five** questions.
3. Assume suitable data wherever necessary.
4. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) Write any two limitations of conventional tubes at Microwave frequencies. **6**

b) What rare the modes of operation that result in microwave oscillations in a Gunn diode? Explain in detail. **8**

2. a) Explain the principle of working of Travelling Wave Tube with neat sketches. **7**

b) Draw the equivalent circuit of varactor diode and explain its operation. What are the applications of varactor diode? **7**

3. a) Derive the S-matrix for directional coupler. **7**

b) Explain how Manley-Rowe power relations are useful in the prediction of power gain possibility in a parametric amplifier. **7**

4. a) With the help of Applegate diagram, explain the operation of a reflex klystron; show that the theoretical efficiency of reflex klystron is 27.78% **7**

b) With the help of velocity diagram explain principle of two-cavity Klystron amplifier. **7**

5. a) Draw the experimental setup for the measurement of impedance of discontinuity and explain. **7**

b) Explain using suitable diagrams two methods of designing broad band amplifier. **7**

6. a) Explain in detail Double ended diode mixer. What are mixer design considerations? **7**

b) Design a low pass constant K filter using image parameter method. **7**

7. a) Describe the characteristics of amplifier and Examine the transducer power gain, unilateral power gain, available power gain and operating power gain of a microwave amplifier using S parameters. **8**

b) Compare the different types of mixers with its principle of operation. **6**

8. a) Explain oscillator phase noise in detail. **7**

b) Explain the oscillation mechanism and the electron trajectory concept of magnetron oscillator. **7**

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