II/IV B.Tech. DEGREE EXAMINATIONS, DECEMBER- 2016
First Semester
EC/EE
ELECTRONIC DEVICES & CIRCUITS

Time: Three Hours
Maximum marks: 60

Answer Question No.1 Compulsory. 12X1=12 M
Answer One Question from each Unit. 4X12=48 M

1. a) Define cui-in voltage?
   b) Write the diode current equation?
   c) Define transition capacitance of the diode?
   d) Draw the Eber-smoll model of transistor?
   e) Draw the circuit of CE configuration.
   f) Draw the symbols of PNP & NPN transistor?
   g) Define Q-point?
   h) Define biasing?
   i) What is thermal runaway?
   j) Draw the symbols of p-channel JFET
   k) Draw fixed bias circuit for JFET
   l) Compare JFET AND MOSFET

UNIT-I

2. a) Explain the VI-Characteristics of PN Junction Diode.
   b) Write short notes on Diffusion capacitance.
   (OR)

3. a) Explain the concept of breakdown in PN diode.
   b) Write short notes on Diode switching times.

UNIT-II

4. a) Explain the operation of Transistor as an amplifier.
   b) Explain about I/P and O/P characteristics of CB configuration.
   (OR)

5. a) Explain the operation of NPN transistor with neat sketches.
   b) Explain about I/P and O/P characteristics of CE configuration.

UNIT-III

6. a) Explain the operation of Voltage divider bias circuit with neat diagram?

P.T.O
b) What is the need for biasing of transistor?

(OR)

7. a) Explain about DC Load line analysis?
    b) Explain the operation of collector to base bias circuit with neat diagram.

UNIT-IV

8. a) Explain the operation of Fixed bias JFET circuit?
    b) Write short notes on Compensation techniques?

(OR)

9. a) Explain the operation of Deletion mode MOSFET with neat diagram.
    b) Explain the operation of voltage divider bias of JFET?
II/IV B.Tech. DEGREE EXAMINATIONS, DECEMBER- 2016
First Semester
EE/EC/EI
CIRCUIT THEORY

Time: Three Hours

Maximum marks:70

Answer Question No.1 Compulsory. 14X1=14 M
Answer One Question from each Unit. 4X14=56 M

1. a) Define current and write its equation
   b) State KCL and KVL
   c) Define form factor
   d) What is the power factor of a purely inductive load?
   e) State Thevinin’s theorem.
   f) What is the Laplace transform of \( u(t-T) \)?
   g) How much of the reactive power absorbed by the inductor is supplied by the main voltage source in a series RLC circuit at resonance?
   h) Define and write the equation for time constant of an R-L circuit.
   i) Define cut set matrices.
   j) State final value theorem
   k) What is complex theorem.
   l) Define power and energy.
   m) What is bandwidth?
   n) Define passive elements.

UNIT-I

2. a) Find \( R_{eq} \) for the following circuit.
b) Find the power absorbed by the dependent current source.

3. With reference to the circuit shown find
   (a) \( I_x \) if \( I_1 = 12 \text{mA} \) and 
   (b) \( I_x \) if \( I_s = 60 \text{mA} \)

4. a) Transform each of the following functions of time into phasor form:
   (a) \(-5\sin(580t-110^\circ)\);  
   (b) \(3\cos600t-5\sin(600t+110^\circ)\)
   (c) \(8\cos(4t-30^\circ)+4\sin(4t-100^\circ)\)

   b) Let \(w=2000\, \text{rad/s} \) and \(t=1\, \text{ms}\). Find the instantaneous value of each of the currents 
given here in phasor form:
   (a) \(j10\text{A}\);  
   (b) \(20+j10\text{A}\);  
   (c) \(20+jj(10 \angle 20^\circ)\)

5. a) Let \(V=10 \angle 0^\circ \text{V} \). In the circuit of the fig. below, construct a phasor diagram showing
   \(I_R, I_L\) and \(I_C\). By combining these currents, determine the angle by which \(I_s\) leads
   (a) \(I_R\), (b) \(I_C\), (c) \(I_L\)
b) In the circuit shown below, let \( i_c \) be expressed as \( i_c(t) = 20 \cos(40t + 30^\circ) \) A. Find \( V_s(t) \).

\[ \text{UNIT-III} \]

6. a) Use superposition to evaluate \( V_x \) in the circuit shown

\[ \text{UNIT-IV} \]

7. a) Find the resonant frequency and the value of \( Z_{in} \) at resonance.

b) Define and derive the expression for bandwidth in a series RLC circuit.

8. a) Determine the value of \( i_L \) at the instant just after switch changes
b) Find \( i(0^+), i(0^-), V(0^+), V(2\text{ms}) \) and \( V(t) \) for \( t > 0 \) in the following circuit.

![Circuit Diagram]

(OR)

9. a) Find \( f(t) \) if \( f(s) \) equals to

\[
\begin{align*}
\text{i) } & \frac{1}{S(S+1)(S+2)} \\
\text{ii) } & \frac{S}{(S+1)(S+2)} \\
\text{iii) } & \frac{S+1}{S(S+2)}
\end{align*}
\]

b) Find \( f(0^+) \) and \( f(\infty) \) for the following transforms

\[
\begin{align*}
\text{i) } & F(s) = \frac{4e^{-2s}}{(S+50)S} \\
\text{ii) } & \frac{S^2 + 6}{S^2 + 7} \\
\text{iii) } & \frac{5S^2 + 10}{2S(S^2 + 3S + 5)}
\end{align*}
\]
CIRCUIT THEORY

Time: Three Hours

Maximum marks: 70

Answer Question No.1 Compulsory.

14X1 = 14 M

Answer One Question from each Unit.

4X14 = 56 M

1. a) Define active and passive elements
   b) Explain the purpose of star-delta transformation
   c) State maximum power transfer theorem.
   d) Define form factor.
   e) Define tree, branch and link
   f) Write an expression for energy stored in capacitor.
   g) What is selectivity?
   h) Obtain Laplace transform of \( f(t) = e^{-at}, a>0 \)
   i) Define transient
   j) What is the phase difference between voltage and current waveforms for a purely capacitive load.
   k) What is the laplace transform of an impulse signal delayed by 2 seconds?
   l) State Millman’s theorem
   m) What is a super node?
   n) What is source transformation?

UNIT-I

2. Use Kirchoff’s and Ohm’s laws in a step-by-step procedure to evaluate all the currents and voltages in the circuit shown below. Calculate the power absorbed by each of the five circuit elements and show that the sum is zero.
3. a) Find the effective resistance across terminals AB of the circuit shown

![Circuit Diagram](image1)

b) Using source transformation find the power delivered by the 50V source in the given network.

![Circuit Diagram](image2)

**UNIT-II**

4. a) State and explain thevenin’s theorem

b) The circuit below shows one form of the equivalent circuit for a transistor amplifier. Determine the open circuit value of \( V_2 \) and the output resistance \( (R_{th}) \) of the amplifier.

![Circuit Diagram](image3)

**(OR)**

5. Find the loop currents \( i_1 \) and \( i_2 \) in the following circuit

![Circuit Diagram](image4)
UNIT-III

6. a) Determine the average power delivered to a $5 \Omega$ resistor by the periodic waveform shown

b) Determine the average power delivered to each of the boxed networks in the circuit.

(OR)

7. a) A series resonant circuit has a bandwidth of 100Hz and contains a 20mH inductance and a 2 $\mu$F capacitance. Determine: (i) $f_0$; (ii) $Q_0$; (iii) $Z_{in}$ at resonance (iv) $f_2$

where $f_0$ is the resonant frequency.

b) Draw the impedance curve and current curve for a series RLC circuit and explain its equation.

P.T.O
UNIT-IV

8.  
   a) Find $i_L(t)$ for $t>0$ in the circuit below

   
   ![Circuit Diagram](image1)

   b) Find $V_c(t)$ for all time in the circuit.

   
   ![Circuit Diagram](image2)

(OR)

9.  
   a) Find $V_c(0^-)$ and $V_c(0^+)$ for the circuit shown below.

   b) Obtain an equation for $V_c(t)$ that holds for $t>0$

   c) Use laplace transform techniques to solve for $V_c(s)$ and then find $V_c(t)$

   ![Circuit Diagram](image3)
II/IV B.Tech. DEGREE EXAMINATIONS, APRIL/MAY- 2016
First Semester
EE/EC/EI
CIRCUIT THEORY

Time: Three Hours
Maximum marks: 70

Answer Question No.1 Compulsory
14X1 = 14 M

Answer ONE question from each Unit
4X14 = 56 M

1. 
   a. Define KCL and KVL
   b. Define trace, twig and link
   c. State millman’s theorem
   d. Define transient response?
   e. Define power factor
   f. What is the phase relationship for a pure inductor?
   g. Define Quality factor
   h. State final value theorem
   i. What is the “form factor” for sinusoidal wave?
   j. What is selectivity?
   k. What is source transformation.
   l. What is laplace transform of \( f(t) = 1 - e^{-at} \)
   m. Define “DC sweep” statement in PSPICE?
   n. Define Reciprocity theorem?

UNIT-I

2. 
   a. Derive an expression for energy stored in a capacitor and draw it response characteristics.
   b. Find the equivalent resistance of Network shown in fig(1)
3.  
   b. Develop the fundamental cut-set matrix and equilibrium equation on nodal basis.

UNIT-II

4.  
   a. Determine R.M.S average value and form factor of the waveform given in fig.(3).
   b. A resistor of 10 Ω, an inductance of 150 mH and a capacitor of 100 µF are connected across a 50V, 50Hz voltage sources. Find the branch currents and total current. Draw the phasor diagram?

(OR)

5.  
   a. Explain Impedance and Power triangles?
   b. Obtain the values of the complex power of the sources shown in fig(4).
UNIT-III

6. a. State and prove superposition theorem?
   b. Find the Thevenin’s equivalent of Network show in fig(5)

   ![Network Diagram](image)

(OR)

7. a. Define Q-factor and Bandwidth? Derive necessary expression for it for series RLC circuit?
   b. Determine all the currents, in the resonant frequency, half power frequencies in the circuit show in fig.(6).

   ![Resonant Circuit Diagram](image)

UNIT-IV

8. a. Derive an equation for step responce of series RC circuit in laplace domain.
   b. Find loop current i(t), following switching of k at t=0 in the circuit of fig (7) from A to B

   ![RC Circuit Diagram](image)

(OR)

9. a. A series RLC circuit has R=15 Ω, L=0.25 H and C=55 μ F. A constant DC voltage of 200V is impressed upon the circuit at t=0. Find the expression for the transient current using laplace transformations. Assume zero initial conditions.
   b. Explain DC analysis and control statements in PSPICE.
II/IV B.Tech. DEGREE EXAMINATIONS, APRIL/MAY- 2016
First Semester
EC/EE/EI
CIRCUIT THEORY

Time: Three Hours
Maximum marks:70

Answer Question No.1 Compulsory
14X1=14 M

Answer ONE question from each Unit
4X14=56 M

1.  a. What is meant by Natural frequency?
    b. What is dual network
    c. What is a super node?
    d. State Millmen’s theorem.
    e. Explain the purpose of star-delta transformation.
    f. Define cut-set matrix?
    g. What is twig, link.
    h. What is the difference between Active ans passive elements
    i. State final vlaue theorem.
    j. Define power factor
    k. Define Quality factor
    l. Write the laplace transform for ramp wave?
    m. What is magnification
    n. State Superposition theorem.

UNIT-I

2.  a. State and explain Kirchoff’s laws wh relevent expressions?
    b. Obtain the equivalent inductance at terminal x,y in fig(1)
3. a. Develop the fundamental cut-set matrix of the network shown in fig (2)

![Network Diagram](image1)

b. Define fundamental tie-set matrix and write the procedure to form tie-set matrix with an example?

UNIT-II

4. a. State and explain Thevenin’s theorem. Also give an example.
b. Find the power loss in $5 \, \Omega$ resistor by superposition theorem. in fig(3)

![Network Diagram](image2)

UNIT-III

5. a. State and explain Reciprocity theorem.
b. A voltage wave is represented by $v(t) = 200 \sin(314t + 30^\circ)$ find (i) maximum value
   (ii) RMS value (iii) Average value (iv) frequency (v) time period (vi) Instantaneous value after 0.05 sec.

(OR)

6. a. State and prove maximum power transfer theorem for AC circuit?
b. Find Real and Reactive power in the network of fig(4)

$$z_1 = (5 + j10) \Omega, z_3 = (1 + j3) \Omega, z_2 = (2 - j4) \Omega$$

![Network Diagram](image3)
7. a. Derive expression for Resonance frequency and Q-factor for parallel RLC circuit?
   b. Obtain the values of R,L,C in a series RLC circuit that resonates at 1.5 KHz and consumes 50W from a 50V, A.C source operating at the resonance frequency. The bandwidth is 0.75 KHz.

UNIT-IV

8. a. The 10 µF capacitor in RC circuit of fig(5) has initial charge of 100 µC with polarities as shown. At t=0, the switch being closed, A.D.C voltage of 100V is applied. Find the expression for current.
   b. Derive step response of RLC series circuit in Laplace domain?

(OR)

9. a. In series RLC Network R=0.5 Ω, C=1 F, L=1H. If the initial voltage on the capacitor is 4V. Find i(t) following switching of a voltage 10 u(t) into circuit. Assume zero initial conditions.
   b. Explain about describing dependent and independent current and voltage sources in PSPICE. Also give an example.