



- (i) What are different layers of ionosphere ?
- (j) What is critical frequency with respect to an ionosphere layer ?
2. (a) Define voltage reflection coefficient. Is it same as current reflection coefficient ? Explain. 4
- (b) On a lossless transmission line terminated in a load  $Z_L = 100 \Omega$ , the standing wave ratio is measured to be 2.5. Use the Smith chart to find the two possible values of  $Z_0$ . 6
3. (a) Derive field equations of a circular waveguide. Explain why are Bessel functions of the second kind not useful in the analysis of wave propagation in a hollow circular waveguide ? 6

- (b) In an air filled square waveguide with dimensions  $a = 1.2 \text{ cm}$ ,  $E_x = -10 \sin(2\pi y / a) \sin(\omega t - 150z) \text{ V/m}$ . Find
- (i) Mode of propagation,
- (ii) Cut-off wavelength,
- (iii) Calculate the frequency of operation and
- (iv) Wave impedance. 4
4. (a) In relation with directional coupler, define (i) coupling, (ii) directivity and (iii) isolation. How are these factors effect on the performance of a directional coupler ? 5
- (b) An E-plane tee has a SWR of 2.25 at port 1. When the other ports are matched terminated, calculate the power delivered to ports 2 and 3, when a matched

generator with an available power of 1 W  
is connected to port 1. Assume  $b_1 = b$ .

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5. Discuss, in brief, with suitable diagram the working of a cavity magnetron. Also, establish the relation for minimum anode potential for a  $\pi$  mode of operation. 10

6. Discuss the principles of the following terms :

(i) Gunn effect (ii) Two valley theory. 4

(b) Describe, in brief, the limited space charge accumulation mode of operation for Gunn diodes. 6

7. Discuss with neat sketches different types of horn antenna. Discuss the application of the horn and give its advantages. 10

8. Write short notes on (any two) : 5×2

(a) Stub matching

(b) Reflex klystron

(c) Line of sight propagation

(d) Measurement of antenna gain.