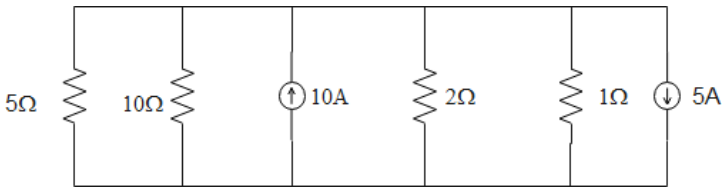
SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR-517 583

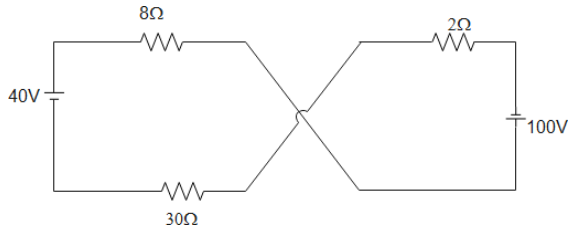
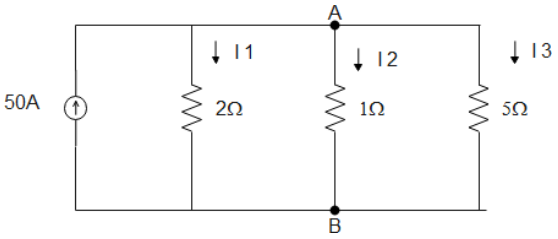
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

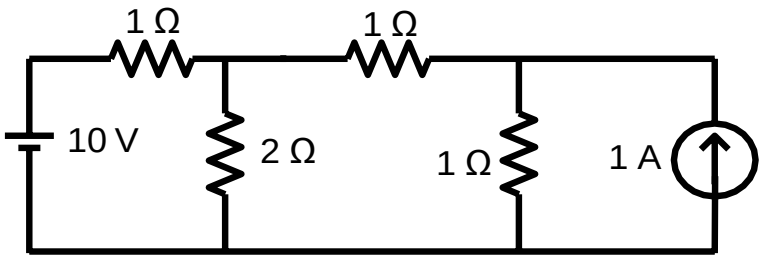
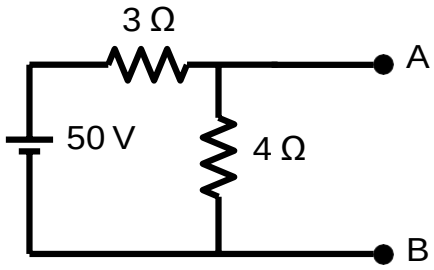
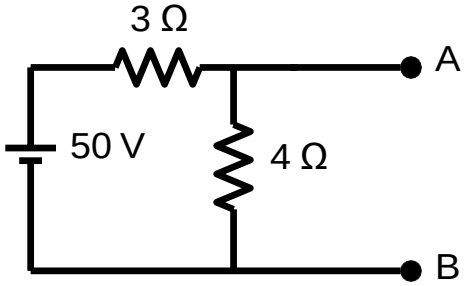
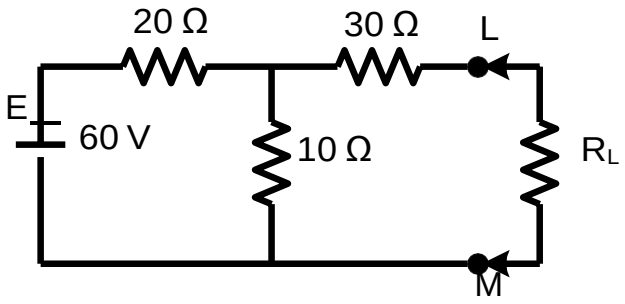
Subject with Code : Basic Electrical and Electronics Engineering (20EE0251)
Course & Branch. B.Tech - MECHANICAL
Year & Semester : I B.Tech. & I - Semester **Regulation:** R20

PART-A
UNIT-I
INTRODUCTION TO ELECTRICAL ENGINEERING

1	a)	State and explain Ohm's law.	[L1] [CO1]	**[5M]**
	b)	For the given circuit as shown in figure find the voltage across 10 ohm resistor and the current passing through it. 	[L1] [CO1]	**[5M]**
2		State and prove Kirchhoff's laws and explain with suitable example.	[L2] [CO1]	**[10M]**
3	a) b)	Explain Basic circuit components in detail. Define independent source and dependent source what are the types of dependent sources.	[L2] [CO1] [L2] [CO1]	**[5M]** **[5M]**
4		Explain the following in detail i) Resistive networks ii) Inductive networks iii) Capacitive networks	[L1] [CO1]	**[10M]**
5	a) b)	Write the derivation for equivalent resistance in series circuit. A 5ohm , 10 ohm ,20 ohm, resistors are connected in series across 120V DC supply calculates Total Resistance, Total current, Voltage drop across each resistor.	[L3] [CO1] [L4] [CO1]	**[5M]** **[5M]**
6		Derive the expression of Star-Delta transformation and Delta to star transformation	[L4] [CO1]	**[10M]**
7		Explain in detail about RMS value, Average value, and Form Factor and Peak factor, peak value.	[L2] [CO1]	**[10M]**

8	a)	Find the voltage across 30 ohm resistor and current across 30 ohm resistor in the given circuit as shown below.  	[L2] [CO1]	**[5M]**
	b)	Write the derivation of RMS Value of Alternating voltage.	[L3] [C01]	**[5M]**
9	a)	Write the derivation of Average value of Alternating voltage and currents.	[L2] [CO1]	**[5M]**
	b)	Determine the current in all resistors in the circuit as shown in fig.  	[L2] [CO1]	**[5M]**
10		Explain principle of AC voltages with neat diagram and waveform.	[L2] [CO1]	**[10M]**

UNIT - II
NETWORK THEOREMS &DC GENERATORS

1	a)	State Super position theorem	[L1] [CO2]	**[2M]**
	b)	Calculate the current in 2Ω resistor in the given circuit using super position theorem. 	[L3] [CO2]	**[8M]**
2	a)	State Thevenin's theorem	[L1] [CO2]	**[2M]**
	b)	Find the Thevenin's equivalent circuit across AB for the circuit shown. 	[L3] [CO2]	**[8M]**
3	a)	State Norton's theorem.	[L1] [CO2]	**[2M]**
	b)	Find Norton's equivalent circuit across AB for the circuit shown. 	[L3] [CO2]	**[8M]**
4		Determine the maximum power delivered to the load resistance R_L 	[L3] [CO2]	**[10M]**
5		State and derive Reciprocity theorem.	[L3] [CO2]	**[10M]**

6		Write the constructional features of a DC machine with neat diagram	[L3] [CO2]	**[10M]**
7		Explain the principle and operation of DC generator.	[L2] [CO2]	**[10M]**
8	a) b)	Derive the EMF equation of a DC Generator A 4-pole lap wound dc generator has a useful flux of 0.07wb per pole Calculate the generated emf when it is rotated at speed of 900rpm with the help of prime mover. Armature consists of 440 number of conductors calculate the generated emf, if lap wound is replaced by wave wound?	[L4] [CO2] [L4] [CO2]	**[5M]** **[5M]**
9		Explain a) Separately excited Dc Generator b) Shunt DC Generator c) Series Dc Generator d) Compound Dc Generator e) Self excited DC Generator.	[L1] [CO2] [L1] [CO2] [L1] [CO2] [L1] [CO2] [L1] [CO2]	**[2M]** **[2M]** **[2M]** **[2M]** **[2M]**
10	a) b)	Explain Long Shunt Compound Generator and short shunt generator with neat diagram List the applications of different types of dc generators.	[L3] [CO2] [L5] [CO2]	**[5M]** **[5M]**

UNIT – III

DC MOTORS & TRANSFORMERS

1	a)	Discuss about the principle of operation of DC motors	[L5] [CO3]	**[5M**
	b)	Calculate the value of torque established by the armature of a 4-pole DC motor having 774 conductors, 2 paths in parallel, 24mwb flux per pole when the total armature current is 50A.	[L5] [CO3]	**[5M]**
2		A 220V shunt motor takes a total current of 80A and runs at 800 RPM. Shunt field resistance and armature resistance are 50Ω and 0.1Ω, respectively. If iron and friction losses amount to 1600W. Find (i) Copper losses (ii) Armature torque (iii) Shaft torque (iv) Efficiency.	[L5] [CO3]	**[10M]**
3	a)	Derive Torque equation of dc motor.	[L3] [CO3]	**[5M]**
	b)	The counter EMF of Shunt motor is 227 V. The field resistance is 160Ω and field current 1.5A. If the line current is 36.5A, find the armature resistance also find armature current when the motor is stationary.	[L5] [CO3]	**[5M]**
4	a)	Explain about constructional details of dc motor.	[L2] [CO3]	**[5M]**
	b)	A 6 pole lap wound shunt motor has 500 conductors, the armature and shunt field resistances are 0.05 Ω and 25 Ω, respectively. Find the speed of the motor if it takes 120 A from dc supply of 100 V. Flux per pole is 20 mWb.	[L5] [CO3]	**[5M]**
5		Briefly discuss about various types of DC motors with neat sketches.	[L1] [CO3]	**[10M]**
6	a)	Derive EMF equation of a transformer	[L3] [CO3]	**[6M]**
	b)	A 100 kVA, 11000/400 V, 50 Hz transformer has 40 secondary turns. Calculate the number of primary turns and primary and secondary currents.	[L4] [CO3]	**[4M]**
7	a)	Explain the constructional details of transformer.	[L2][CO3]	**[6M]**
	b)	A 20 kVA, 2000/200V, 50Hz transformer has 66 secondary turns. Calculate the number of primary turns and primary and secondary currents. Neglect losses.	[L4] [CO3]	**[4M]**
8		Explain in detail about various transformer losses.	[L2] [CO3]	**[10M]**
9	a)	Derive the condition for maximum efficiency of the transformer.	[L3] [CO3]	**[5M]**
	b)	Discuss about the voltage regulation of the transformer.	[L3] [CO3]	**[5M]**
10	a) b) c) d) e)	Enumerate the types of DC motors. List the application of DC motors. Write the expression for transformer ratio in terms voltage, current and turns. What is working principle of transformer? Enumerate the various losses associated with transformer.	[L1] [CO3] [L1] [CO3] [L5] [CO3] [L1] [CO3] [L1] [CO3]	**[2M]** **[2M]** **[2M]** **[2M]** **[2M]**

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PART-B
UNIT –I
SEMICONDUCTOR DEVICES

1	a)	Distinguish between conductors, semiconductors and insulators.	[L2] [CO5]	**[5M]**
	b)	With a neat sketch of atomic structure, discuss why an intrinsic semiconductor is relatively a poor conductor of electricity.	[L2] [CO5]	**[5M]**
2		Discuss the conduction properties of semiconductors and explain the process of generation and recombination of an electron-hole pair.	[L2] [CO5]	**[10M]**
3		Distinguish between intrinsic and extrinsic semiconductors and explain the process of conduction in each of them.	[L2] [CO5]	**[10M]**
4	a)	Define Doping and explain about P-and N-type semiconductors.	[L1] [CO5]	**[5M]**
	b)	Explain in detail about diffusion current.	[L2] [CO5]	**[5M]**
5	a)	Explain the working of a PN junction diode under forward and reverse bias.	[L2] [CO5]	**[6M]**
	b)	Sketch the V-I Characteristics of a PN JunctionDiode.	[L3] [CO5]	**[4M]**
6	a)	Explain about drift current with expressions.	[L2] [CO5]	**[6M]**
	b)	List out the Diode Specifications and Diode Applications.	[L1] [CO5]	**[4M]**
7	a)	Explain the working principle of Half Wave Rectifier with neat circuit diagram. Also draw its input and Output waveforms.	[L2] [CO5]	**[5M]**
	b)	Define ‘Ripple Factor’ and derive an expression for ripple factor of Half wave rectifier.	[L3] [CO6]	**[5M]**
8	a)	With a neat circuit diagram, explain the operation of a full wave rectifier.	[L2] [CO5]	**[5M]**
	b)	Define ‘Ripple Factor’ and derive an expression for ripple factor of a full wave rectifier.	[L1] [CO6]	**[5M]**
9	a)	Explain the working principle of Bridge Rectifier with neat circuit diagram. Also draw its input and output waveforms.	[L2] [CO5]	**[5M]**
	b)	Explain the working principle of Full wave rectifier with a capacitor filter.	[L2] [CO5]	**[5M]**
10	a)	Draw and explain the V-I characteristics of Zener diode.	[L1] [CO5]	**[5M]**
	b)	Show that the Zener diode can be used as a Voltage regulator with neat diagram.	[L1] [CO5]	**[5M]**

UNIT –II
BJT

1	a)	What is a Bipolar junction Transistor? Mention its types.	[L1] [CO5]	**[4M]**
	b)	Discuss the operation of NPN transistor with neat schematic diagram.	[L2] [CO5]	**[6M]**
2	a)	Explain the construction of an NPN transistor and give the circuit symbols for NPN and PNP transistors.	[L2] [CO5]	**[4M]**
	b)	If the base current in a transistor is 20μA when the emitter current is6.4mA, what are the values of α and β? Also calculate the collector Current.	[L4] [CO6]	**[6M]**
3		With neat diagram, explain the Input and Output characteristics of a BJT in CB Configuration.	[L2] [CO5]	**[10M]**
4		Draw the circuit diagram of CE configuration and describe its input and output characteristics.	[L1] [CO5]	**[10M]**
5		Explain the Common collector configuration and plot its input andOutput characteristics.	[L2] [CO5]	**[10M]**
6	a)	Derive the relationship between α, β and ϒ of a Transistor.	[L3] [CO5]	**[5M]**
	b)	A transistor operating in CB configuration has I_C = 2.98mA, I_E = 3.00mA and I_{CO} =0.01mA Determine the current that will flow in the collector circuit when connected in CE configuration with a base current of 30μA.	[L3][CO6]	**[5M]**
7	a)	For a transistor, the leakage current is 0.1μA in CB configuration, While it is 19μA in CE configuration. Find α & β of the same transistor?	[L3][CO5]	**[5M]**
	b)	Compare Transistor configurations.	[L4] [CO6]	**[5M]**
8	a)	Explain the early effect and its consequences.	[L2] [CO5]	**[5M]**
	b)	For a transistor, the leakage current is 0.1μA in CB configuration, while 9μA in CE configuration. Find α & β of the same transistor.	[L3][CO6]	**[5M]**
9		Explain the Fixed Bias of a BJT with a neat diagram.	[L2] [CO6]	**[10M]**
10	a)	List the applications of a transistor and explain how transistor acts a Switch.	[L1] [CO5]	**[5M]**
	b)	Explain in detail how the transistor works as an amplifier.	[L2] [CO5]	**[5M]**

UNIT –III
JFET & MOSFETS

1	a)	Classify the types of JFET and Draw its symbols.	[L2] [CO5]	**[4M]**
	b)	Describe the working principle of N-channel JFET.	[L2] [CO5]	**[6M]**
2	a)	Explain the construction and working principle of P-channel JFET	[L2] [CO6]	**[5M]**
	b)	Sketch the Drain characteristics of N-channel JFET and explain it.	[L3] [CO5]	**[5M]**
3	a)	With a neat diagram, explain the Transfer characteristics of N-channel JFET.	[L2] [CO5]	**[5M]**
	b)	Sketch the transfer characteristics of P-channel JFET.	[L3] [CO5]	**[5M]**
4	a)	The data sheet for enhanced MOSFET gives I_D=4.5mA, at V_{GS}=12Vand V_{GS} (th)=6V. Determine the value of I_D and at V_{GS}(th)=10V .	[L3] [CO6]	**[5M]**
	b)	Explain the CD configuration of JFET.	[L2] [CO5]	**[5M]**
5	a)	With a neat diagram deduct, the CG configuration of JFET	[L5] [CO5]	**[5M]**
	b)	An N channel JFET as I_{DSS} =8mA and V_p =-5v. Determine the minimum value of V_{DS} for pinch off region and the drain current I_{DS}, for V_{GS} =-2v in pinch off region.	[L3] [CO6]	**[5M]**
6	a)	List the differences between N-channel JFET and P-channel JFET.	[L2][CO5]	**[5M]**
	b)	Compare between CS, CG, CD configuration of JFET.	[L4] [CO5]	**[5M]**
7	a)	Describe the working principle of JFET as an amplifier.	[L2] [CO5]	**[6M]**
	b)	List the applications of JFET and MOSFET.	[L1] [CO5]	**[4M]**
8	a)	Analyze the working condition of JFET working as a switch.	[L4] [CO5]	**[5M]**
	b)	Explain the working principle of DMOSFET.	[L2] [CO5]	**[5M]**
9	a)	Compare between BJT and JFET.	[L4] [CO5]	**[5M]**
	b)	Explain working principle of EMOSFET with neat diagram.	[L2] [CO5]	**[5M]**
10		With the help of neat diagram, explain the operation and characteristics of N-channel Depletion type MOSFET under Enhancement mode.	[L2] [CO5]	**[10M]**

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