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C – 2463

Reg. No. :

Name :

**Eighth Semester B.Tech. Degree Examination, May 2017
(2013 Scheme)
13.805.6 : MICROWAVE DEVICES AND CIRCUITS (T)
(Elective V)**

Time : 3 Hours

Max. Marks : 100

PART – A

Answer **all** questions.

1. What do you mean by longitudinal and transverse waves ?
2. What are resonant cavities ?
3. Why is TEM wave impossible in hollow waveguide ?
4. Explain what is meant by re-entrant cavities.
5. Explain the phenomenon of Faraday rotation.
6. Write the S- matrix for four port circulator.
7. What are the differences between two-port network and two-terminal network ?
8. List the advantages of MASERs.
9. Explain negative differential mobility.
10. What is negative resistance parametric amplifier ? **(2×10=20 Marks)**

P.T.O.



PART – B

Answer **any one full** question from **each** Module, **20 marks each**.

Module – I

11. An air-filled circular waveguide has a radius of 1.5 cm and is to carry energy at a frequency of 10 GHz. Find all TE and TM modes for which transmission is possible.

OR

12. A hybrid waveguide is constructed of two identical rectangular waveguides across each other at the center and works as four-port device. Write a general scattering matrix and then simplify it as much as possible by inspection of geometric symmetry and by use of the known phases of the electric waves. **(20×1=20 Marks)**

Module – II

13. a) Obtain the relations defining between z and S parameters.
b) Discuss the constructional features and principles of operation of Magic Tee and hybrid ring.

OR

14. a) Explain single-stub impedance matching in transmission systems. Derive the relevant equations.
b) Compare single and double stub matching. **(20×1=20 Marks)**

Module – III

15. a) Obtain the power output and efficiency of the IMPATT diode.
b) Describe the modes of operation for Gunn diodes.

OR

16. a) Discuss the principle of high mobility transistor and explain its characteristics.
b) Define and explain the terms conversion loss and noise figure of diode mixer circuits. The conversion loss of a mixer is 5 dB. Find the approximate value of noise figure. **(20×1=20 Marks)**



Module – IV

17. a) A sinusoidal input signal at frequency f_g and pump signal at frequency f_p are applied across a time varying non-linear capacitance. If the output circuit is a band-pass filter with resistive series load at frequencies $f_g + f_p$, calculate the power gain.
- b) A microwave transistor common-source oscillator is designed with small-signal transducer gain at 10 GHz as 5 dB. The $P_{sat} = 1$ Watt. Calculate the maximum efficient oscillator power gain and maximum oscillator power output.

OR

18. a) A parametric diode amplifier has $R_S = 4$ Ohm, $R_L = R_1 \neq R_2 = 0$. The characteristic impedance of the amplifier is 50 Ohm. Calculate the reflection coefficient and the power gain.
- b) Derive the Manley- Rowe energy/power relations. **(20×1=20 Marks)**

