

07 AUG 2023

Reg. No.

Question Paper Code

12120

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2023
Second Semester

Electrical and Electronics Engineering

(Common to Electronics and Instrumentation Engineering & Instrumentation and Control Engineering)

20EEPC201 - ELECTRICAL CIRCUIT ANALYSIS

(Regulations 2020)

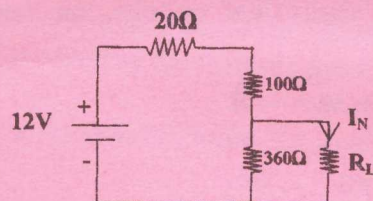
Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

- | | <i>Marks,
K-Level, CO</i> |
|---|-------------------------------|
| 1. An electric appliance consumes 1.2kWh in 30mins at 120V. What is current drawn by the appliance? | 2,K2,CO1 |
| 2. Define RMS voltage. | 2,K1,CO1 |
| 3. Determine the value of I_N for the circuit shown in figure. | 2,K2,CO2 |



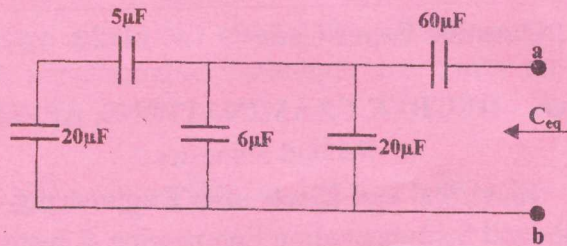
- | | |
|--|----------|
| 4. State reciprocity theorem. | 2,K1,CO2 |
| 5. Distinguish between steady state and transient state. | 2,K2,CO3 |
| 6. In a series RLC circuit, $L=2H$ and $C=5\mu F$. Determine the value of R to give critical damping. | 2,K2,CO3 |
| 7. Write dot rule. | 2,K1,CO4 |
| 8. Draw the frequency response characteristics of parallel resonant circuit. | 2,K1,CO4 |
| 9. What are the advantages of three phase system? | 2,K1,CO5 |
| 10. Write the effect of power factor in energy consumption billing. | 2,K2,CO5 |

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

- | | |
|---|----------|
| 11. a) (i) Three loads A, B, C are connected in parallel to a 240V source. Load A takes 9.6kW, load B takes 60A, and load C has a resistance of 4.8Ω . Calculate R_A and R_B , and the total current, total power and equivalent resistance. | 8,K2,CO1 |
|---|----------|

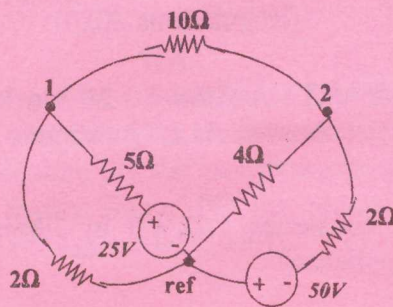
(ii) Find the equivalent capacitance C between terminals A and B of figure shown.



OR

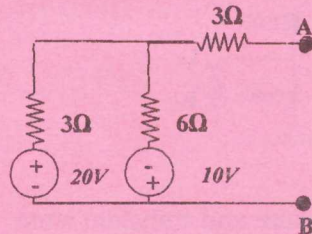
b) Solve the network given below by the node voltage method.

13,K3CO1



12. a) Obtain the Thevenin and Norton equivalent circuits for the active network shown below.

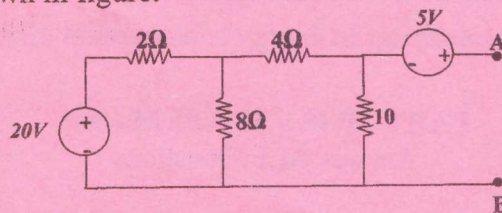
13,K3,CO2



OR

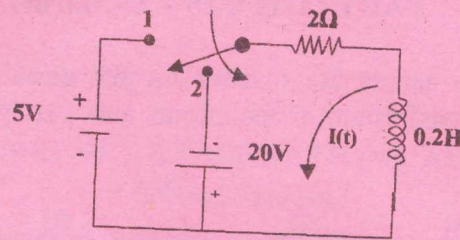
b) Determine the value of resistance that may be connected across A and B so that maximum power is transferred from the circuit to the resistance. Also, estimate the maximum power transferred to the resistance shown in figure.

13,K2,CO2



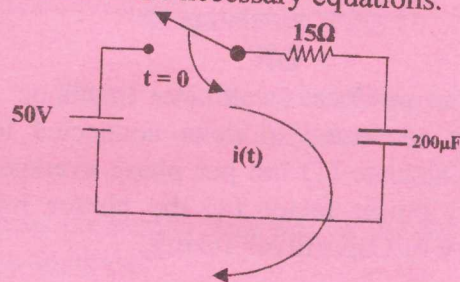
13. a) In the RL circuit shown in figure. The switch is closed to position-1 at $t=0$. After $t=100\text{ms}$, the switch is changed to position-2. Find $i(t)$ and sketch the transient.

13,K3,CO3



OR

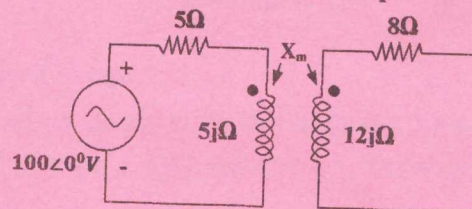
- b) In the circuit shown in figure. Determine the transient current after switch is closed at time $t=0$, given that initial charge of $100\mu\text{C}$ is stored in the capacitor. Derive the necessary equations. 13,K3,CO3



14. a) Determine the resonant frequency, bandwidth and quality factor of the coil for the series resonant circuit considering $R=10\Omega$, $L=0.1\text{H}$ and $C=10\mu\text{F}$. Derive the formula used for bandwidth. 13,K2,CO4

OR

- b) Find the mutual reactance X_m in the coupled coils shown in figure. 13,K3,CO4



15. a) (i) A symmetrical three phase; three wire 440V supply to a star connected load. The impedance in each branch are $Z_R = 2 + 3j\Omega$, $Z_Y = 1 - 2j\Omega$ and $Z_B = 3 + 4j\Omega$. determine its equivalent delta connected load. 7,K2,CO5

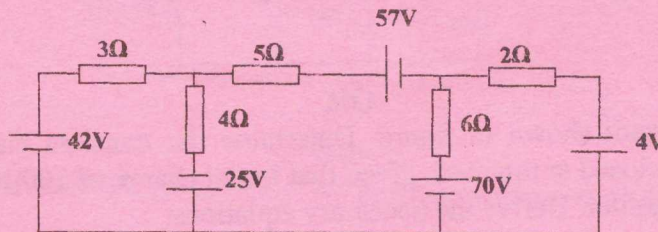
- (ii) A three phase, balanced delta-connected load of $4+8j\Omega$ is connected across a 400V, 3 ϕ balanced supply. Determine the phase currents and line currents. (phase sequence is RYB). 6,K2,CO5

OR

- b) Show that three phase power can be measured by two wattmeters. Draw the Phasor diagrams. Derive an expression for power factor in terms of wattmeter readings. 13,K2,CO5

PART - C (1 × 15 = 15 Marks)

16. a) Find the voltage across 5Ω resistor for the circuit shown in figure. *15,K3,CO2*
Using source transformation technique and verify the results using mesh analysis.



OR

- b) The two wattmeter produces wattmeter readings $P_1=1560\text{W}$ and $P_2=2100\text{W}$ When connected to delta connected load. If the line voltage is 220V , Calculate (1) the per phase average power (2) total reactive power (3) Power factor (4) the phasor impedance. Is the impedance inductive or Capacitive? Justify. *15,K3,CO5*