R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year II Semester Examinations, April - 2018
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to CE, ME, MCT, MMT, AE, MIE, PTM, CEE, MSNT)

Time: 3 hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.   Each
question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a)   Distinguish between ideal and practical voltage source?   [2]
  b)   State Ohm's law and give an example.   [3]
  c)   What is resonance in electric circuits?   [2]
  d)   State the Maximum Power Transfer theorem.   [3]
  e)   Draw the equivalent circuit of an ideal diode and that of a piecewise linear model of it.
                                                                                        [2]
  f)   Show the current paths in a full wave bridge rectifier for a sinusoidal input during
       positive and negative half cycles.   [3]
  g)   Define operating point of a BJT. List the parameters against the variations of which the
       operating point needs to be stabilized.   [2]
  h)   Define h_{fe} and h_{oe} of a BJT in CE configuration. Mention their units. [3]
  i)   What is pinch-off voltage for a JFET?   [2]
  j)   Draw the symbols of p-channel JFET, NPN-BJT, tunnel diode and varactor diode.
                                                                                        [3]

PART-B
(50 Marks)

2.a)   Making use of star/delta transformation, determine the resistance between terminals A
       and B as shown in figure 1.
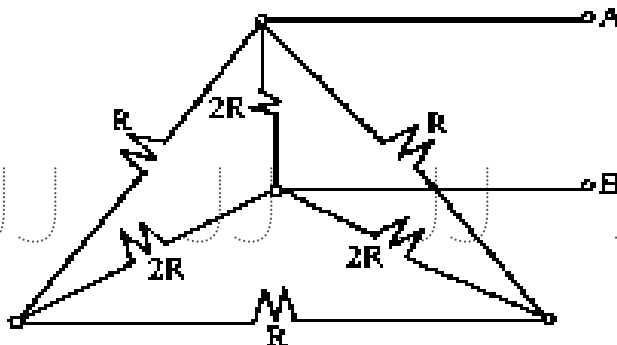
Figure: 1

  b)   Derive the expression for the RMS, average values, peak factor and form factor of
       sinusoidal signal.   [5+5]

OR

3.a) An inductance of 0.5H, a resistance of 5 ohms, and a capacitance of 8 μF are in series across a 220V, 50Hz AC supply. Find the voltage across each element and total current supplied by the supply and draw the phasor diagram for the circuit.

b) In the following circuit shown in figure 2, the effective voltage between points A and B is 25 volts. Find the corresponding effective values of V and I_T. [5+5]
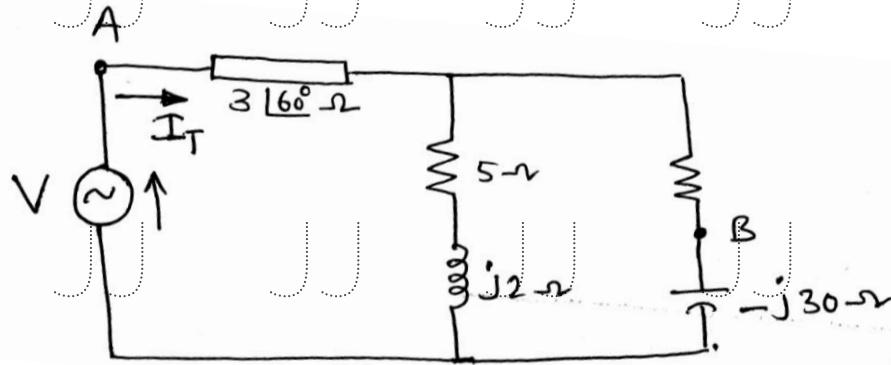

Figure: 2

4.a) Explain the procedure to draw the locus diagram of R-L series circuit, when L is varying.

b) Apply super position theorem to the network shown in figure 3 and obtain current $(3 + j4)\Omega$ impedance. [5+5]
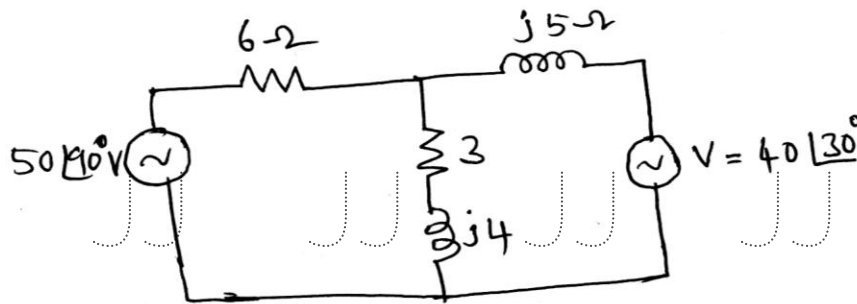

Figure: 3

OR

5.a) Derive the expression for resonant frequency, half power frequencies of series RLC circuit.

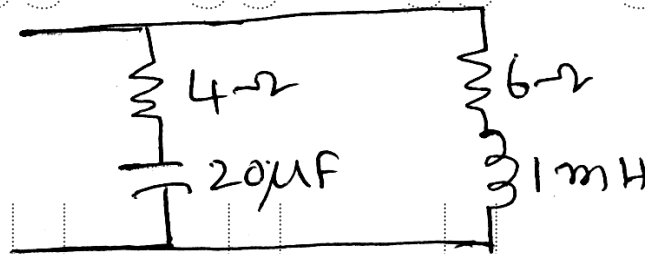b) Find the resonant frequency of the following circuit shown in figure 4. [5+5]

Figure: 4

6.a) Differentiate between:
i) Static and dynamic resistances of a diode.
ii) Transition and diffusion capacitances of a diode.

b) Define Rectification efficiency of rectifier. Derive expression to show that it is 81% for a Full wave rectifier. [5+5]

OR

7.a) Explain how current flows in a diode under forward biased and reverse biased conditions.
  b) Compare the performance of:
  i) Centre tapped transformer type and bridge type full wave rectifiers.
  ii) Capacitor and π-section filters. [5+5]

8.a) Derive an expression for the stability factor S of a BJT with voltage divider bias.
  b) Draw the h-parameter equivalent circuit of a BJT in CE configuration. [5+5]

OR

9.a) For the voltage divider biased BJT shown below in figure 5, determine the operating point. Assume β to be 50 for the transistor.
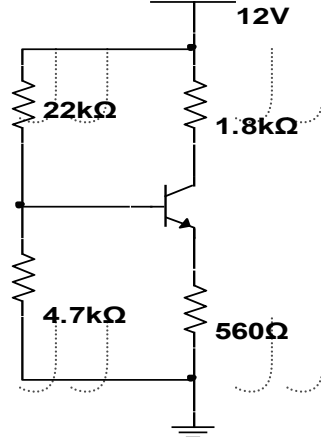
Figure: 5

  b) Compare the characteristics of CE, CB and CC configurations of a BJT. [5+5]

10.a) Compare BJT and JFET in all aspects.
  b) With the help of relevant energy band diagram explain tunnelling phenomenon in a Tunnel diode. [5+5]

OR

11.a) Draw the characteristics of an n-channel JFET in Common source configuration. Show pinch-off region on the curves.
  b) How and under what conditions Zener breakdown take place in a diode? Draw the V-I characteristics of Zener diode and show the breakdown region. [5+5]

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