NETWORK THEORY BRANCH: EEE Max Marks: 100 Time: 3 Hours Q.CODE: HB604 Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III. The figures in the right hand margin indicate marks. Part-I Part-I Questions (Answer All-10) (2 x 10) Part-I Question of coupling and its physical significance? Who coupled coils with $L_1 = 0.6 = L_2$ have a coefficient of coupling K=0.8. What is the ne turn ratio $\frac{N_1}{N_2}$? Prove that resonant frequency is the geometric mean of the two half power requencies? What is the fourier transform of step function? What is the relation between resonant frequency and quality factor? If is simple of the two half power requencies? What is the relation between resonant frequency and quality factor? If if is order linear system is initially relaxed . For a unit step signal u(t), the response is (t)= (1-e-3t) for t>0. If a signal 3u(t)+ δ (t) is applied to the same initially relaxed system what is the necessary and sufficient condition of Positive real function? In initially relaxed RC-series network with R=2M Ω and c=1 μ F is switched on to a 10V tep input. What is the Voltage across the capacitor after 2 seconds? Part-II Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) In a two-element series network, voltage v(t) is applies, which is given by, which is given by,
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The unit impulse response of current of a circuit having R=1 Ω & C = 1F in series is
iven by $[\delta(t)-\exp(-t)u(t)]$. Find the current expression when the circuit is driven by the
oltage given as [1-exp(-2t)] u(t).
ind the network for the following in Foster 2 and Cauer 1 Form $Z(s) = \frac{2(s+1)(s+3)}{s(s+2)}$
he network equation for two port network give the current I1 and I2 at the two ports as $I_1 = 0.25V_1 - 0.2V_2$ and $I_2 = -0.2V_1 + 0.1V_2$
Determine the ABCD parameters for the Network and hence write the network
quation. 210 210 210 210 210

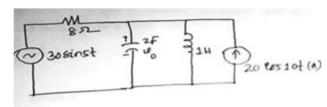
frequencies. g) Determine the impulse response of the linear system whose transfer function given as

$$H(j\omega) = \frac{3 + 2j\omega}{(j\omega)^2 + 6j\omega + 8}$$

- h) Write the limitation pole zero in a transfer function?
- Synthesis the Foster II from network when its admittance function is given as i)

$$Y(s) = \frac{s(s^2+3)(s^2+5)}{(s^2+2)(s^2+4)}$$

- The current in a 10 ohm resistor is i(t)=10e^{-2t}u(t)(A). What is the energy associated j) with the frequency band $0 \le \omega \le 2$ rad/s?
- Find Vo using Thevenin's theorem in fig -1. 210



A coil of inductance L and resistance R, in series with a capacitor is supplied at a constant voltage from a variable frequency source. Find the values of that frequency, in terms of R , L and ω_0 at which the circuit current would be half as much as at resonance.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

- For a series RLC circuit with R=2 ohm, L=1mH and C=0.4µF and a supply voltage (16) ₂₁₀ Q3 v(t)=20 sinwt, find:(a) the resonant frequency ω_o , (b) The half power frequencies, (c) The quality factor and bandwidth, (d) The amplitude of the current at $^{\omega_o}$.
- Q4 Write a short note on Cut set and Tie set matrix with examples. a)
- (8)b) Show that sum of energy stored by the inductor and capacitor connected in parallel (8)RLC circuit at resonance at any instant is constant and is given by CV².
- Q5 Design a high pass, constant-k type filter with T- section and π-section when the cut-off (16)frequency is 8 KHz and the nominal characteristic impedance is 500Ω . Also determine the attenuation and phase constant for frequencies 5 KHz , 20 KHz.
- Q6 A two terminal network consists of a coil with resistance R and inductance L Henries (16)and it is shunted by a capacitor C. The poles and zero of the driving point impedance function z(s) are poles $-\frac{1}{2} \pm j \frac{\sqrt{3}}{2}$, zero at -1.lf (j0) = -1, Determine the values of R, L and C.