Hall Ticket No | | | | | | | | | | | Question Paper Code: AEE017

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Four Year B.Tech III Semester End Examinations (Regular) - November, 2018

Regulation: IARE – R16

ELECTRICAL TECHNOLOGY

Time: 3 Hours **(ECE)** **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Determine the transient response of current and voltage in R–L series circuit using differential equations. **[7M]**

   (b) A coil of inductance 50 mH and resistance 5Ω is connected to a 110 V, DC supply. Determine (i) The final value of current (ii) The value of current after 4 ms (iii) The value of the voltage across the resistor after 6 ms. **[7M]**

2. (a) Brief the procedure to solve differential equations by using Laplace transforms. **[7M]**

   (b) A series RC circuit has a step input V applied to it. Use Laplace transforms to determine an expression for the current i flowing in the circuit given that when time t = 0, i = 0. **[7M]**

UNIT – II

3. (a) Explain the hybrid parameters of a two port network. **[7M]**

   (b) For a series connected two port network, show that the overall impedance parameter matrix is simply the sum of impedances matrices of each individual network. **[7M]**

4. (a) Derive the expressions for transmission parameters using terminal variables shown in the Figure 1. **[7M]**

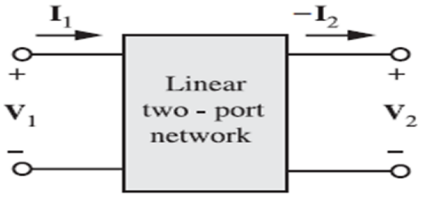

Figure 1

   (b) Find the Z-parameters for the two-port network shown in Figure 2. **[7M]**

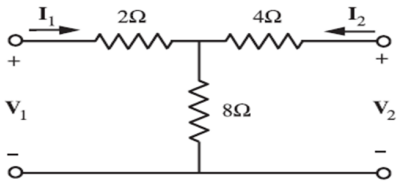

Figure 2

UNIT – III

5. (a) Classify the types of attenuators and briefly explain any two types of attenuators. **[7M]**

   (b) A symmetrical π-attenuator pad has a series arm of 500Ω resistance and each shunt arm of 1 kΩ resistance. Determine (i) The characteristic impedance (ii) The attenuation (in dB) produced by the pad. **[7M]**

6. (a) Derive the values of L, C and cutoff frequency of constant - k low pass filter. **[7M]**

   (b) Design a symmetrical lattice attenuator to have characteristic impedance of 800 Ω and attenuation of 20 dB. **[7M]**

UNIT – IV

7. (a) Derive the armature torque expression of a dc motor. **[7M]**

   (b) A 240 V, 4-pole shunt motor has N = 1500 rpm, output = 15 HP, I_a = 50 A, Ra = 0.1Ω, I_{sh} = 1A. Brush drop 1V/brush, winding = wave, Z = 540. Find useful torque, total torque, and useful flux per pole, rotational losses and efficiency. **[7M]**

8. (a) Explain the classification of DC generators with neat circuit diagrams. **[7M]**

   (b) A shunt generator supplies a 20 kW load at 200 V through cables of resistance, R = 100 mΩ. If the field winding resistance, R_f = 50Ω and the armature resistance, R_a = 40 mΩ, determine (i) The terminal voltage (ii) The e.m.f. generated in the armature. **[7M]**

UNIT – V

9. (a) Derive the emf equation of the transformer. **[7M]**

   (b) A 200KVA, single phase transformer has an efficiency of 98% at full load. The maximum efficiency occurs at 3/4th full load. Calculate: **[7M]**

   i. The iron losses

   ii. The copper losses at full load

   iii. The efficiency at half load assuming a power factor of 0.8 at all loads.

10. (a) Draw and explain the approximate equivalent circuit of a transformer with reference to the primary side. **[7M]**

    (b) A single phase, 250/500V transformer gave the following results: **[7M]**

    Open Circuit test: 250V, 1A, 80W (on low voltage side.)

    Short circuit test: 20V, 12A, 100W (with low voltage winding short circuited)

    Draw the equivalent circuit by showing all the circuit constants.