Code No. 11197/S

FACULTY OF ENGINEERING

BE 4/4 (ECE) I-semester (Main & Backlog) (Suppl.) Examination, April / May 2019

Subject: Microwave Engineering

Time: 3 Hours **Max. Marks: 75**

Note: Answer all questions from Part A and any five questions from Part B.

PART-A (25 Marks)

1. What is cut off frequency or critical frequency (fc)? (2)
2. What are degenerate modes in a rectangular waveguide? (2)
3. Derive the expression for phase velocity in a rectangular waveguide & sketch the variation with frequency. (3)
4. Define Quality factor (Q) of a resonator. (2)
5. Give the differences between Isolator and Circulator? (3)
6. The input power in a two hole directional coupler is 1 mW. The coupler has a coupling factor of 15 dB and a directivity of 30 dB. Calculate the power in all the ports? (3)
7. Define Transit time in Reflex klystron. (2)
8. Why slow wave structure is used in TWT? Mention its characteristics? (3)
9. Define Gunn Effect? (2)
10. List the applications of Varactor diode? (3)

PART-B (5X10=50 Marks)

11. Derive the field expression for TMmn modes in parallel plate wave guide. What happens when m=0? (10)

12. a) Explain the wave impedance of rectangular waveguide in TE and TM modes? (7)
    b) Dominant mode is propagating in rectangular guide 2.2 cm X 1 cm & frequency of operation is 9 GHz. Find guide wavelength. (3)

13. For rectangular wave guide of size 3 X 1cm, frequency of propagating signal is 10 GHz. Find characteristic wave impedance, phase velocity. What will be the input VSWR if this guide is terminated in a load of 500 Ω? (10)

14. a) Derive the scattering matrix of a Magic Tee. (7)
    b) An Isolator has insertion loss of 0.5 dB, an isolation of 25 dB and VSWR of 2, Find the S-matrix. (3)

15. a) Explain the working and applications of Travelling Wave Tube (TWT)? (7)
    b) Differentiate between linear and cross field devices? (3)

16. Explain the basic principle of operation of a Gunn diode & mention its applications? (10)

17. Write short notes on the following. (5+5)
    a) Attenuation in parallel plane guides
    b) Circulators

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