

T.E. Sem 6 (Rev.)

VT Oct. 08-190

Etax

Microwave & fibre Optics Communication

01/12/08

Con. 5287-08.

(REVISED COURSE)

RC-6899

(3 Hours)

[Total Marks : 100

- N.B. :** (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Assume any **suitable** data whenever **required** but justify the **same**.

1. Attempt any **four** from the following :- 20
- (a) Explain the limitations of conventional vacuum tubes at microwave frequency.
 - (b) Describe the importance of the 'S' parameter use in microwave.
 - (c) Draw ray diagrams to illustrate the propagation path of light energy in single mode step index and single mode graded index fiber.
 - (d) Differentiate between spontaneous and stimulated emission of radiation.
 - (e) State and explain the construction of cavity resonator.
2. (a) With the help of Applegate diagram explain the operation of Reflex Klystron. 10
Show that the theoretical efficiency of the Reflex Klystron is 27.78%.
- (b) A Reflex Klystron has the following parameters :- 10
- DC accelerating voltage (V_{dc}) = 1.4 KV
 - Repeller voltage = -100V
 - Resonant frequency (f) = 8 GHz
 - Distance between cavity and repeller (d) = 2 cm
- Compute - (i) DC electron velocity
(ii) Round trip DC transit time.
3. (a) Explain the construction, working and characteristic of IMPATT diode. 10
- (b) Define group velocity and phase velocity for a wave propagating in rectangular waveguide. 3
- Derive the relation between them. 3
- A waveguide has a cut off frequency of 3.75 GHz. Find the group velocity of this rectangular waveguide at 5 GHz 4
4. (a) What are crossfield devices ? Explain the working of cavity magnetron with the help of a schematic diagrams. 10
- (b) Obtain the expression for the numerical aperture of an optical fiber in terms of refractive indices of core and cladding. An optical fiber has refractive index of 1.6 for the core and 1.4 for the cladding. Calculate the critical angle, numerical, aperture and maximum angle of acceptance. 4+6

5. (a) What are different types of dispersion mechanism seen in optical fiber ? 10
Explain them in brief.
- (b) Explain with neat diagram the double crucible method for fiber fabrication. 10
6. (a) Describe with suitable diagrams three common techniques used for mechanical splicing of optical fiber. 10
- (b) Explain the constructional details and working of a GUNN diode. 10
7. Write short notes on any **four** :- 20
- (a) Rise time budget
 - (b) Optical detectors
 - (c) Multiplexing techniques in fiber optic system
 - (d) Directional coupler
 - (e) Measurement of microwave power.
