Reg. No. : | | | | | | | | | | |

Question Paper Code: 41454

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2016

Fifth Semester

Electronics and Communication Engineering

14UEC504 - TRANSMISSION LINES AND WAVEGUIDES

(Regulation 2014)

Duration: Three hours | Maximum: 100 Marks

Answer ALL Questions

(Smith chart may be permitted)

PART A - (10 x 1 = 10 Marks)

1. Which stands for *dB* relative level?

   (a) *dBrn* (b) *dBa* (c) *dBr* (d) *dBx*

2. One decibel equals to

   (a) 5.356*N* (b) 8.686*N* (c) 7.635*N* (d) None of these

3. A transmission line is terminated in a load equal to its characteristic impedance. The reflection coefficient is

   (a) plus one (b) minus one (c) zero (d) infinity

4. Short-circuited stubs are preferred to open circuited stubs because the latter are

   (a) more difficult to make and connect
   (b) made of transmission line with a different Z_0
   (c) liable to radiate
   (d) incapable of giving full range of reactance

5. In a transmission line with standing waves, distance between a voltage maxima and adjacent-minima is

(a) $\lambda/4$ (b) $\lambda/8$ (c) $\lambda/2$ (d) λ

6. A Smith chart is used for solving problems in

(a) radio wave propagation (b) transmission line
(c) antenna systems (d) power transfer problems

7. Dominant mode in TE waves in parallel waveguide is

(a) TE11 (b) TE10 (c) TE01 (d) TE02

8. Relationship between λ_g, λ_0 and λ_c is

(a) $\lambda_g = \lambda_0 + \lambda_c$ (b) $\frac{1}{\lambda_g} = \frac{1}{{\lambda_0}^2} - \frac{1}{{\lambda_c}^2}$

(c) $\frac{1}{\lambda_g} = \frac{1}{{\lambda_0}^2} + \frac{1}{{\lambda_c}^2}$ (d) $\lambda_c = \lambda_g + \lambda_0$

9. Dominant mode in circular cavity resonator is

(a) TM_{010} (b) TM_{111} (c) TM_{101} (d) TM_{100}

10. Principal mode is

(a) TE mode (b) TM mode (c) TEM mode (d) None

PART - B (5 x 2 = 10 Marks)

11. Define propagation constant.

12. Define reflection coefficient.

13. Why is a quarter wave line called as impendence inverter?

14. Why are rectangular wave-guides preferred over circular wave-guides?

15. What are the root values for the TE modes?

PART - C (5 x 16 = 80 Marks)

16. (a) (i) Design a constant - k low pass filter and derive the expression for phase shift and attenuation. (10)

(ii) At what frequency will a prototype T-section low pass filter having a cut off frequency f_c , have an attenuation of 10 dB? (6)

41454

Or

(b) Derive an m-derived band pass constant–k filter. (16)

17. (a) A transmission line has the following primary constants measured per *km*, R =10.15 Ω, L = 3.93 mH, C = 0.00797μF, G = 0.29μmho. Determine Z_0 and propagation constant at a frequency of 796H_z. Also calculate at the sending end if the line is terminated in its characteristic impedance. (16)

Or

(b) Obtain the general expression for current and voltage at any point along a transmission line. (16)

18. (a) A lossless transmission line with Z_0 = 75 Ω and of electrical length l = 0.3λ is terminated with load impedance of Z_R = (40 + j20) Ω. Determine the reflection coefficient at load, SWR of line, input impedance of the line. (16)

Or

(b) Using Smith chart, determine the length and location of the stub to produce an impedance match on a line of R_0 = 600Ω terminated in $200\angle 0°\Omega$. The stub is short circuited at the other end. (16)

19. (a) Derive the field component of the wave propagating between parallel planes. (16)

Or

(b) Derive the electromagnetic field expressions for TM waves guided by a parallel conducting planes. (16)

20. (a) Obtain the electromagnetic field equations for TE waves in rectangular waveguides. (16)

Or

(b) Explain in detail about

(i) Excitation of waveguides (8)

(ii) Resonant cavities (8)

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