

B. Tech 8th Semester Examination

Microwave Engineering (NS)

EEE-421(c)

Time : 3 Hours

Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all, selecting one Question from each of the Sections A, B, C and D and all the subparts of questions in section E.

SECTION - A

1. Explain the schematic illustration, properties, uses and Scattering matrix of the following microwave components:
(i) Directional Coupler (ii) Two hole coupler (iii) Magic Tee
(iv) Hybrid Ring. (20)
2. With the help of relevant diagrams, explain in detail the principle and working of microwave devices (Circulator and Gyrator) employing Faraday Rotation. (20)

SECTION - B

3. Explain in detail the construction and operation of a Gunn diode. Discuss its four frequency modes along with applications. (20)
4. (a) Explain the equivalent microwave circuit of a PIN diode. How does it differ from a conventional PN junction diode? (10)
(b) Discuss in detail the structure, field profile, V-I characteristics and applications of an IMPATT diode. (10)

SECTION - C

5. (a) What are the limitations of conventional tubes at microwave frequencies? Discuss the constructional features of TWT. (10)
(b) With the help of mathematical analysis, explain the operation of cylindrical magnetron. (10)
6. Discuss in detail the construction, operating characteristics, mathematical analysis, efficiency and equivalent circuit of a Reflex Klystron. (20)

SECTION - D

7. (a) Explain in detail the losses in micro-strip lines. (10)
(b) Derive the characteristic impedance and quality factor of micro-strip lines. (10)
8. Write detailed notes on the following:
(a) Measurement of microwave power. (10)
(b) Measurement of microwave frequency and wavelength. (10)

SECTION - E (Compulsory Question)

9. (a) Mention microwave frequency bands as per IEEE/Industry standards.
(b) Define S-parameters.
(c) Write S-matrix for a Phase Shifter.
(d) What is the use of ferrite in microwave devices?
(e) What do you mean by MASER?
(f) What are the main characteristics of strip lines?
(g) What is the difference between a Klystron oscillator and a Klystron amplifier?
(h) Write the full form of TRAP ATT and BARITT.
(i) Define VSWR.
(j) Define Quality Factor of micro-strip line. (10×2=20)