

FACULTY OF ENGINEERING
B.E. 4/4 (ECE) (I-Semester) Supplementary Examination, April 2006
MICROWAVE ENGINEERING

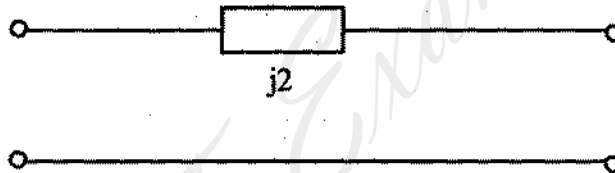
Time : Three Hours]

[Maximum Marks : 75

Answer All questions of Part A.
Answer FIVE questions from Part B.

PART—A
(Marks : 25)

1. Define Group velocity, Phase velocity in a waveguide and sketch its variation with frequency. 3
2. What is optimum choice for rectangular waveguide dimensions ? Justify your answer. 2
3. Find S-parameters of circuit shown : 3



4. Dominant mode is propagating in rectangular guide 2.2 cm × 1 cm and frequency of operation is 9.4 GHz. Find guide wavelength. 3
5. Waveguide in question 4, is terminated in load of 400 Ω. What will be the VSWR ? 2
6. What is the role of velocity modulation of electrons in two cavity Klystron ? Explain. 3
7. Sketch the characteristics of varactor diode and explain the same. 2
8. Give reasons for variation of gain with frequency in TWT amplifier. 3
9. What are applications of IMPATT Diode in Microwave Circuits ? 2
10. Name the dominant mode in parallel plate, rectangular waveguide and circular waveguide. 2

PART—B
(Marks : 5×10=50)

11. Derive the field expressions for TE modes in parallel plate guide. 10
12. (a) Find the resonant frequency of Cavity Resonator of principle mode with dimensions a = 2 cm, b = 1 cm, c = 2 cm (length). 4

- (b) Justify that TE_{11} mode is the dominant mode in circular waveguide. 3
- (c) Why TEM mode cannot propagate in rectangular waveguide? 3
13. (a) Derive the S Matrix of a Directional coupler. 6
- (b) Explain the working principle of waveguide attenuator. 4
14. Describe the interaction in Multi Cavity Magnetron. What is π mode? What are the methods of separation of π mode from other modes? Sketch the characteristics of Magnetron. 10
15. (a) Explain the working of PIN diode and its application in Microwave Test Bench. 4
- (b) How IMPATT diode can be used as oscillator? 3
- (c) What is transferred electron effect? 3
16. (a) What is the effect of grid interception of beam current? 4
- (b) What is frequency pulling and frequency pushing? 3
- (c) What is the role of slow wave structure in TWT? 3
17. (a) Explain the working of a 4 port circulator with a neat sketch. 5
- (b) Describe admittance spiral of Reflex Klystron and explain how oscillations are sustained in Klystron Oscillator. 5