

- f. A uniline or isolator is a _____ device
- (A) a ferrite loaded 2 port device (B) A 3 port device
(C) 4 port device (D) None of them
- g. When a transmission line is terminated by an impedance, called characteristic impedance represents _____
- (A) short circuit (B) open circuit
(C) infinite line (D) finite line
- h. An X band reflex klystron operates in the frequency range _____
- (A) 8 to 12 GHz (B) 20 to 50 GHz
(C) 4 to 6 GHz (D) 100 MHz – 200 MHz
- i. A klystron oscillator
- (A) act as a signal source in microwave generators
(B) used in optical fiber communication
(C) not suitable for microwave applications
(D) not suitable for frequency modulation
- j. A device which exhibits negative resistance it is possible to used as
- (A) an oscillator (B) an amplifier
(C) mixer (D) All of them

**Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.**

- Q.2** a. What are the different types of transmission lines used? Explain them with neat figures. (4)
- b. Derive transmission line equations for voltage and current. (6)
- c. Explain Smith Chart and explain how a normalized impedance can be obtained from it. (6)
- Q.3** a. Arrive at the solution of wave equations in a rectangular co-ordinates. Discuss the three distinct cases of propagation constant in the waveguide. (10)
- b. An air filled rectangular waveguide operates in dominant TE_{10} mode as shown in Fig.1. Its inside dimensions are 8×4 cms. Calculate
- (i) Cut off frequency
(ii) Find the phase velocity of the wave at 4 GHz
(iii) Determine the guide wave length at the same frequency. (6)

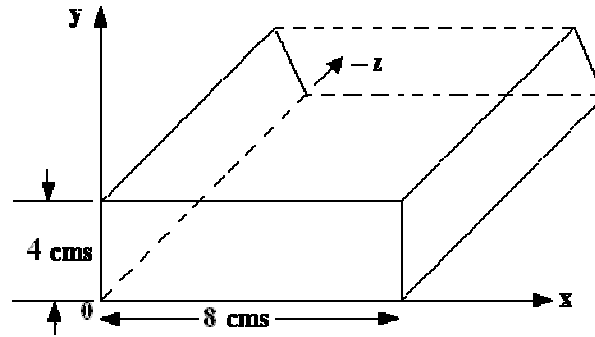


Fig.1

- Q.4** a. Derive S parameters for two port microwave junction. (8)
 b. Draw a neat diagram of directional coupler and derive S matrix for it. (8)
- Q.5** a. What are microwave solid state devices? Write a note on their applications and advantages. (8)
 b. Explain what is differential negative resistance. Explain the two valley model theory of Gunn diode. (8)
- Q.6** a. What do you understand by Apple gate diagram? With a neat diagram explain the operation of Reflex klystron. (10)
 b. Write short notes on Helix travelling wave tube. (6)
- Q.7** a. Explain linear magnetron, derive the expressions for Hull cut off voltage and Hull cut off magnetic flux density. (10)
 b. A linear magnetron has the following operating parameters
 Anode voltage $V_0 = 10 \text{ kV}$
 Cathode current $I_0 = 1\text{A}$
 Magnetic flux density $B_0 = 0.01 \text{ wb/m}^2$
 Distance between Cathode and Anode $d = 5 \text{ cms}$
 Compute the Hull cut off voltage for a fixed B_0 . (6)
- Q.8** a. Explain microstrip line with neat diagram. What are the feeding mechanisms? Explain with neat diagrams. (6)
 b. A lossless parallel stripline has a conducting strip width w . The substrate dielectric separating the two conducting strips has a relative dielectric constant ϵ_{rd} of 6 and thickness $d = 4 \text{ mm}$. Calculate the required width w of the conducting strip in order to have a characteristic impedance of 50Ω . (6)
 c. Write explanatory note on coplanar strip lines. (4)
- Q.9** a. What are the fabrication techniques involved in MMIC? (6)

- b. What are planar capacitor film? Explain with neat figures. (6)
- c. An integrated capacitor fabricated on a GaAs substrate has the following parameters

No of fingers	$N = 8$
Relative dielectric	$\epsilon_r = 13.10$
Const of GaAs	
Substrate height	$h = 0.254 \text{ cm}$
Finger length	$\ell = 0.00254 \text{ cms}$
Finger base width	$w = 0.051 \text{ cms}$
$A_1 = 0.089 \text{ pF/cm}$	$A_2 = 0.10 \text{ pF/cm}$
Is the contribution of Interior finger for $h > w$	is the contribution of 2 external fingers for $h > w$

Compute the capacitance of the interior finger. (4)