

Reg. No. :

--	--	--	--	--	--	--	--	--	--

**Question Paper Code: 35404**

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2022

Third Semester

Electronics and Communication Engineering

01UEC504- TRANSMISSION LINES AND WAVEGUIDES

(Regulation 2013)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. Define decibel. Calculate the  $P$  ( $mW$ ) for a gain of  $-30\text{dbm}$ .
2. List the advantages of  $m$  derived filter.
3. An open wire line having a characteristic impedance  $692\angle -12^\circ$  ohms is terminated in  $200$  ohms resistor. The line is  $100$  km long and is supplied power by a generator of  $1$  volt at  $1000\text{Hz}$ . Estimate the voltage reflection coefficient.
4. State distortion less line and mention the condition for a distortionless line.
5. Justify the reason for preferring a short circuited stub when compared to an open circuited stub.
6. Define SWR.
7. Write Maxwell's equations.
8. What are dominant mode and degenerate modes in rectangular waveguide?
9. Define the quality factor of a resonator.
10. List the applications of cavity resonator.

PART - B (5 x 16 = 80 Marks)

11. (a) Derive the characteristic impedance and propagation constant of a symmetrical T-Network. (16)

Or

- (b) Design m-derived LPF, having a  $f_c = 5000\text{Hz}$  and a design impedance of  $600\ \Omega$ . The frequency of infinite attenuation is  $1.25 f_c$ . (16)

12. (a) Derive the general transmission line equation for voltage and current at any point on a line. (16)

Or

- (b) (i) Originate the expressions for differential equations governing the voltage and current at any point on a uniform transmission line. Solve the equations to obtain the voltage and current in terms of load current and voltage. (16)

13. (a) A transmission line has a characteristic impedance of  $300\ \Omega$  and terminated in a load  $Z_L = 150 + j150\ \Omega$ . Find the following using smith chart.

(1) VSWR.

(2) Input impedance at a distance  $0.1\lambda$  from the load.

(3) Input admittance from  $0.1\lambda$

(4) Position of first voltage minimum and maximum from the load. (16)

Or

- (b) (i) Illustrate the input impedance of open and short circuited dissipation-less transmission line. (8)

- (ii) Obtain the input impedance of a Quarter wave line and Half wave line and write about its application. (8)

14. (a) (i) Derive the field expression of TM waves guided by a parallel conducting plane. (8)

- (ii) Discriminate the characteristics of TEM waves. (8)

Or

- (b) Explain wave impedance and obtain the expression of wave impedance for TE, TM and TEM waves guided along parallel planes. (16)

15. (a) A rectangular air-filled waveguide with dimension  $0.9 \text{ inch} \times 0.4 \text{ inch}$  cross section and  $12 \text{ inch}$  length is operated at  $9.2 \text{ GHz}$  with a dominant mode. Find cut-off frequency, guide wave-length, phase velocity, characteristics impedance and the loss. (16)

Or

- (b) Explain the propagation of electromagnetic waves in a cylindrical waveguide with suitable expressions. (16)
-

