

QP Code : 8608

(3 Hours)

[Total Marks : 100

N.B. : (1) Question No. 1 is compulsory.

(2) Answer any four questions out of remaining six questions.

(3) Illustrate answers with sketches.

(4) Use of Smith chart is compulsory.

1. (a) State and explain Lorentz reciprocity theorem. 5
- (b) Explain the terms frequency pushing and frequency pulling with reference to magnetrons. 5
- (c) Differentiate between transit time devices and transferred electron devices. 5
- (d) Explain in brief point contact diode and its applications 5
2. (a) Describe the mechanism of velocity modulation in a two cavity Klystron and hence obtain an expression for the bunched beam current. Also find out condition for maximum power output. 10
- (b) With a neat diagram explain the working of a Magic Tee. Derive its scattering matrix. 10
3. (a) Derive equations for phase velocity, cutoff frequency, cutoff wavelength and field equations for rectangular waveguide. 10
- (b) Explain various types of microwave solid state devices along with their applications. 10
4. (a) A lossless line of characteristic impedance $R_c = 50\Omega$ is to be matched to a load $Z_L = 50\sqrt{2} + j(2 + \sqrt{3})\Omega$ by means of a lossless short-circuited stub. The characteristic impedance of the stub is 100Ω . Find the stub position and length so that a match is obtained. 10
- (b) Explain the working of a negative resistance parametric amplifier. 10
5. (a) Explain the procedure of measurement of dielectric constant at microwave frequency. 10
- (b) What are different microwave band classification? Give applications of various microwave bands. What is the band of rectangular waveguide with dimensions 2.3 cm and 1 cm? 10
6. (a) What is TWT? Explain its construction and amplification process. 10
- (b) Explain the working and derive S-matrix for a two-hole directional coupler. 10
7. Write short notes on :-
 - (a) Resonant re-entrant cavities 5
 - (b) Modes on Gunn diode 5
 - (c) Power dividers 5
 - (d) Microwave filters. 5