Subject with Code: Basic Electrical and Electronics Engineering (18EE0240) **Course & Branch**: B. Tech-AGRI

Year & Sem: B.Tech - I & II-Sem   **Regulation:** R18

PART - A

UNIT – I

INTRODUCTION TO DC & AC CIRCUITS

1) a) Define and Explain about ohms law?   [5M]
   b) Explain about passive elements in detail?   [5M]
2) Three resistances of values 2Ω, 3Ω and 5Ω are connected in series across 20V DC supply.
   Calculate i) Equivalent resistance of the circuit. ii) The total current of the circuit. iii) The
   voltage drop across each resistor. iv) The power dissipated in each resistor.   [10M]
3) Define and Explain about Energy sources in detail/Explain active elements in detail.   [10M]
4) a) State and prove Kirchhoff law's with an example.   [5M]
   b) In the circuit shown below find i_1, i_2, i_3 by using Kirchhoff's laws?   [5M]
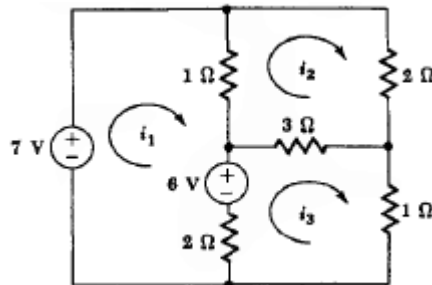
5) Find the current delivered by the source for the circuit shown in figure.   [10M]
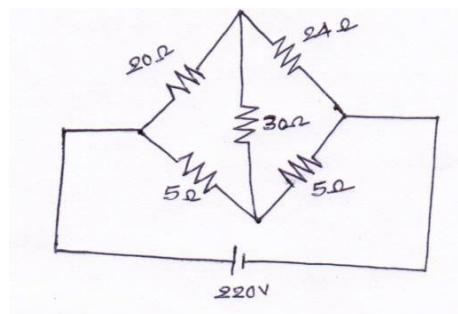
6) Find the voltage to be applied across AB in order to drive a current of 5A into the circuit

[10M]
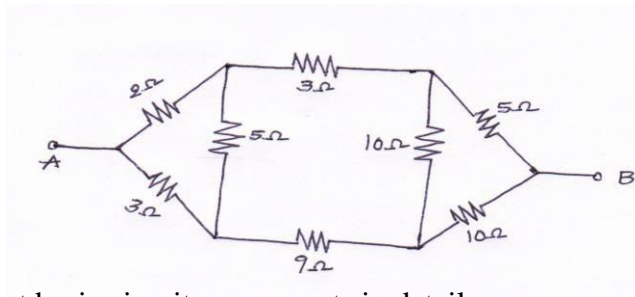
7) a) Explain about basic circuit components in detail. [5M]
   b) Explain about KVL. [5M]
8) Explain the following [10M]
   a) Resistive Networks.
   b) Inductive Networks.
9) Explain the following [10M]
   a) Resistive Networks.
   b) Capacitive Networks.
10) a) Define RMS value, average value, form factor and peak factor. [5M]
    b) Show the form factor of the sine current is 1.11./ Find form factor of the sine Current.
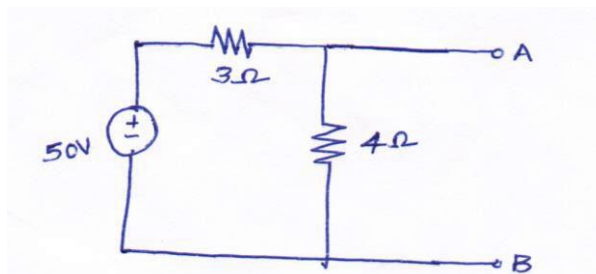[5M]

UNIT-II

NETWORK THEOREMS & TWOPORT NETWORKS

1) a) State super position theorem. [2M]
   b) Calculate the current in 2Ω resistor in the fig. using super position theorem [8M]
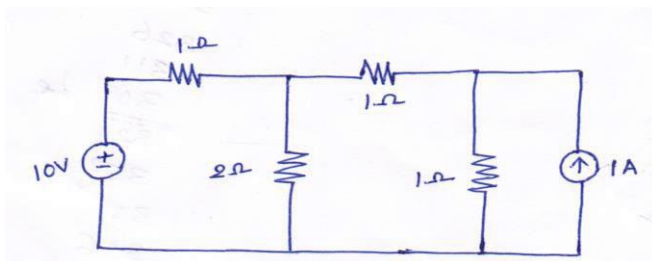
2) a) State Thevenins theorem. [5M]
   b) Find Thevenins equivalent circuit across AB for the circuit shown in below [5M]

3) a) State Norton's theorem [5M]
   b) Find Norton's equivalent circuit across AB for the circuit shown in below [5M]
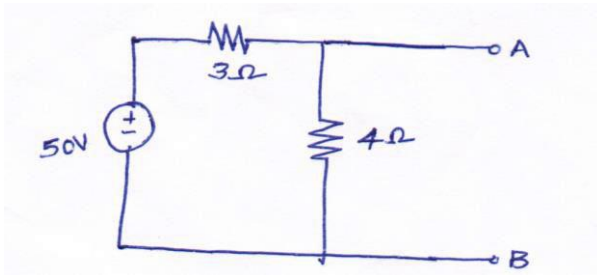
4) Determine the maximum power delivered to the load in the circuit shown in fig [10M]
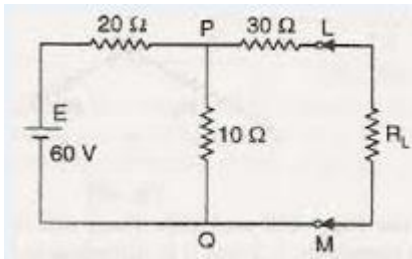
5) State and prove Reciprocity theorem with an example [10M]
6) a) Define and explain about Impedance parameters [5M]
   b) Define and explain about Y- parameters [5M]
7) Find the Open circuit parameters for the circuit shown in fig. [10M]
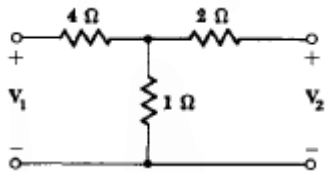
8) Find the Short circuit parameters for the circuit shown in fig [10M]
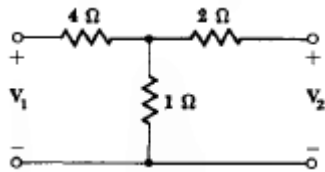
9) The given ABCD parameters are A=2,B=0.9,C=1.2,D=0.5 find Y- parameters [10M]
10) The given Y-parameters are Y_{11}=0.5, Y_{12}=Y_{21}=0.6,Y_{22}=0.9 find impedanace [10M]

UNIT-III

DC & AC MACHINES

1) a) Explain about principle of operation of DC Motors in detail.   [5M]

   b) Calculate the value of Torque established by the armature of a 4-pole motor having 774conductors, 2 paths in parallel, 24mwb flux per pole when the total armature current is 50A.   [5M]

2) A 220Vshunt motor takes a total current of 80A and runs at 800 r.p.m. 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.   [10M]

3) a) Derive Torque equation of dc motor   [5M]

   b) The counter EMF of Shunt motor is 227 volts the field resistance is 160Ω & field current 1.5A if the line current is 36.5A find the armature resistance also find armature current when the motor is stationary.   [5M]

4) a) Explain about constructional details of dc motor   [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 120A from dc supply of 100V flux per pole is 20mwb   [5M]

5) A 230Vshunt motor takes a total current of 70A and runs at 900 r.p.m .Shunt field resistance and armature resistance are 40Ω and 0.2Ω respectively. If iron and friction losses amount to 1700W.find(i) Copper losses (ii) Armature torque (iii) Shaft torque (iv) Efficiency   [10M]

6) a) Derive EMF equation of a transformer   [5M]

   b) A 100KVA, 11000V/400V, 50Hz transformer has 40 secondary turns. Calculate the number of primary turns and primary and secondary currents   [5M]

7) a) Explain constructional details of transformer   [5M]

   b) A 20KVA, 2000V/200V, 50Hz transformer has 66 secondary turns. Calculate the number of primary turns and primary and secondary currents. Neglect losses   [5M]

8) a) Explain OC and SC test of a single phase transformer   [5M]

   b) A Single phase 2200/250V, 50Hz transformer has a net core area of 36cm^2 and a maximum flux density of 6wb/m^2.Calculate the number of turns of primary and secondary.   [5M]

9) a) Explain principle of operation of transformer

   b) An ideal transformer has 1000turns on its primary and 500 turns on its secondary the driving voltage of primary side is 100V and the load resistance is 5 Ω, calculate V_2, $I_1$and I_2 ?   [5M]

10) a) Explain principle of operation of transformer   [5M]

    b) Derive EMF equation of a transformer   [5M]

PART -B
UNIT –I
SEMICONDUCTOR DEVICES

1) Draw the Crystal Lattice structure of Si? Explain how charge flows through the lattice? [10M]

2) a) What is Doping? Explain why it is used in semiconductor Industry? [5M]

   b) Explain Energy band gap in semiconductor with a neat sketch? [5M]

3) With a neat sketch explain the flow of Drift and Diffusion current in a semiconductor? [10M]

4) Explain how current flows in a PN diode? With a neat sketch explain the VI characteristics of the diode? [10M]

5) Explain how current flows in a Zener diode in reverse bias with necessary diagrams? [10M]

6) a) With a neat sketch explain the operation of Half-wave rectifier? [5M]

   b) Derive an expression for ripple factor of a Half- wave rectifier with and without load? [5M]

7) a) With a neat sketch explain the operation of Full-wave rectifier? [5M]

   b) Derive an expression for ripple factor of a Half- wave rectifier with and without load? [5M]

8) Design a Voltage rectifier with a load? Derive an expression for load current? [10M]

9) Explain the following with an example [10M]

   a) Atom   b) Ion   c) Ohms law   d) Circuit   e) Electronic Instrument

10) Explain the importance of filters in voltage regulators with necessary expressions? [10M]

UNIT- 2

BIPOLAR JUNCTION TRANSISTOR

1) What is a Transistor? With a neat sketch explain how current flows in a transistor?   [10M]

2) Explain the following terms   [10M]

   a) Biasing   b) Early effect   c) Q-point   d) Transportation factor   e) Charge Density

3) a) With a neat sketch? Explain the construction and working principle of NPN transistor? [4M]

   b) Draw the Output Characteristics of NPN transistor? Explain the operation of NPN transistors

      in three regions specified in the output characteristics?   [6M]

4) a) Draw a diagram and explain emitter bias configuration with necessary expressions?   [5M]

   b) Explain a simple application of Emitter bias configuration?   [5M]

5) a) Compare between different configurations of BJT?   [5M]

   b) Derive an Expression between I_b, I_c and I_e of a BJT?   [5M]

6) Draw input and output characteristics CB configuration? Explain the Operation of CB transistor

   with necessary expressions?   [10M]

7) Explain the any five applications of BJT in modern Electronics?   [10M]

8) Explain how a transistor acts as a switch for an input signal with necessary assumptions?[10M]

9) a) Explain Emitter follower with necessary expression?   [5M]

   b) Explain why self Bias is widely used in Amplifiers?   [5M]

10) Draw input and output characteristics CE configuration? Explain the Operation of CE transistor

   with necessary expressions?   [10M]

UNIT- 3

FET and MOSFET

1) a) Draw and explain the Construction of JFET?   [6M]

   b) Draw the symbols of n-channel and p-Channel JFET?   [4M]

2) With a neat sketch explain the working principle of JFET? Explain how the current flows in a JFET?   [10M]

3) a) Sketch different configurations of JFET? Explain their importance in electronics?   [6M]

   b) Write the expression for drain current and explain the terms?   [4M]

4) Draw and Explain the construction of n-channel Depletion mode MOSFET? Explain how current flows through the MOSFET?   [10M]

5) Draw and Explain the construction of n-channel Enhancement mode MOSFET? Explain how current flows through the MOSFET?   [10M]

6) Compare BJT, JFET and MOSFET?   [10M]

7) a) Discuss how a MOSFET acts as a Switch?   [5M]

   b) Draw and Explain the importance of Depletion mode MOSFET?   [5M]

8) a) Discuss the Advantages of MOSFET over JFET?   [5M]

   b) With a neat sketch explain the operation of fixed bias configuration using MOSFET?   [5M]

9) a) Write the expression for drain current of a MOSFET and explain the terms?   [4M]

   b) Explain the Transfer characteristics of MOSFET?   [6M]

10) a) Explain the static characteristics of MOSFET?   [5M]

    b) Explain the output characteristics JFET?   [5M]