DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE FILE

BASIC ELECTRICAL ENGINEERING

I B. Tech-I SEM

ACADEMIC YEAR 2018-19

REGULATIONS: R18

Mr.G.CHIRANJEEVI

ASSISTANT PROFESSOR

NARSIMHA REDDY ENGINEERING COLLEGE

(Sponsored by Jakkula Educational Society)

Approved by AICTE & Permanently Affiliated to JNTUH, Accredited By NAAC With A-Grade

ISO 9001:2008 Certified Institute

SY.NO:518, MAISAMMAGUDA (V), Medchal (M), R.R.DIST. HYD-14

INSTITUTE VISION AND MISSION

Vision

To emerge as a destination for higher education by transforming learners into achievers by creating, encouraging and thus building a supportive academic environment.

Mission

To impart Quality Technical Education and to undertake Research and Development with a focus on application and innovation which offers an appropriate solution to the emerging societal needs by making the students globally competitive, morally valuable and socially responsible citizens.

DEPARTMENT VISION AND MISSION

Vision

To excel in engineering education and research, inculcating and imbibing professional ethics in students and emerge as leaders in the nation in the field of electrical and electronics engineering.

Mission

-
- Knowledge on the basic principles of modern electrical and electronics technology
- Capable to apply their knowledge to solve any problem arising in whatever career path they choose
- Are sensitive to societal issues and are committed to professional ethics

Program Educational Objectives (PEOs)

PEO#1	To understand the purpose of learning electrical and electronics engineering to acquire the necessary skills for analysis and synthesis of problems in generation.
PEO#2	To become proficient in addressing social , technical and engineering challenges.
PEO#3	To be capable of creating the employment both at the national and international level with professional competence so as to handle critical situations.

Program specific outcomes (PSOs)

PSO#1	MATLAB simulation: simulate, design and analyze electrical machines and power systems through Matlab and its tools
PSO#2	Interfacing of Machines: Interfacing of electrical machines through power electronic devices
PSO#3	PLC and DCS usage:design and development of electrical control systems using PLC and DCS.

COURSE OUTCOMES (Cos):

CO [1] To analyze and solve electrical circuits using network laws and theorems

CO [2] To understand and analyze basic electric and magnetic circuits

CO [3] To study the working of single phase transformer

CO [4] To study the working principles of electrical machines

CO [5] To introduce components of low voltage electrical installations

COs	POs											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO[1] To analyze and solve electrical circuits using network laws and theorems	3	3	1	1	1	0	0	0	2	1	0	1
CO[2] To understand and analyze basic electric and magnetic circuits	3	3	1	1	1	0	0	0	2	1	0	1
CO[3] To study the working of single phase transformer	2	3	1	3	0	1	0	0	1	0	0	1
CO[4] To study the working principles of electrical machines	3	2	1	2	0	1	0	0	0	0	0	1
CO[5] To introduce components of low voltage electrical installations	3	1	3	2	0	2	1	0	1	1	0	2

BASIC ELECTRICAL ENGINEERING:			
COs	**PSOs**		
	PSO1	**PSO2**	**PSO3**
CO[1] To analyze and solve electrical circuits using network laws and theorems	√		√
CO[2] To understand and analyze basic electric and magnetic circuits	√		√
CO[3] To study the working of single phase transformer	√	√	√
CO[4] To study the working principles of electrical machines	√	√	√
CO[5] To introduce components of low voltage electrical installations	√	√	√

SYLLABUS

UNIT-I: D.C. Circuits
Electrical circuit elements(R, L and C), voltage and current sources,KVL&KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT-II: A.C. Circuits
Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series R- L-C circuit.
Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III: Transformers
Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT-IV: Electrical Machines
Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor.
 Construction and working of synchronous generators

UNIT-V: Electrical Installations
Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Suggested Text-Books/Reference-Books:
1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata McGraw Hill.
2. D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. L.S. Bobrow, Fundamentals of Electrical Engineering", Oxford University Press, 2011
4. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson, 2010.
5. 5Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall India, 1989

LESSON PLAN

S.NO Unit/Topic NO	Topic Name	No. of classes Required
1	Introduction, Electrical circuit elements (R, L and C), voltage and current sources,	5
	KVL&KCL, analysis of simple circuits with dc excitation.	8
	Superposition, Thevenin and Norton Theorems.	6
	Time-domain analysis of first-order RL and RC circuits.	6
2	Introduction, Representation of sinusoidal waveforms, peak and rms values,	4
	phasor representation, real power, reactive power, apparent power, power factor,	2
	Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel)	12
	resonance in series R- L-C circuit. Three-phase balanced circuits,	3
	voltage and current relations in star and delta connections.	4
3	Introduction, Ideal and practical transformer	3
	equivalent circuit of a transformer,	4
	losses in transformers, regulation and efficiency. Auto-transformer	7
	three-phase transformer connections.	1
4	Introduction, Generation of rotating magnetic fields	2
	Construction and working of a three-phase induction motor	2
	Significance of torque-slip characteristic. Loss components and efficiency	4
	starting and speed control of induction motor	2
	Single-phase induction motor. Construction, working, torque-speed characteristic	3
	speed control of separately excited dc motor.	2
	Construction and working of synchronous generators	2

|			
5	Introduction, Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB,	3
	Types of Wires and Cables, Earthing	2
	Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption,	3
	power factor improvement and battery backup	2

UNIT1 (QUESTION BANK)

MULTIFUL CHOICE QUESTIONS

1. Potential difference in electrical terminology is known as?   [a]
   a) Voltage   b) Current
   c) Resistance   d) Conductance
2. The relationship between Electrical energy (E), Voltage (V) and Charge (Q) is   [c]
   a) $E=Q / V$ b) $E=QV^2$
   c) $E=Q \times V$ d) $E= V / Q^2$
3. The voltage across R_1 resistor in the circuit shown below is?   [b]

   a) 10   b) 5
   c) 2.5   d) 1.25
4. The energy stored in the inductor is?   [b]
   a) $Li^2/4$ b) $Li^2/2$
   c) Li^2 d) $Li^2/8$
5. If the resistances 1Ω, 2Ω, 3Ω, 4Ω are parallel, then the equivalent resistance is?   [b]
   a) 0.46Ω
   b) 0.48Ω
   c) 0.5Ω
   d) 0.52Ω
6. Inductor is _____ element.   [b]
   a) Active
   b) Passive
   c) Linea r
   d) Polar
7. In case of ideal current sources, they have   [d]
   a) zero internal resistance
   b) low value of voltage
   c) large value of current
   d) infinite internal resistance

8. Ohm's law is applicable to   [d]
   a. Semiconductors
   b. Electrolytes
   c. Arc Lamps
   d. None

9. OHM is the unit of following except   [a]
 a).Resistance
 b).capacitance
 c).Capacitive reactance
 d).Inductive reactance

10.   The basic laws for analyzing an electric circuit are :-   [c]
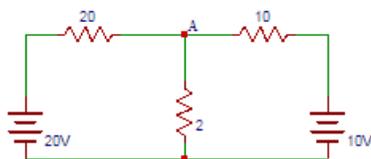   a) Einstein's theory
   b) Newton's laws
   c) Kirchhoff's laws
   d) Faradays laws

11.   A junction whell two (or) more than two network elements meet is
   known as a   [a]
      a) Node
      b) Branch
      c) Loop
      d) Mesh

12.   Relation between currents according to KCL is   [d]
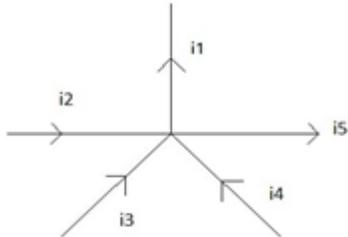
   a) $i_1=i_2=i_3=i_4=i_5$
   b) $i_1+i_4+i_3=i_5+i_2$
   c) $i_1-i_5=i_2-i_3-i_4$
   d) $i_1+i_5=i_2+i_3+i_4$

13.   Find the voltage across 2Ω resistor due to 20V source in the
   circuit shown below.   [b]

      a) 1
      b) 1.5
      c) 2
      d) 2.5

14.   In Superposition theorem, while considering a source, all other
voltage sources are?   [b]
a) open circuited
b) short circuited
c) change its position
d) removed from the circuit
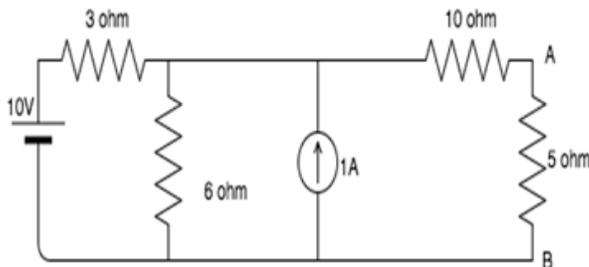
15.   Consider the circuit shown below. Find the equivalent Thevenin's
voltage between nodes A and B.   [b]
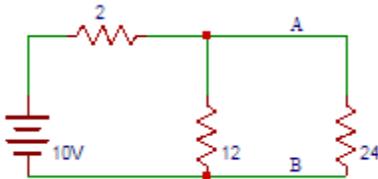
a) 8
b) 8.5
c) 9
d) 9.5

16.   Determine the equivalent thevenin's voltage between terminals A
and B in the circuit shown below.   [c]
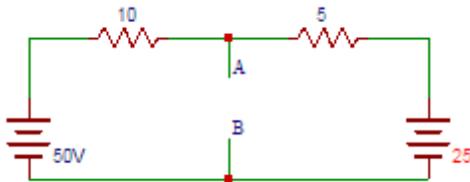
a) 0.333
b) 3.33
c) 33.3
d) 333

17.   Calculate the Norton's equivalent voltage for the following circuit if
5 ohm is the load resistance.   [c]

a) 10 ohm
b) 11 ohm
c) 12 ohm
d) 13 ohm

FILL IN THE BLANKS

1. The circuit in which current has a complete path to flow is called --------------circuit.   (closed)
2. The algebraic sum of voltages around any closed path in a network is equal to--------   (Zero)
3. The Norton current is the--------   (Both open circuit and short circuit current)
4. Inductor does not allow sudden changes-----------   (current)
5. Capacitor does not allow sudden changes---------   (voltage)

6. The expression of current in R- L circuit is------------ $(i=(V/R)(1-\exp((R/L)t)))$
7. The value of the time constant in the R-L circuit is------------------(L/R)
8. The expression of current in R- C circuit is------------------ $(i=(V/R)\exp(-t/RC))$
9. The time constant of an R-C circuit is-------------------------- (RC)

Short answer type questions

1. Discuss resistor, capacitor, and inductor with relevant expression?
2. Define electrical Power and energy. state its units?
3. Explain ideal voltage and current source?
4. State Ohm's law? Discuss limitations?
5. State Kirchhoff's voltage law and Kirchhoff's Current law?
6. Explain the equations for resistors in equivalent delta. If the resistors Ra, Rb and Rc are connected electrically in star?
7. Explain the equations for resistors in equivalent Star. If the resistors Ra, Rb and Rc are connected electrically in Delta?
8. State Superposition Theorems?
9. State Thevinins Theorem?
10.   State Norton theorem?
11.   Explain difference between series and parallel resistive circuit?

12. What do you understand by time constant of circuit ?what is significance on the response of the circuit

13. Difference between natural response and forced response of an electrical circuits

14. Differentiate the time constant of RL and RC series circuit

Long answer type questions

1. Explain in detail the volt-ampere relationship of R, L and C elements with neat diagrams?

2. Explain classifications of network elements?

3. Write differences between ideal and practical voltage sources?

4. Write differences between ideal and practical current sources?

5. Write down KVL and KCL and explain?

6. Determine the current in the 10 ohm's resistor of the show in figure by using mesh analysis
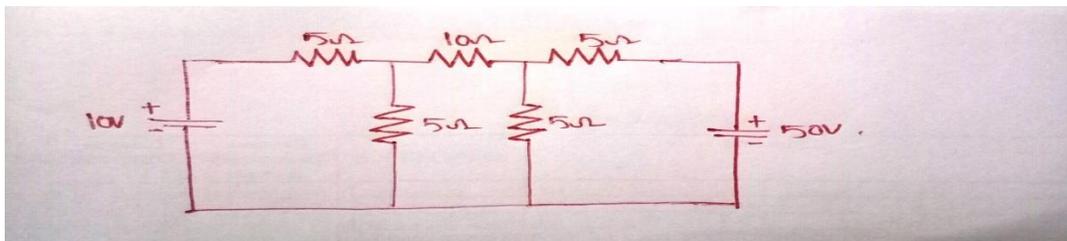
7. Find the current in 4 ohm's resistor by using nodal analysis
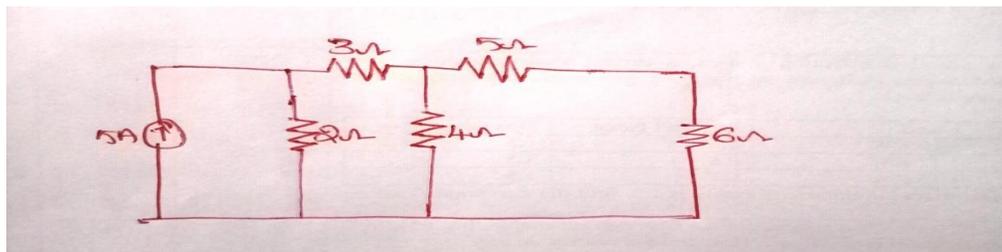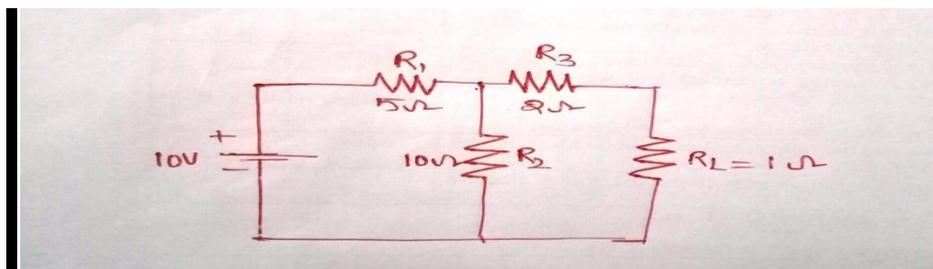

8. Explain superposition theorems?

9. Explain Thevinin's theorem?

10. Explain Norton theorem?

11. Calculate the current 'I' shown in figure using super position theorem?
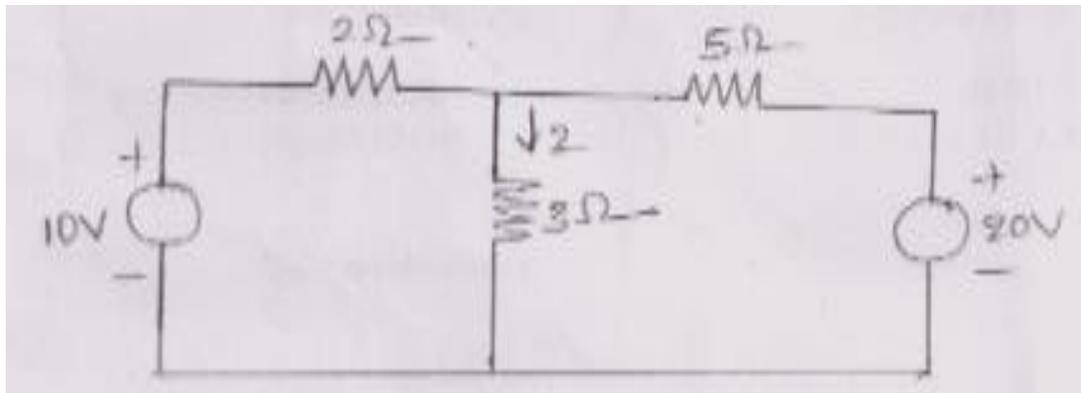
12.   By using Thevinin's theorem determine the current through 5 ohm resistor?
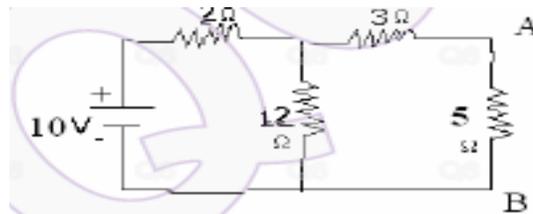
13.   By using Norton theorem determine the current through 1 ohm resistor?


14.   Transient response of series RL circuit with DC Excitation.
15.   Transient response of series RC circuit with DC Excitation
16.   Find the current in a series R-L circuit having R=2 Ω and L=10H while a D.C voltage of 100V is applied, what is the value of this current after 5sec of switching on?
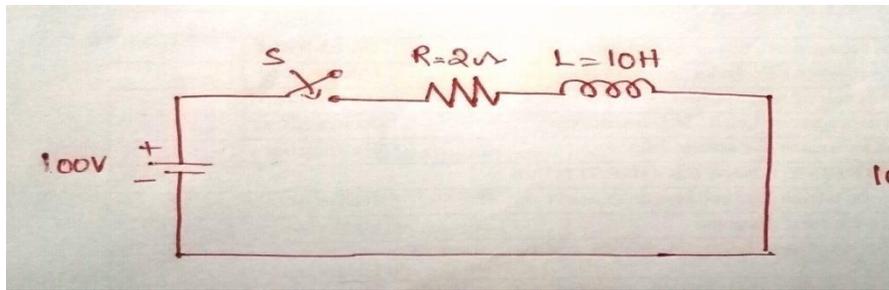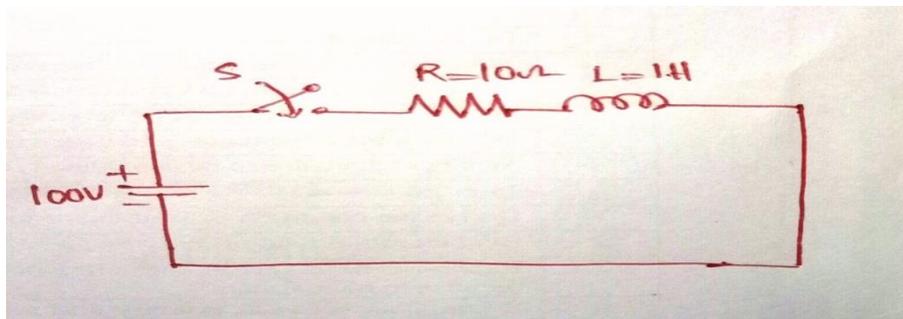
17.   A DC voltage constant voltage source feeds a R of 200K Ω,in series
   with a C=5µf   .Find the time taken for the capacitor when the charge
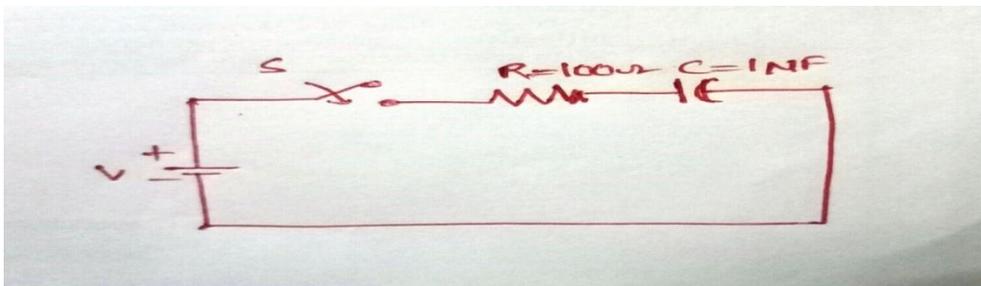   retained will be decayed to 50%
   Of the initial value the voltage source being short circuited.
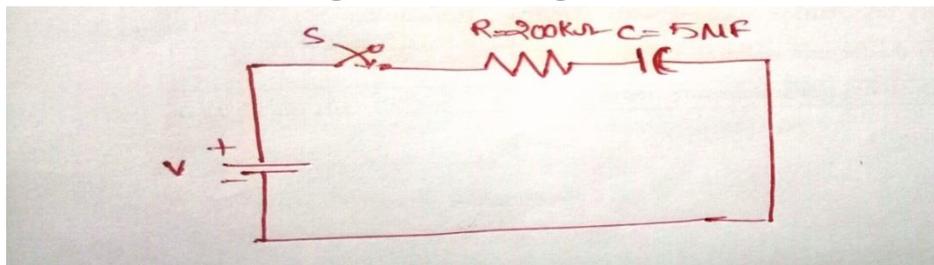
18.   The shown k is closed at t=0; Find the values of i, di/dt,d²i/dt², at
   t=0⁺ assume initial current of inductor zero

19.   In the network shown k is closed at t=0 with the capacitor
   unchanged. Find the values of i,di/dt,d²i/dt², at t=0⁺ for elements values
   as follows V=100V,R=100Ω, c=1µf

Assignment questions

1) Discuss resistor, capacitor, and inductor with relevant expression?
2) State Kirchhoff's voltage law and Kirchhoff's Current law?

3) State Thevinins Theorem?

4) Write down KVL and KCL and explain?

5) Find the current in 4 ohm's resistor by using nodal analysis ?
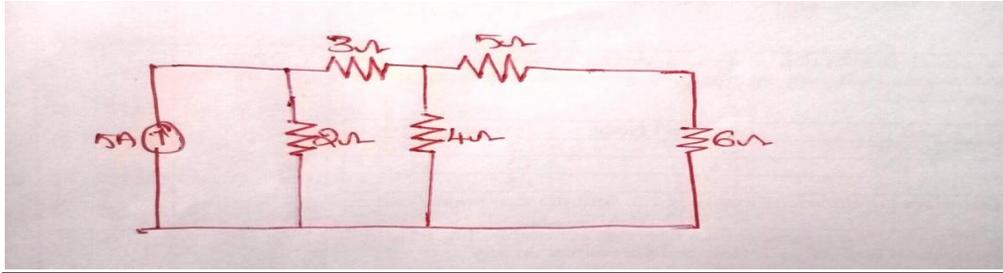
UNIT 2 (QUESTION BANK)

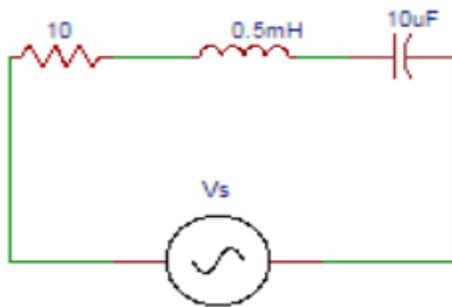## MULTIFUL CHOICE QUESTIONS

1) The peak value of a sine wave is 200 V. Its average value is   (b)

   a) 127.4 V   (b) 141.4 V   (c) 282.8 V   (d)200V

2) The expression of reactive power (Q) is?   (b)

   a) $V_{eff}I_m\sin\theta$ b) $V_mI_m\sin\theta$ c) $V_{eff}I_{eff}\sin\theta$ d) $V_mI_{eff}\sin\theta$

3) Determine the resonant frequency (kHz) for the circuit shown below (b)

   a) 2.25   b) 22.5   c) 225   d) 2250

4) In a three phase, delta connection ——-   (b)

   a) Line Current Is Equal To Phase Current
   b) Line Voltage Is Equal To Phase Voltage
   c) None Of The Above
   d) Line Voltage And Line Current Is Zero

5) For a star connected three phase AC circuit ———   (d)

   a)   Phase voltage is equal to line voltage and phase current is three times the line current
   b)   Phase voltage is square root three times line voltage and phase current is equal to line current
   c)   Phase voltage is equal to line voltage and line current is equal to phase current
   d)   None of the above

FILL IN THE BLANKS

1) Define the peak factor_____(the ratio of max. value to rms value)

2) The impedance of RLC series ac circuit _____ $(Z=\sqrt{r^2+(x_l-x_c)^2})$

3) Formula for RMS value_____ $(V_m/\sqrt{2})$

4) In a series resonance circuit, series resonance occurs when_____ $(x_l=x_c)$

5) In a star connected system, the phasor V_{RN} , V_{YN} are ____ apart.   (120)

6) Power factor $\cos\varphi$=_____   (R/Z)

Short answer type questions

1. Define RMS Value?
2. State advantages of alternating quantities?
3. Define form factor?
4. Define peak factor?
5. Define average Value?
6. Explain polar form and rectangular form?
7. Differentiate ac and dc quantities?
8. Define time period
9. Define cycle
10.   Define frequencies?
11.   Define waveform?
12.   Define peak value?
13.   Explain phase and phase difference?
14.   Write about series RL circuit?
15.   Write about series RC circuit?
16.   Write about series RLC circuit?
17.   Write about resonance?

18. Defind the quantity factor?

19. Write about Three-phase balanced circuits?

20. Explain delta connected three-phase system?

21. Explain star connected three-phase system?

22. Advantages of three phase over single phase system?

Long answer type questions

1. Explain following terms:

   i) Impedance ii) admittance iii) susceptance iv) conductance v) Power factor?

2. Write about series RL circuit?

3. Write about series RC circuit?

4. Explain behavior of RLC Series circuit?

5. Write equations for RMS value, average value, form factor and peak factor?

6. Explain the behavior of ac through resistance (R) derive instantaneous value of v and i, average power, power factor, instantaneous power, and relevant phasor.

7. Explain how the voltage and current in purely resistive circuit are in phase

8. Explain the behavior of ac through inductance (L).derive instantaneous value of v and i, average power, power factor, instantaneous power, and relevant phasor.

9. Explain the behavior of ac through capacitance(C).derive instantaneous value of v and i, average power, power factor, instantaneous power, and relevant phasor.

10. Discuss in detail about RL series circuit?

11. A resistance of 10Ω and inductance of 0.1H are connected in series across a supply of 220V,50Hz,determine a)impedance b)current flowing c)power factor d)phase angle b/w V&I

12. Discuss in detail about RC series circuit?

13. A non inductive resistance of 15 Ω is connected in series with a capacitance of 100 µf .capacitance across a 230V,50Hz single phase ac supply calculate a) impedance   b)current flowing c) power factor &phase angle

14. Discuss in detail about RLC series circuit?

15. A coil of resistance of 50 Ω and inductance of 0.1H is connected in series with a capacitance of 150 µf across a 200V,50Hz single phase ac supply calculate a)current   b)power factor c)power &voltage across the coil and capacitor draw the phasor diagram

16. Discuss in detail about RLC parallel circuit?

17. Explain   resonance in series RLC circuit?

18. Determine the resonant frequency for the circuit show in figure R=10 Ω L=0.5Mh,C=10µf

19. A220V,100Hz ac source supplies a series LCR circuit with a capacitor and a coil ,if the coil has 50M Ω resistance and 5Mh Inductance, find at resonance frequency of 100Hz what is the value of capacitor ,also calculate the Q factor and half power frequency of the circuits .

20. Explain the relation between line voltages and line currents in balanced star connection?

21. A balanced star connected load is supplied from a balanced three phase 400V, system, if the current in each phase is 15A, and lags the phase voltages by 30 , find the phase voltage and the total power.

22. Explain the relation between line voltages and line currents in balanced delta connection?

23. A three phase balanced system supplies 110V,to a delta connected load whose phase impedance are equal to (3.54+j3.54) Ω, determine the line current &draw the phasor diagram .

24. A three phase 400V,50Hz source supplies power to a three phase balanced motor load ,if the line current be 25A,power factor being 0.85 obtain the values of real and reactive power consumed.

25. Three coils each of resistance 10Ω and inductance of 30 mh are connected in star across 400v, 3phase, 50Hz ac supply mains. Calculate the current drawn in each line, power factor, and total power drawn?

26.   A balanced three-phase, delta connected load had per phase impedance of (25+j40) Ω.if 400v, 3 phase supply is connected to this load. Find (i) phase current (ii) line current (iii) power supplied to load?

Assignment questions

1) Define rms value and average value ?
2) Derive the equation for rms value?
3) Find the average value of a trapezoidal voltage wave ?
4) Discuss in detail about RLC series circuit?
5) Explain the relation between line voltages and line currents in balanced star connection?

UNIT 3 (QUESTION BANK)

MULTIPLE CHOICE QUESTIONS

1) If the primary winding is excited by a purely sinusoidal alternating voltage, than the nature of the flux produced is   (d)

    a. Square wave   b. Rectangular wave
    c. Saw tooth wave   d. Sinusoidal wave

2) For an ideal transformer winding resistances and leakage flux should be(c)

    a. Least, maximum   b. Both should be maximum
    c. Both should be zero   d. Maximum, least

3) If V1 is the primary applied voltage and E1 is the primary induced emf. For an ideal transformer   (b)

    a. V1 > E1   b. V1 = E1
    c. V1 < E1   d. V1 = E1 / 2

4) For the calculation of induced emf in a transformer the flux used in the equation is in its   (c)

    a. RMS value   b. Average value
    c. Maximum value   d. Double of its maximum value

5) The average emf induced per turn in a transformer is given by   (c)

a. $1.11f\ \Phi_m$
b. $0.5f\ \Phi_m$
c. $4f\ \Phi_m$
d. $8f\ \Phi_m$

 6) For a single phase no load transformer, which among the following losses will be minimum?   (c)

    a. hysteresis losses   b. eddy current losses
    c. copper losses   d. mechanical losses

7) For maximum efficiency in a transformer   (c)

    a. Core losses = 2 * copper losses   b. Core losses = copper losses / 2
    c. Core losses = copper losses   d. Core losses = copper losses ∧ 2

8) In transformers for maximum voltage regulation to occur, the power factor and magnitude is (a)

    a. Lagging, Z_{pu} b. Leading, Z_{pu}

    c. Unity, Z_{pu} d. None of these

9) For a transformer, no load primary current (I_0) has two components, magnetizing component and active components. The magnetizing component is given by (b)

    a. $I_0 \cos \Phi_0$ b. $I_0 \sin \Phi_0$

    c. $I_0 \cot \Phi_0$ d. $I_0 \tan \Phi_0$

10) When a resistance is to be transferred from primary to secondary side of transformer with the turns ratio as k, it must be (a)

    a. Multiplied by k ∧ 2   b. Multiplied by k

    c. Divided by k   d. Divided by k ∧ 2

11) Laminations and varnish are used to reduce the eddy current losses. The laminations and varnish tends to present a (a)

    a. High resistance path to eddy current

    b. Low resistance path to eddy current

    c. Low reluctance magnetic path

    d. High reluctance magnetic path

12) The hysteresis loss in a transformer is minimized by using (b)

a. Laminated sheets of steel

b. Special grade of heat treated grain oriented silicon steel

c. Bracing of transformer assemblies

d. Proper design of winding

13) In a step down autotransformer, if the transformation ratio increases then the saving of copper (a)

    a. Increases   b. Decreases

    c. Remains same   d. None of these

14) Whether the given autotransformer is step up or step down, its VA rating is always (a)

    a. Greater than the two winding transformer

         b. Equal to the two winding transformer

c. lesser than the two winding transformer

d. cannot say

15) The most commonly used connections for power systems as a step - up and step - down transformers are   (d)

a. Star - delta, star – star   b. Delta - star, star - delta

c. Star - star, delta – delta   d. Star - delta, delta - star

FILL IN THE BLANKS

1) Step-up transformers will ___ to the secondary.   increase the voltage)
2) ___ is the concept of one coil inducing a voltage into another coil (Mutual inductance)
3) ___ is sometimes constructed as a variable transformer (autotransformer)
4) Both resistances and leakage reactances of the transformer windings are _____   (Series effects)
5) To convert an ideal transformer into a practical transformer we add _____ (Primary winding resistance, leakage and secondary winding leakage reactance)
6) Primary winding resistance, leakage and secondary winding leakage reactance   (frequency and area of the core)
7) Silicon steel used in laminations, because it reduces _____ (Hysteresis loss)
8) When will be the efficiency of a transformer maximum ----- (Copper losses = iron losses)
9) A transformer can have zero voltage regulation at _____ (Leading power factor)
10)   Voltage regulation of transformer is given by _____ (E_2-V_2/E_2)

Short answer type questions

1. Define transformation ratio?

2. Explain the purpose of laminating the core in a transformer?

3. Explain the emf equation of a transformer and define each term. ?

4. Explain mutual induction principle?

5. Explain why the transformer measured in KVA?

6. Discuss what are the parts are in parts in transformer?

7. Explain the equivalent circuit diagram of transformer?

8. Define voltage regulation of a transformer?

9. Define efficiency of transformer?

10. Explain difference between core and shell type transformers?

11. Explain core type transformers?

12. Explain shell type transformers?

13. Explain iron losses of the transformers?

14. Explain core losses of the transformers?

15. Discuss about Eddy current loss in transformer.

16. Discuss about Hysteresis loss in a transformer

17. Can dc supply be used for transformers?

18. Write about star-star connection in a three a phase transformer

19. Write about delta-star connection in a three a phase transformer

20. What is an auto transformer?

Long answer type questions

1. Describe the construction details of transformer?

2. Explain the principle of operation of transformer?

3. Explain the losses in a Transformer?

4. Obtain the condition for maximum efficiency of a transformer?

5. Obtain the equivalent circuit of a single phase transformer?

6. Explain the determination of deducing equivalent circuit parameters?

7. Explain the ON load condition of a transformer?

8. Explain the NO load condition of a transformer?

9. Explain what the differences between an Ideal transformer and Practical are Transformer?

10. Explain in detail the difference between a core type and a shell type transformer.

11. Derive the approximate equivalent circuit of a 1 phase transformer.

12. Derive an emf equation of a single phase transformer.

13. Differentiate b/w two winding transformer& auto transformer?

14. Define efficiency of transformer, how to obtain it at different loads?

15.   Define regulation of transformer, state its expression, how it depends on the load power factor? sketch the regulation characteristics

16.   What is an auto transformer? Explain its working, state its application?

17.   What are the possible connection of three phase transformer ?state where they are used

18.   The emf per turn of a 1-φ, 2200/220 V, 50 Hz transformer is approximately 2V.Calculate i.The number of primary and secondary turns, and

 ii.The net cross -sectional area of core for a maximum flux density of 1.5 T?

19.   A 440/110 v transformer has a primary resistance of 0.03 ohms and secondary resistance of 0.02 ohms if iron losses at normal input is 150 watts   determine the secondary current at which maximum efficiency will occur and the value of this maximum efficiency at a unity power factor load?

20.   A 125 KVA transformer having primary voltage of 2000V at 50 Hz has 182 primary and 40 secondary turns. Neglecting losses, calculate

 i.The full load primary and secondary currents

 ii.The no-load secondary induced emf

Assignment questions

1. Derive an emf equation of a single phase transformer?

2. Analysis of practical transformer with winding resistance and leakage reactance?

3. Explain the voltage regulation of a transformer?

4. What is an auto transformer? explain its working?

5. Derive the approximate equivalent circuit of a 1 phase transformer.

UNIT 4 (QUESTION BANK)

MULTIFUL CHOICE QUESTIONS

1) Which of the following part is used in construction of DC machine but not in AC machine? (c)
   a) Armature Winding   b) Field winding
   c) Commutator   d) Shaft

2) The armature of DC motor is laminated to _____ (c)
   a) To reduce mass   b) To reduce hysteresis loss
   c) To reduce eddy current loss   d) To reduce inductance

3) In a DC shunt motor, speed is related to armature current as (d)
   a) Directly proportional to the armature current
   b) Proportional to the square of the current
   c) Independent of armature current
   d) Inversely proportional to the armature current

4) How speed of the DC shunt motor can be increased? (b)
   a) Decreasing the field current
   b) Increasing the field current
   c) Decreasing the load current
   d) Increasing the armature current

5) No-load speed of which of the following DC motor will be highest? (b)
   a) Shunt motor   b) Series motor
   c) Cumulative compound motor   d) Differentiate compound motor

6) In an induction motor, rotor runs at a speed (b)

   a) Equal to the speed of stator field
   b) Lower than the speed of stator field
   c) Higher than the speed of stator field
   d) Having no relation with the speed of stator field

7) The synchronous speed of an induction motor is defined as (a)

   a) Natural speed at which a magnetic field rotates
   b) The speed of a synchronous motor
   c) The speed of an induction motor at no load
   d) None of these

8) The frame of an induction motor is usually made of (b)

   a) Silicon steel   b) Cast iron

c) Aluminium   d) Bronze

9) The starting torque of a squirrel-cage induction motor is   (c)

   a) Full-load torque   b) Slightly more than full-load torque

   c) Low   d) Negligible

10)] Which of the following statements about a three-phase squirrel-cage
induction motor are false?   (3)
(a) It has no external electrical connections to its rotor
(b) A three-phase supply is connected to its stator
(c) A magnetic flux which alternates is produced
(d) It is cheap, robust and requires little or no skilled maintenance

(1) A,B,C only
(2) C and D only
(3) C only
(4) None of the above
(5) B only

11) Which of the following statements about a three-phase induction
motor are false?
(a) The speed of rotation of the magnetic field is called the synchronous speed
(b) A three-phase supply connected to the rotor produces a rotating magnetic
field
(c) The rotating magnetic field has a constant speed and constant magnitude
(d) It is essentially a constant speed type machine   (2)

(1) C only
(2) B only
(3) A only
(4) All of the above
(5) A and C only

12) Which of the following statements is false when referring to a three-phase
induction motor?
(a) The synchronous speed is half the supply frequency when it has four poles
(b) In a 2-pole machine, the synchronous speed is equal to the supply
frequency
(c) If the number of poles is increased, the synchronous speed is reduced
(d) The synchronous speed is inversely proportional to the number of poles (2)

(1) All of the above

(2) D only
(3) B only
(4) None of the above
(5) A and C only

13) A 4-pole three-phase induction motor has a synchronous speed of 25 rev/s. The frequency of the supply to the stator is: (a)
(a) 50 Hz
(b) 100 Hz
(c) 25 Hz
(d) 12.5 Hz

14) In a three-phase induction motor. Which of the following statements are false? (3)
(a) The slip speed is the synchronous speed minus the rotor speed
(b) As the rotor is loaded, the slip decreases
(c) The frequency of induced rotor e.m.f.'s increases with load on the rotor
(d) The torque on the rotor is due to the interaction of magnetic fields

(1) All of the above
(2) C only
(3) B only
(4) A and C only
(5) B and D only

15) In a three-phase induction motor. Which of the following statements are false?
(a) If the rotor is running at synchronous speed, there is no torque on the rotor
(b) If the number of poles on the stator is doubled, the synchronous speed is halved
(c) At no-load, the rotor speed is very nearly equal to the synchronous speed
(d) The direction of rotation of the rotor is opposite to the direction of rotation of the magnetic field to give maximum current induced in the rotor bars (5)

(1) A, B , C
(2) C only
(3) B only
(4) A and C only
(5) D only

16) The slip speed of an induction motor may be defined as the: (d)
(a) Number of pairs of poles ÷ frequency
(b) Rotor speed - synchronous speed

(c) Rotor speed + synchronous speed
(d) Synchronous speed - rotor speed

17) The slip speed of an induction motor depends upon: (c)
(a) Armature current
(b) Supply voltage
(c) Mechanical load
(d) Eddy currents

18) The starting torque of a simple squirrel-cage motor is: (a)
(a) Low
(b) Increases as rotor current rises
(c) Decreases as rotor current rises
(d) High

19) The slip speed of an induction motor: (c)
(a) is zero until the rotor moves and then rises slightly
(b) is 100 per cent until the rotor moves and then decreases slightly
(c) is 100 per cent until the rotor moves and then falls to a low value
(d) is zero until the rotor moves and then rises to 100 per cent

20) If the frequency of input power to an induction motor increases, the rotor
copper loss   (b)

a) Decreases   b) Increases
c) Remains the same   d) None of these

FILL IN THE BLANKS

1) In capacitor motors, the capacitor is connected in .... with the
starting winding.   (series)

2) In shaded pole motors the shading coil is normally made of..............(copper)

3) The running winding of a split phase induction motor has ....
resistance and .... reactance   (low, high)

4) Salient poles are generally used on........... (low and medium speed prime
movers)

5) Fleming's left hand rule may be applied to an electric generator to find out....... (direction of induced emf)

6) The expression for back emf in a DC MOTOR is Eb =_____($\Phi zn/60*P/A$)

7) The rotor speed of a six pole 50 Hz induction motor is 960 rpm the

percentage of slip   is _____ (.04)

8) The relation between rotor frequency and stator frequency is given by

_____($f_r=sf$)

Short answer type questions

1. Define slip in induction motor?
2. State Fleming's Left Hand Rule?
3. State Fleming's Right Hand Rule?
4. What is principle operation of 3-phase induction motor?
5. State two types of induction motors?
6. State the function of commutator?
7. State the function of slots?
8. State the function of slip rings?
9. What is the slip at start? How slip affects the rotor frequency?
10.   A three phase 4 pole, 50 Hz induction motor runs at 1460r.p.m determine its %slip?
11.   State the various losses in three induction motor
12.   Why are centrifugal switches provided on many single phase induction motor
13.   What is the use of condenser in single phase a.c. motor
14.   What are the two types of synchronous generator? where are they used suitably

Long answer type questions

1. Explain the production of rotating magnetic filed in a three phase induction motor.
2. Explain the principle of a 3 phase induction motor?
3. Explain the construction of a 3 phase induction motor?
4. Explain the slip-torque characteristics of 3-phase induction motor?
5. Derive the expression for rotor frequency?
6. Explain the V/F control method for controlling speed of three phase induction motor/
7. Explain the principle of a induction motor?
8. Explain the construction of a induction motor?
9. Explain the principle of a synchronous generator?
10. Explain the construction of a synchronous generator?
11. A three phase 4 pole, 50 Hz induction motor runs at 1410r.p.m determine its slip?
12. A three phase 4 pole, 50 Hz induction motor runs at 1400r.p.m determine its %slip?

Assignment questions

1. Explain the construction of dc machine?
2. State various types of dc motors along with their voltage and current relationships?
3. Explain the construction of a 3 phase induction motor?
4. Torque equation of induction motor? Explain the slip-torque characteristics and Explain the torque-speed characteristics?
5. What are the two types of synchronous generator? where are they used suitably

UNIT 5 (QUESTION BANK)

MULTIFUL CHOICE QUESTIONS

1) most commonly used wires are——— (c)

   a) V.I.R b) C.T.S

   c) P.V.C d) none of these

2) ----- device provides protection by destroying itself (a)

   a) fuse b) MCB

   c) MCCB d) ELCB

3) ------ wires are mainly used in the wiring (b)

   a) line,neutral b) line,neutral,earth

   c) line,earth d) positive,negative,neutral

4) earthing is mainly used for ------ (b)

   a) protecting premises b) safety of human being

   c) safety of equipments d) safety of wires used

5) earth wire is connected to the ----- (d)

   a) equipment b) distribution board

   c) transformer d) ground

6) MCB is used instead of fuse because -------- (d)

   a) very fast in operation b) no tripping circuit is required

   c) can be reset quickly d) all of these

7) serving in the cable is made up of ------ (a)

   a) jute cloth b) galvanized steel

   c) lead sheath d) wood

8) ampere-hour efficiency of lead acid battery is about ------ % (c)

   a) 10 to 20 b) 30 to 40

c) 70 to 80   d) 100

9) the electrical switch gear rated upto 1 KV is called ------- switch gear   (c)

    a) high voltage   b) medium voltage

    c) low voltage   d) domestic

10) ------- is the advantage of switch fuse unit   (d)

    a) less space is required   b) reduces number of joint

    c) compact construction   d) all of the above

FILL IN THE BLANKS

1) ELCB is an abbreviation of ----------   (earth leakage circuit breaker)
2) Domestic energy meter reads --------- consumption of house (energy)
3) The insulating material used for the low voltage cables is ----- (silk and cotton)
4) ------- cables are generally suitable for the voltages upto 11KV (belted)
5) MCB is an abbreviation of ------- (miniature circuit breaker)
6) MCCBs are used for the current ratings ------   (63 A to 3000 A)
7) ------- wires are commonly used in domestic wiring   (flexible)
8) The battery capacity is measured in --------   (Ah-ampere hour)
9) In plate earthing , the plate is made up of --------   (galvanised iron)
10)   The total domestic energy consumption is measured in ------ (unit or kwh)

Short answer type questions

1. What is switch fuse unit? State its advantages
2. Explain the necessity of ELCB.
3. State its advantages OF ELCB.
4. State The Application Areas Of MCCB
5. What is earthling? Expalin its importance.
6. Name the various method of earthling.
7. What is power factor?
8. What is battery backup device? Explain its need

Long answer type questions

1. Explain the necessity, construction and working of miniature circuit's breaks.
2. Compare MCB with fuse.
3. Explain the working of ELCB with neat diagram.
4. Explain the construction and working of MCCB.
5. Name the various types of wires used in electrical installation
6. Explain the construction of single core underground cables
7. Explain the various types of cables with neat diagrams.
8. State the various types of batteries and their application
9. Explain in important characteristics for batteries.
10. Write a note on calculation for energy consumption and savings
11. What is power factor? What is its significance?

What are battery backup devices

Assignment questions

1. Explain about SFU and MCB?
2. Write the chemical reactions in lead-acid battery?
3. Explain about Battery back-up?
4. Explain the working of ELCB with neat diagram?
5. What is power factor? What is its significance?

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year I Semester Examinations, December - 2016
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to EEE, ECE, CSE, EIE, IT)

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) What is the significance of j- notation in analysis of A.C circuits? [2]
 b) Obtain the V-I relationship for passive elements. [3]
 c) What is the relation between bandwidth and quality factor in RLC series resonant circuit?
 [2]
 d) State Tellegen's theorem. [3]
 e) What is a bleeder resistance? Why it is used in L-C filter? [2]
 f) Determine AC resistance for a semiconductor diode with a forward bias of 0.25V.
 Reverse saturation current at room temperature is of 1.2μA. [3]
 g) What is thermal runaway in transistor amplifier circuit? [2]
 h) In a transistor determine base current if emitter current is 1.00 mA and collector current is
 0.92 mA. [3]
 i) Define pinch-off voltage of a JFET. [2]
 j) What are the relative merits and demerits of a FET amplifier over a transistor amplifier?
 [3]

PART-B

(50 Marks)

2.a) Find equivalent resistance R_{ab} in figure 1. Resistor values are in ohms.
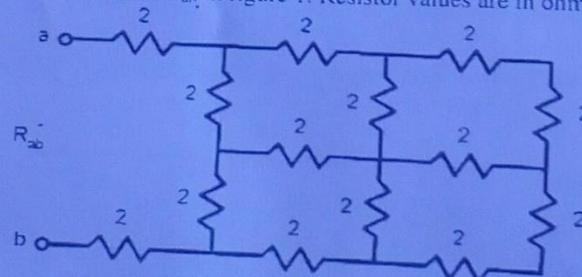
Figure: 1

b) Find the voltage across terminals 'x' and 'b' of the circuit as shown in figure 2 using source transformation. [6+4]
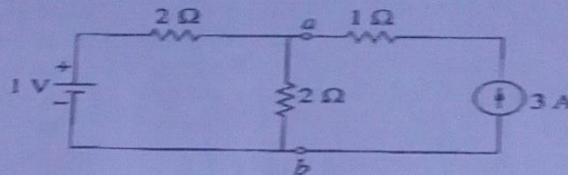
Figure: 2

OR

3.a) Derive an expression for power in a single phase circuit contains R, L elements in series across sinusoidal voltage.

b) A coil takes a current of 2.5 A at 0.8 lagging power factor from a 220 volt 60Hz single phase source. If the coil is modeled by a series RL circuit, find i) the complex power in the coil and ii) the values of R and L. [5+5]

4.a) An inductance of 0.5 H, a resistance of 5 ohm and a capacitance of 8 μF are in series across a 220 V a.c supply. Calculate the frequency at which the circuit resonates. Find the current at resonance, bandwidth, half power frequencies and the voltage across capacitance at resonance.

b) In the network shown in figure 3, the load consists of fixed capacitive reactance of 15Ω and a variable resistance R_1. Determine i) the value of R_1 for which the power transferred is a maximum and ii) The value of maximum power. [5+5]
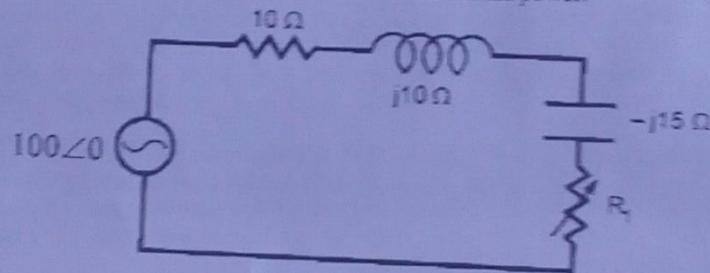
Figure: 3

OR

5.a) State and explain compensation theorem.

b) In the given figure 4, find the current flowing through R_1 using Thevenin's theorem. [4+6]
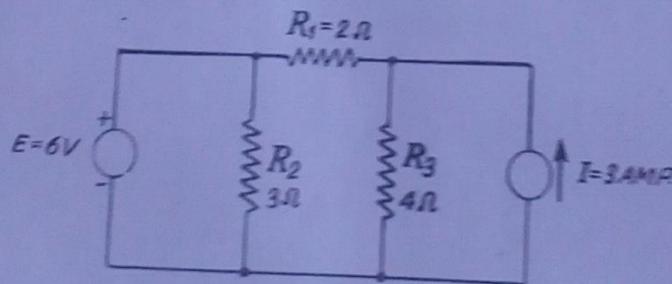
Figure: 4

6.a) Define diffusion capacitance of a P-N junction diode. Obtain an expression for the same. Why is the diffusion capacitance negligible for a reverse-biased diode?

b) A full-wave rectifier uses a double diode with each element having a constant forward resistance of 600Ω. The transformer r.m.s secondary voltage from the centre tap to each side is $280V$ and the load has a resistance of $3K\Omega$. Determine i) dc output power ii) ac input power iii) the rectification efficiency and iv) voltage regulation from no load to full-load. [5+5]

OR

7.a) Draw the circuit diagram of a full-wave bridge rectifier circuit and calculate i) I_{dc} ii) I_{rms} iii) ripple factor iv) efficiency of rectification and v) PIV rating of diode.

b) A half-wave rectifier has a load resistance of $4K\Omega$. If the diode and secondary of the transformer have a total resistance of 800Ω and the input voltage has an ac signal of $220V$ (peak value), determine i) peak, average and r.m.s values of current flowing ii) dc power output iii) ac power input iv) rectification efficiency and v) ripple factor. [5+5]

8.a) Sketch typical CB input characteristic curves for an NPN transistor. Label all variables. How would you calculate the input dynamic resistance of the transistor?

b) What is early effect? Explain how it affects the BJT characteristics in CB configuration. [6+4]

OR

9.a) Draw the biasing circuits in cases of i) fixed bias ii) fixed bias with resistor R_E in series with emitter and reference ground iii) potential divider bias.

b) A common emitter transistor amplifier circuit has the following characteristics: $h_{ie} = 1000\Omega$; $h_{fe} = 50$, $h_{re} = 2.5\times10^{-4}$, $h_{oe} = 25\times10^{-6}A/V$. If the load resistance $R_L = 10K\Omega$ and source resistance is 100Ω. Find the input resistance, output resistance and the voltage, current and power gains. [5+5]

10.a) What is meant by depletion region in JFET? Explain with suitable diagrams what are the basic differences between BJT and JFET?

b) When gate-source voltage is $-12V$ and gate current is $1\times10^{-6}mA$, determine the resistance between the gate and source of a given JFET. [6+4]

OR

11.a) Explain how can a Zener diode be used as voltage regulator.

b) State and explain different applications of SCR and Tunnel diode. [5+5]

---oo0oo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year I Semester Examinations, May/June - 2017
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to EEE, ECE, CSE, EIE, IT)

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)	State ohm's law and mention the limitations of it.	[2]
b)	Mention the advantages of sinusoidal alternating quantity.	[3]
c)	Explain what is meant by Bandwidth and Q factor?	[2]
d)	Give the statement of Reciprocity theorem.	[3]
e)	What is forward bias and reverse bias in a PN junction?	[2]
f)	Define ripple factor. What is the value of ripple factor for FWR and HWR?	[3]
g)	Why transistor is called as a current controlled device?	[2]
h)	Explain how h_{ie} is different from h_{fe} in CE configuration.	[3]
i)	How is drain current controlled in a JFET?	[2]
j)	List some applications of varactor diode.	[3]

PART-B
(50 Marks)

2.a)   For the circuit shown in figure 1, find the current flowing in all the branches.
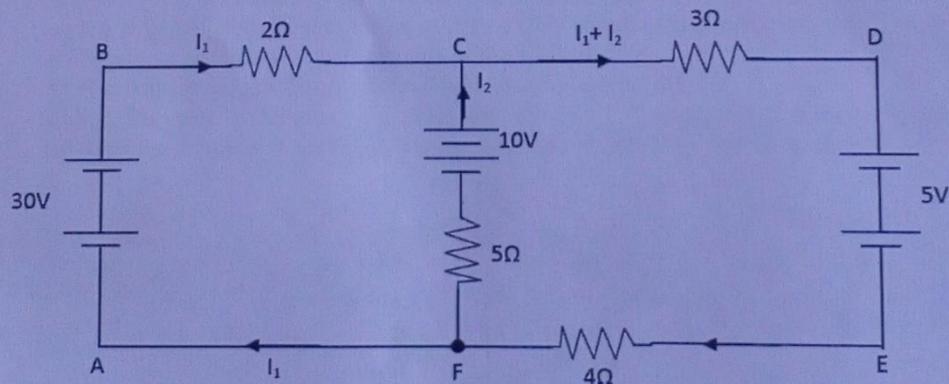
Figure: 1

b)   Find the rms value, average value and form factor of a half wave rectified voltage.[5+5]

OR

3.a) Define the following:
i) Alternating Quantity
ii) R.M.S. Value
iii) Average value
iv) Form factor.

b) Deduce an expression for the equivalent capacitance of three capacitors connected in
i) Parallel
ii) Series.
Hence calculate the equivalent capacitance if three capacitors of capacitances 2, 4, and 8 micro – Farads are connected in 1) Series 2) Parallel
If a voltage of 10 V is connected, calculate the charge stored in each case.   [5+5]

4.a) A series circuit comprising R, L and C is supplied at 220 V, 50 Hz. At resonance, the voltage across the capacitor is 550 V. The current at resonance is 1A. Determine the circuit parameters R, L and C.

b) In the network shown in figure 2, find the value of Z_L so that the power transferred from the source is maximum. Also find P_{max}.   [5+5]
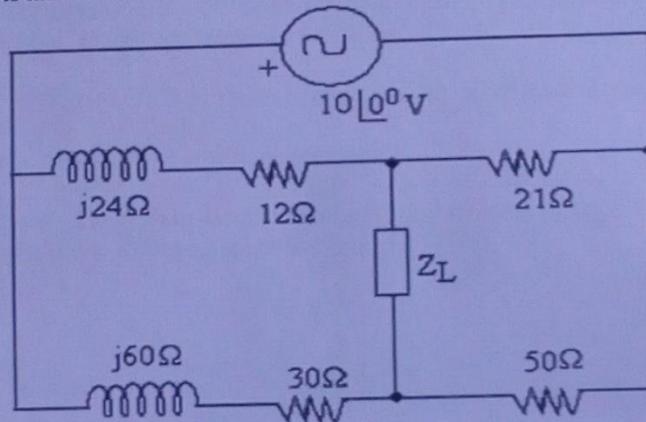
Figure: 2

OR

5.a) A coil having a resistance of 10 ohms and an inductance of 0.2H is connected in series with a 100×10^{-6} F capacitor across a 230V, 50Hz supply, Calculate:
i) The active and reactive components of the current
ii) The voltage across the coil, Draw the phasor diagram.

b) Using Thevenin's theorem, calculate the current I through the resistance connected between the terminal A and B (All resistances are in ohms) as shown in figure 3.   [5+5]
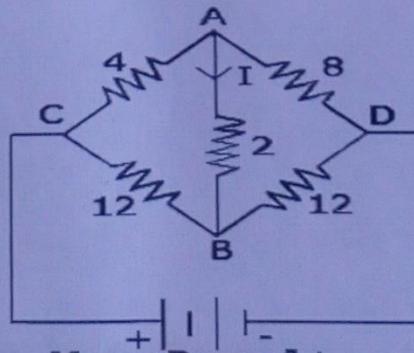
Figure: 3

6.a) Draw and explain the V-I characteristics of a pn junction.
   b) Compare Half wave rectifier, Full wave rectifier and Bridge rectifier in any four aspects.
   [5+5]

OR

7.a) What are the applications of the semiconductor diode? Explain each one with suitable circuit diagram.
   b) A silicon diode operates at forward voltage of 0.4V. Calculate the factor by which the current will be multiplied when the temperature is increased from 25^0C to 150^0C. [5+5]

8.a) Draw the input and output characteristics of n-p-n transistor in common base configuration and explain how they are obtained.
   b) In a fixed bias circuit using n-p-n transistor, find the operating point if V_{CC} = 24V, R_B = 220k, R_C = 4.7k. [5+5]

OR

9.a) Draw the circuit and explain the characteristics of CB configuration.
   b) Write short notes on thermal runaway problems. [6+4]

10.a) What is a zener diode? Draw the equivalent circuit of an ideal zener in the break down region.
    b) How is zener diode used as a voltage regulator? [5+5]

OR

11.a) Draw the circuit and explain the drain and gate characteristics of a JFET.
    b) Give the parameter values and specifications of a JFET. [6+4]

---ooOoo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year I Semester Examinations, December - 2017
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to EEE, ECE, CSE, EIE, IT, ETM)

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)	Define unilateral and bilateral elements.	[2]
b)	Differentiate Independent and Dependent sources.	[3]
c)	What is parallel resonance?	[2]
d)	State maximum power transfer theorem.	[3]
e)	Define ideal and practical resistances.	[2]
f)	Define ripple factor.	[3]
g)	What is early effect?	[2]
h)	Compare CB and CC Configurations.	[3]
i)	Differentiate between BJT and JFET.	[2]
j)	Give applications of zener diode.	[3]

PART-B

(50 Marks)

2.a) Explain in detail the volt-ampere relationship of R, L and C elements with neat diagrams.
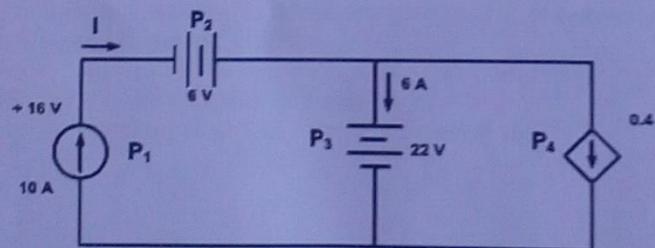 b) Calculate the power absorbed by each component in the circuit shown in below Figure 1.

[5+5]

Figure: 1

OR

3.a) Explain in detail about the steady state analysis of a series RL circuit with sinusoidal excitation.
  b) Explain the concept of j-notation.

[7+3]

4.a) Show that the resonant frequency ω_0 of an RLC series circuit is the geometric mean of ω_1 and ω_2, the lower and upper half power frequencies respectively.

b) A voltage $V = 50\angle 0^\circ$ V is applied to a series circuit consisting of fixed inductive reactance $X_L = 5$ ohms and a variable resistance R. Sketch the current locus diagram.

[5+5]

OR

5.a) State and explain Thevenin's theorem.

b) Using Thevenin's theorem, find the voltage 'V' in the circuit shown in Figure 2.   [4+6]
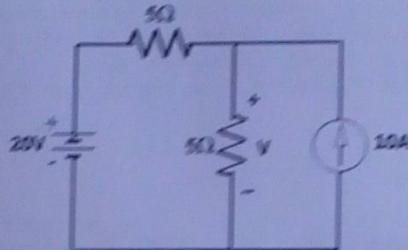
Figure: 2

6.a) Explain about a Fixed Bias Circuit, and derive the necessary DC currents and voltages.

b) Derive the expression for the stability "S" of a fixed bias Circuit.   [6+4]

OR

7.a) Explain the operation of a full wave bridge rectifier with relevant waveforms.

b) Explain the necessity of filter circuit after the rectifier circuit.   [6+4]

8.a) Explain the operation of a transistor with relevant diagrams.

b) Derive the relationship between α and β of a transistor.   [4+6]

OR

9.a) Explain compensation techniques with respect to BJT Biasing.

b) Draw the h-parameter model of a CB amplifier and derive the expressions for its voltage gain, current gain, input impedance and output impedance.   [4+6]

10.a) Draw and explain the typical transfer characteristics of an n-channel JFET.

b) What is pinch-off voltage? Explain.   [6+4]

OR

11.a) Explain the V-I characteristics of Tunnel diode.

b) Discuss the negative resistance property of tunnel diode.   [6+4]

---ooOoo---

Code No: 131AK

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year I Semester Examinations, May - 2018
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to EEE, ECE, CSE, EIE, IT, ETM)

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) Define dependent sources.   [2]
  b) The essential component of a toaster is an electrical element (a resistor) that converts
     electrical energy to heat energy. How much current is drawn by a toaster with resistance
     15Ω at 110 V?   [3]
  c) What is the condition for maximum power transfer in ac circuits?   [2]
  d) Derive the expression for resonant frequency.   [3]
  e) Define reverse break down voltage of a diode.   [2]
  f) Derive an expression for the average output voltage of a full wave rectifier.   [3]
  g) Draw the high frequency model of a transistor.   [2]
  h) In a BJT, the emitter current is 12 mA and the emitter current is 1.02 times the collector
     current. Find the base current.   [3]
  i) Why FET is called unipolar device?   [2]
  j) What are the special features of FET?   [3]

PART-B

(50 Marks)

2.a) Differentiate between active and passive elements.
  b) Obtain the equivalent resistance for the circuit in figure 1 and use it to find current i.
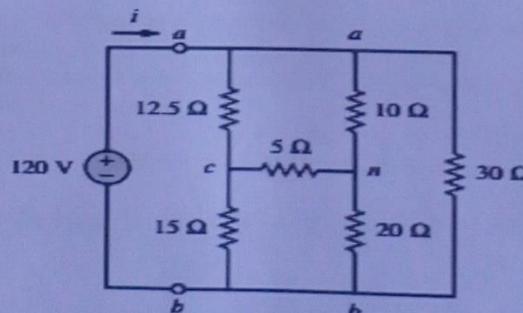   [4+6]

Figure: 1

OR

1.a) Define impedance, susceptance and admittance with examples.
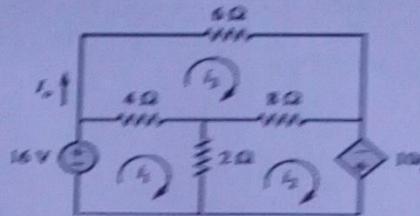b) Using mesh analysis, find I_o in the circuit shown in figure 2. [4+6]

Figure: 2

4.a) The Q factor of a RLC series circuit is 5 at a resonance frequency of 1 KHz. Assuming the power dissipation of 250W, when the current drawn is 1A, find the circuit parameters.
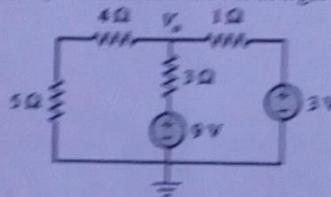b) Using superposition, find V_o in the circuit shown in figure 3. [5+5]

Figure: 3

OR

5.a) A 5 μF condenser is connected in series with a coil having inductance of 50mH. Determine the frequency of resonance, the resistance of the coil if a 50V source causing a current of 10mA is connected. What is the Q factor of the coil?
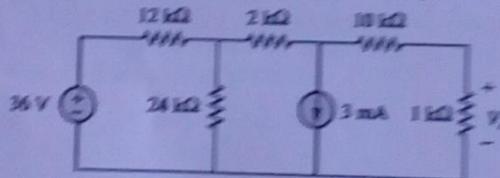b) Use Norton's theorem to find V_o in the circuit shown in figure 4. [4+6]

Figure: 4

6.a) Draw the V – I characteristics of a silicon diode, write an expression for diode current and discuss how cut in voltage changes with temperature.
b) Draw the circuits of a full wave rectifier using 2-diodes and 4-diodes. Discuss the relative merits and demerits. [5+5]

OR

7.a) Define diffusion capacitance in a P-N junction diode and discuss its dependence on diode biasing.
b) Derive expressions for ripple factor and efficiency of rectification for a full wave rectifier. [5+5]

8.a) Derive expressions for voltage gain, input-resistance and current gain for an emitter follower.

b) In the Silicon Transistor circuit shown in figure 5, find the maximum base resistance R_B to drive the Transistor into saturation. [5+5]
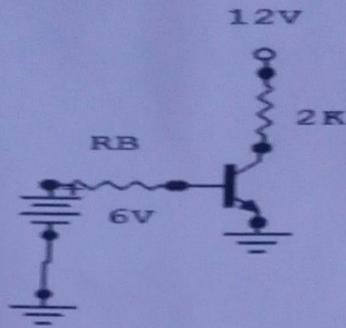

12V

2K

RB

6V

Figure: 5

OR

9.a) Discuss the need for biasing a transistor. Briefly explain about self biasing.

b) Explain how h-parameters can be determined from the static input and output characteristics. [5+5]

10.a) Discuss the characteristic differences between a BJT and a FET. Draw a diagram depicting the structure of a N-channel FET and identify the various terminals and the biasing voltages.

b) Explain how the pinch off voltage can be modified without changing the physical structure of a JFET. [5+5]

OR

11.a) Explain the operation of a FET with a neat diagram and V-I characteristics.

b) An N-channel JFET has a pinch voltage of -4.5V and $I_{DSS} = 9mA$ at what value of V_{GS} will I_D equal to 3mA? What is its g_m at this I_{DS}. [5+5]

---ooOoo---