

1st SEMESTER, B. Tech. (PART –B : Electrical)
MID-SEMESTER EXAMINATION, JANUARY 2023

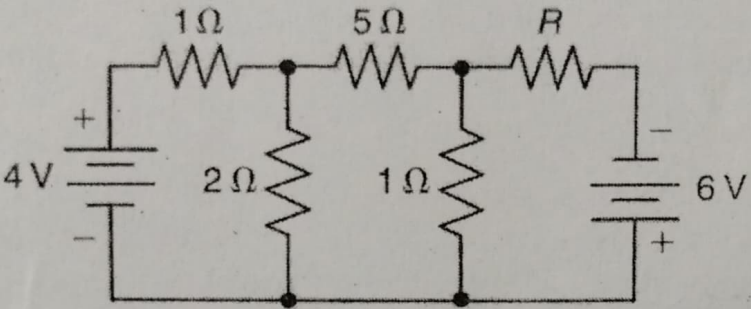
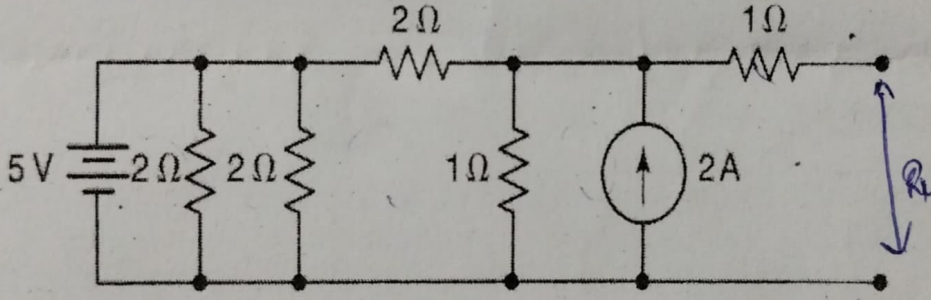
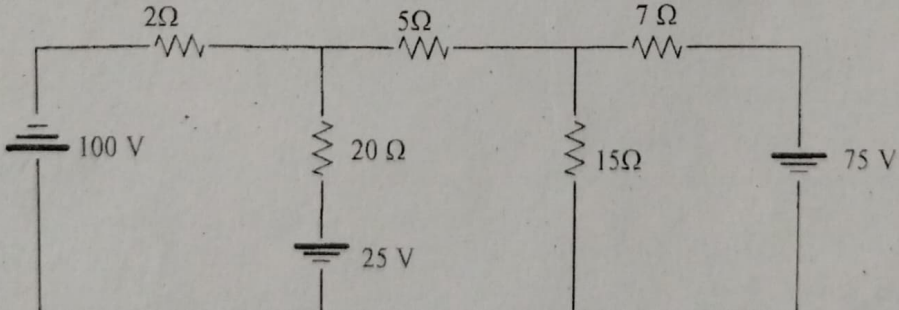
Course Code: FCEC003

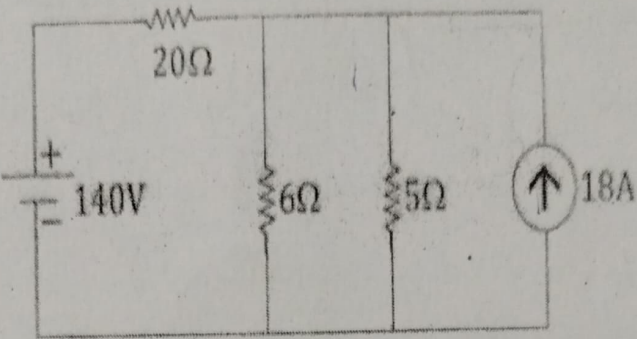
Course Title: Electronics & Electrical Engineering

Time: 1.5 Hours

Max. Marks: 15

Note: Attempt all questions. Missing data/ information if any, maybe suitably assumed

Q. No.	Questions	Marks	COs
1a	<p>Find the value of R in the circuit of Fig.1 such that maximum power transfer takes place for resistor R. Also, calculate the amount of maximum power?</p>  <p style="text-align: center;">Fig.1</p>	1.5	1
1b	<p>Analyze the circuit and find <u>Norton's equivalent circuit</u> for the network shown in the Fig.2.</p>  <p style="text-align: center;">Fig.2</p>	1.5	1
2a	<p>Apply superposition theorem to find the value of the current flowing through 20 ohm resistor in the circuit shown in Fig.3.</p>  <p style="text-align: center;">Fig. 3</p>	1.5	1

2b	Find the current delivered by 140 V source in the circuit shown in Fig.4.	1.5	1
 <p style="text-align: center;">Fig.4</p>			
3a	Prove that in a purely inductive circuit current lags by 90° from the voltage. Also draw the waveform for the voltage and the current.	1.5	2
3b	Two coils of impedance $25.23\angle 37^\circ$ and $18.65\angle 68^\circ$ ohms are connected in series across a 230-V, 50-Hz supply. Find the total impedance, current, power factor, apparent power, active power and reactive power.	1.5	2
4a	A choke coil is connected in series with a $20\ \mu\text{F}$ capacitor. With a supply voltage of 200 V, it is found that the circuit takes its maximum current of 50 A when the supply frequency is 100 Hz. Calculate (i) resistance and inductance of the choke coil and (ii) voltage across the capacitor.	1.5	2
4b	Three coils, each having a resistance of $20\ \Omega$ and an inductive reactance of $15\ \Omega$, are connected in star to a 400 V, 3-phase, 50 Hz supply. Calculate (i) the line current (ii) power factor and (iii) power supplied.	1.5	2
5a	Explain the role of magnetic core in the transformer.	1.5	1
5b	Draw a labelled diagram of DC motor and explain various parts in it.	1.5	1

END-SEMESTER EXAMINATION, March- 2023

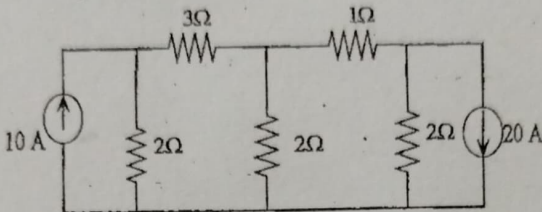
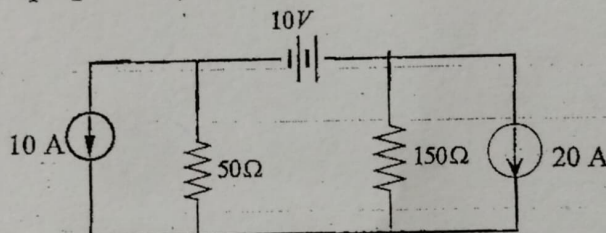
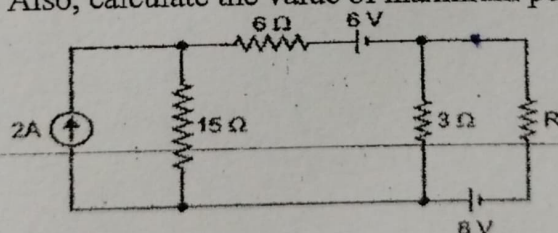
Course Code- FCEC003

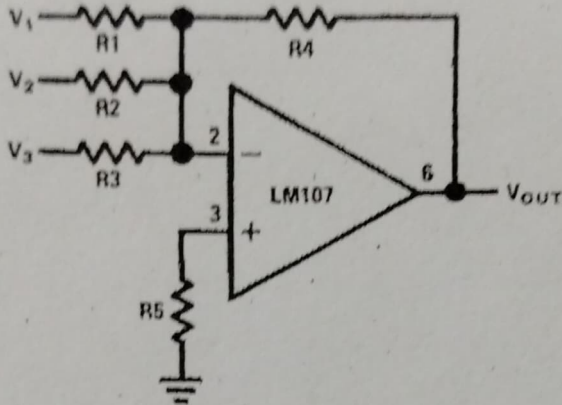
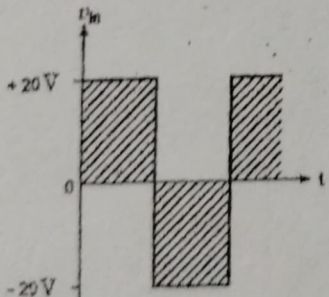
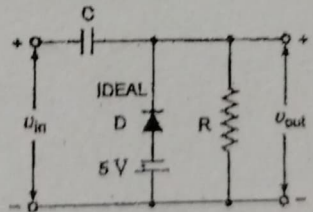
Course Title- Electronics and Electrical Engineering

Time: 3 Hours

Max Marks: 40

Note : Attempt all the five questions Missing data/information (If any), may be suitably assumed & mentioned in the answer.

Q. No.	Questions	Marks	CO
Q.1	Attempt any 2 parts of the following		
1 a	<p>Determine the current flowing through $1\ \Omega$ resistor of the circuit shown in Fig.1, using Nodal analysis.</p>  <p>Fig. 1</p>	4	CO3
1 b	<p>Determine the current flowing through $150\ \Omega$ resistor of the circuit shown in Fig.2, using superposition theorem.</p>  <p>Fig. 2</p>	4	CO3
1 c	<p>Calculate the value of R which will absorb maximum power in the circuit shown in Fig. 3. Also, calculate the value of maximum power.</p>  <p>Fig. 3</p>	4	CO2
Q.2	Attempt any 2 parts of the following		
2 a	<p>An inductive coil of inductance $0.04\ \text{H}$ and resistance of $25\ \Omega$ has been connected in series with another inductive coil of inductance $0.2\ \text{H}$ and resistance $15\ \Omega$. The whole circuit is energized from $230\ \text{V}$, $50\ \text{Hz}$ supply. Calculate: (i) voltage across each coil (ii) power factor of the circuit.</p>	4	CO3
2 b	<p>Prove that the average power in an ac circuit is equal to $VI\cos\phi$. Explain the significance of $\cos\phi$ in the expression.</p>	4	CO3
2 c	<p>A 3-phase, $400\ \text{V}$, $50\ \text{Hz}$ ac supply is feeding a 3-phase, delta-connected load with each phase having a resistance of $25\ \Omega$, an inductance of $0.15\ \text{H}$.</p>	4	CO4

	Calculate: line current, active power and reactive power.		
Q.3	Attempt any 2 parts of the following		
3a	Explain the working of single phase transformer using neat diagram.	4	CO2
3b	Describe operating principle and construction of DC Machine.	4	CO2
3c	Draw a labelled diagram for characteristic curve of the pn junction diode. Write the diode equation and briefly explain the terms used in the equation.	4	CO1
Q.4	Attempt any 2 parts of the following		
4a	<p>Calculate the output voltage of the summing amplifier shown in Fig 4: $(V_1=1V; V_2=2V; V_3=4V; R_1=200\text{ K}\Omega; R_2=500\text{ K}\Omega; R_3=1\text{ M}\Omega; R_4=1\text{ M}\Omega; R_5=0\Omega)$</p>  <p style="text-align: center;">Fig. 4</p>	4	CO4
4b	<p>Draw the circuit of a npn transistor in CE configuration and</p> <ol style="list-style-type: none"> Sketch the input and output characteristics. Define and indicate saturation region, active region and cutoff region. 	4	CO3
4c	<p>Sketch V_{out} for the clamper circuit shown in Fig. 5(b). The applied input waveform shown in Fig. 5(a).</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>(a)</p> </div> <div style="text-align: center;">  <p>(b)</p> </div> </div> <p style="text-align: center;">Fig. 5</p>	4	CO2
Q.5	Attempt any 2 parts of the following		
5a	Implement the logic function $F = A'B + AB'$ using 2-input NAND gates only.	4	CO5
5b	Draw the circuit diagram for a full subtractor circuit and derive the logical expression for difference and borrow bits.	4	CO4
5c	<p>Simplify the function using K-Maps $F(A,B,C,D) = \sum m(0,1,2,3,5,7,9,11,13,15) + d(8,10,14)$</p>	4	CO5