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

INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)

B.Tech III Semester End Examinations (Supplementary) - February, 2018
Regulation: IARE – R16
ELECTRICAL TECHNOLOGY
(Electronics and Communication Engineering)

Time: 3 Hours   **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) The following Figure 1 represents a parallel RLC circuit where R=0.1Ω, L=0.5H and C is 1F. Capacitor C has an initial voltage of 10V (polarity being shown in the Figure 1). The switch K is closed at time t=0. Obtain V(t). **[7M]**
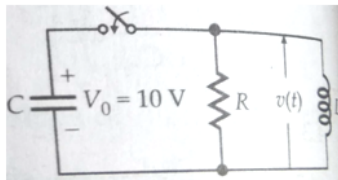

Figure 1

(b) In the following Figure 2, find the expression for currents and voltages through the inductor L and resistances R_1 and R_2 after the switch is opened. Assume steady state initial condition with the switch closed at t=0⁻. [L=1H, $R_1=R_2=10Ω$]. **[7M]**
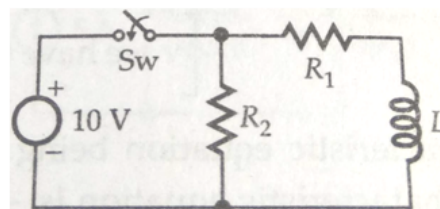

Figure 2

2. (a) A two mesh network is shown in the following Figure 3; obtain the expression for $I_1(s)$ and $I_2(s)$ when the switch is closed. **[7M]**
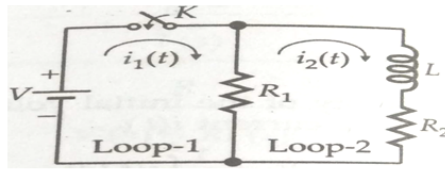
Figure 3

(b) Assuming the initial current to be 2A through the inductor, find $V_0(t)$ in the Figure 4. What will be $V_0(t)$ if the supply is $10e^{-t}$ u (t)? **[7M]**
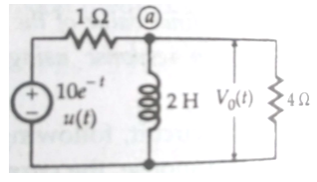

Figure 4

UNIT – II

3. (a) Obtain the open circuit parameters and loop equations of the network shown in the Figure 5. **[7M]**
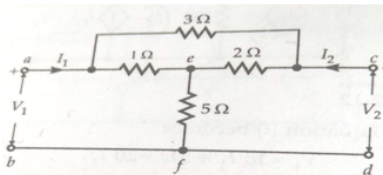

Figure 5

(b) Find ABCD parameters of the following lattice network shown in Figure 6. **[7M]**
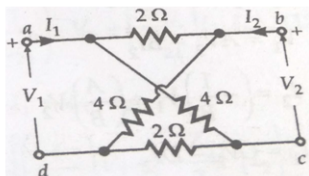

Figure 6

4. (a) 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]**

(b) In the network of the following Figure 7, $r_1=10\Omega$, $r_2=40K\Omega$, $\beta=3\text{x}10^{-4}$, $\alpha=25$, $R_L=50K\Omega$. **[7M]**
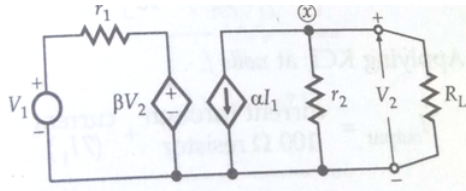Find: (i) h-parameters, (ii) voltage gain, (iii) input impedance.

Figure 7

UNIT – III

5. (a) Design a lattice and a T-type attenuator if the characteristic resistance is 200 ohm and the attenuation 20dB. **[7M]**

(b) Design an L-section attenuator which has input resistance, load resistance and the image resistance looked from the input terminals as 200 ohms and the attenuation is 10 when the L-section face (i) Input terminals (b) Output terminals. **[7M]**

6. (a) Design a low-pass constant-K type T-section and π-section filters with $f_c=3$ KHz and nominal characteristic impedance 500 ohms. Also determine the frequency at which the filter offers attenuation of 20dbs. Determine β for f=2KHz and f=10KHz. **[7M]**

(b) Design a band stop, constant-K filter with cut off frequencies of 4KHz and 10KHz and nominal characteristic impedance of 500Ω. **[7M]**

UNIT – IV

7. (a) Classify DC generators based upon the excitation and write the voltage and current relations. **[7M]**

(b) The armature of a 6 pole DC generator has a wave winding containing 664 conductors. Calculate the generated e.m.f when the flux per pole is 0.06Wb and the speed is 250 rpm. At what speed must the armature be driven to generate an e.m.f of 250 V if the flux per pole is reduced to 0.058Wb? **[7M]**

8. (a) What are the various testing methods for a DC machine and explain Swinburne's test in detail. **[7M]**

(b) A 6 pole lap wound DC shunt motor has 500 conductors in the armature. The resistance of armature path is 0.05 ohm and field resistance is 25 ohm. Find the speed of the motor when it takes 120A from dc mains of 120V. Flux per pole is $2\text{X}10^{-2}$Wb. **[7M]**

UNIT – V

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

(b) A step down transformer has a transformation ratio of 1/4 and takes a no-load current of 1A, at a power factor of 0.2 lag. Determine the primary current and power factor, when the transformer is supplying a load of 35A at 0.8 power factor lagging. **[7M]**

10. (a) In a 25kVA, 2000/200 V transformer, the iron and copper losses are 350 Watts and 400 Watts respectively. Calculate the efficiency at full load and 0.8 power factor lagging. **[7M]**

(b) Explain the constructional details of any two type of transformers. **[7M]**

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