

02/06/2015

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 $R_0 = 50\Omega$ 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