

**B.Tech.**  
**(SEM I) THEORY EXAMINATION 2022-23**  
**Fundamentals of Electrical Engineering**

**Time: 3 Hours**

समय: 03 घण्टे

**Total Marks: 70**

पूर्णांक: 70

**Note:**

- Attempt all Sections. If require any missing data; then choose suitably.
- The question paper may be answered in Hindi Language, English Language or in the mixed language of Hindi and English, as per convenience.

**नोट:** 1. सभी प्रश्नों का उत्तर दीजिए। किसी प्रश्न में, आवश्यक डेटा का उल्लेख न होने की स्थिति में उपयुक्त डेटा स्वतः मानकर प्रश्न को हल करें।  
2. प्रश्नों का उत्तर देने हेतु सुविधानुसार हिन्दी भाषा, अंग्रेजी भाषा अथवा हिंदी एवं अंग्रेजी की मिश्रित भाषा का प्रयोग किया जा सकता है।

**SECTION A**

- 1. Attempt all questions in brief. 2 x 7 = 14**

निम्न सभी प्रश्नों का संक्षेप में उत्तर दीजिए।

a.	Describe briefly the following elements with examples: (i) Unilateral & Bilateral (ii) Active & passive
	निम्नलिखित तत्वों का उदाहरण सहित संक्षेप में वर्णन कीजिए (i) एकतरफा और द्विपक्षीय (ii) सक्रिय और निष्क्रिय
b.	Describe the following elements briefly: (i)Independent Ideal Voltage source (ii) Independent Ideal Current source
	निम्नलिखित शब्दों का संक्षेप में वर्णन करें: (i) स्वतंत्र आदर्श वोल्टेज स्रोत (ii) स्वतंत्र आदर्श वर्तमान स्रोत
c.	Determine the RMS value of sinusoidal current $i = I_m \sin\alpha$ in one complete cycle.
	एक पूर्ण चक्र में साइनसोइडल करेंट $i = I_m \sin\alpha$ का RMS मान निर्धारित करें।
d.	Draw the phasor diagram of a practical two-winding transformer in no-load condition.
	नो-लोड स्थिति में एक व्यावहारिक two-winding ट्रांसफॉर्मर का फेजर आरेख बनाएं।
e.	Describe briefly the different types of DC machines.
	विभिन्न प्रकार की डीसी मशीनों का संक्षेप में वर्णन कीजिए।
f.	Explain briefly the SFU.
	एसएफयू (SFU) को संक्षेप में समझाइए।
g.	What is the real power consumed by a pure inductor? Discuss with suitable diagrams.
h.	शुद्ध प्रेरक द्वारा उपभोग की जाने वाली वास्तविक शक्ति क्या है? उपयुक्त रेखाचित्रों के साथ विवेचना कीजिए।

**SECTION B**

- 2. Attempt any three of the following: 7 x 3 = 21**

निम्न में से किसी तीन प्रश्नों का उत्तर दीजिए।

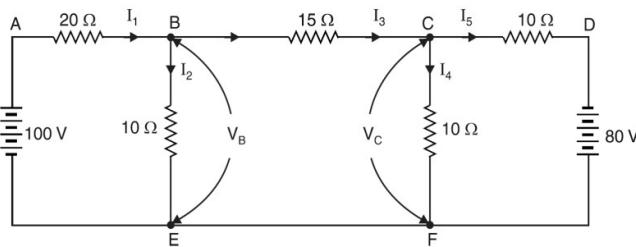
a.	Determine the current by Nodal method, through 2 ohm resistor for the network shown below? नीचे दिखाए गए नेटवर्क के लिए नोडल विधि द्वारा 2 ओम प्रतिरोध में प्रवाहित धारा का निर्धारण करें।
b.	Derive the equation for resonant frequency in the case of a series RLC circuit. and draw the phasor diagram of resultant Voltage and Current in a series RLC circuit in resonant condition.
	शृंखला (series) आरएलसी (RLC) सर्किट में अनुनाद आवृत्ति के लिए समीकरण व्युत्पन्न करें। और अनुनाद की स्थिति में एक शृंखला (series) आरएलसी (RLC) सर्किट में परिणामी वोल्टेज और करंट का फेजर आरेख बनाएं।
c.	Describe different types of transformer losses and methods to minimize it.
	ट्रांसफॉर्मर में होने वाली विभिन्न प्रकार की हानियों तथा उन्हें कम करने के उपायों का वर्णन कीजिए।
d.	Derive the EMF equation of the DC generator.
	DC जनित्र का EMF समीकरण व्युत्पन्न कीजिए।
e.	Discuss briefly the types of batteries and explain anyone with the necessary diagram.
	संक्षेप में बैटरी के प्रकारों पर चर्चा करें और किसी एक को आवश्यक अरिख के साथ व्याख्या कीजिए।

## SECTION C

3. Attempt any one part of the following: 7 x 1 = 7  
निम्न में से किसी एक प्रश्न का उत्तर दीजिए।

(a)	Determine the currents in all branches of the circuit as shown in below figure, using Mesh current method? मेश करंट विधि का उपयोग करके, नीचे दिए गए चित्र में सर्किट की सभी शाखाओं में करंट का निर्धारण कीजिए।
(b)	Determine the currents in the various branches of the circuit shown in Figure by nodal analysis?

नोडल विश्लेषण द्वारा दिखाए गए सर्किट की विभिन्न शाखाओं में धाराओं का निर्धारण करें?



**4. Attempt any one part of the following:**

**7 x 1 = 7**

निम्न में से किसी एक प्रश्न का उत्तर दीजिए।

(a)	Derive the mathematical relationship between phase and line quantities in a 3-phase star configuration with the help of phasor diagram?
	फेजर डायग्राम की मदद से 3-फेज स्टार संरचना में फेज और लाइन राशियों के बीच गणितीय संबंध को व्युत्पन्न करें?
(b)	Determine the mathematical expression for instantaneous power and average power in the case of R and L elements connected in series across a single phase AC supply of voltage $v = V_m \sin \omega t$ . Also draw the instantaneous power waveform.
	एकल फेज एसी वोल्टेज $v = V_m \sin \omega t$ की आपूर्ति में शृंखला में जुड़े R और L तत्वों में ताकालिक शक्ति और औसत शक्ति के बीच गणितीय अभिव्यक्ति निर्धारित करें। तथा ताकालिक शक्ति का वेवफार्म भी बनाएं।

**5. Attempt any one part of the following:**

**7 x 1 = 7**

निम्न में से किसी एक प्रश्न का उत्तर दीजिए।

(a)	A 100 kVA, single-phase transformer has an iron loss of 600 W and a copper loss of 1.5 kW at full-load current. Calculate the efficiency at (i) full load and 0.8 lagging pf, and (ii) half load and unity pf
	एक 100 केवीए, एकल-फेज ट्रांसफार्मर में पूर्ण लोड की स्थिति में 600 W का iron loss और 1.5 kW का copper loss होता है। निम्न स्थितियों में दक्षता की गणना कीजिए। (i) पूर्ण लोड और 0.8 lagging pf, और (ii) आधा लोड और unity pf
(b)	Draw the complete equivalent circuit model of a practical transformer and explain its different parameters.
	व्यावहारिक ट्रांसफार्मर का पूर्ण समतुल्य परिपथ मॉडल बनाइए तथा इसके विभिन्न प्राचलों (parameters) को समझाइए।

**6. Attempt any one part of the following:**

**7 x 1 = 7**

निम्न में से किसी एक प्रश्न का उत्तर दीजिए।

(a)	Describe the working principle and slip-torque characteristics of a three-phase Induction motor.
	तीन-फेज इंडक्शन मोटर के कार्य सिद्धांत और स्लिप-टॉर्क (slip-torque) अभिलक्षणों

	का वर्णन कीजिए।
(b)	A six-pole, 2-circwave-connected armature of a DC machine has 300 conductors and runs at 1000 rpm. The emf generated on the open circuit is 400 V. Determine the useful flux per pole.
	एक डीसी (DC) मशीन के six-pole, 2-circwave-connected आर्मचर में 300 कंडक्टर हैं और यह 1000 RPM पर चलता है। खुले परिपथ पर उत्पन्न विद्युत वाहक बल 400 V है। प्रति पोल उपयोगी फ्लक्स का मान ज्ञात कीजिए।

7. Attempt any *one* part of the following:

$7 \times 1 = 7$

निम्न में से किसी एक प्रश्न का उत्तर दीजिए।

(a)	Draw the typical constructional diagram of a four-core armoured XLPE cable and write down the purpose of its different layers.
	चार-कोर युक्त XLPE केबल का विशिष्ट संरचनात्मक आरेख बनाएं और इसकी विभिन्न परतों (layers) का उद्देश्य लिखें।
(b)	Describe the classification of earthing based on the purpose, with the help of examples.
	उद्देश्य के आधार पर अर्थिंग (earthing) के वर्गीकरण का उदाहरणों की सहायता से वर्णन कीजिए।

## B.TECH.

(SEM II) THEORY EXAMINATION 2022-23  
FUNDAMENTALS OF ELECTRICAL ENGINEERING

Time: 3 Hours

Total Marks: 70

समय: 03 घण्टे

पूर्णांक: 70

## Note:

1. Attempt all Sections. If require any missing data; then choose suitably.
2. The question paper may be answered in Hindi Language, English Language or in the mixed language of Hindi and English, as per convenience.

**नोट:** 1. सभी प्रश्नों का उत्तर दीजिए। किसी प्रश्न में, आवश्यक डेटा का उल्लेख न होने की स्थिति में उपयुक्त डेटा स्वतः मानकर प्रश्न को हल करें।  
 2. प्रश्नों का उत्तर देने हेतु सुविधानुसार हिन्दी भाषा, अंग्रेजी भाषा अथवा हिंदी एवं अंग्रेजी की मिश्रित भाषा का प्रयोग किया जा सकता है।

## SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14

निम्न सभी प्रश्नों का संक्षेप में उत्तर दीजिए।

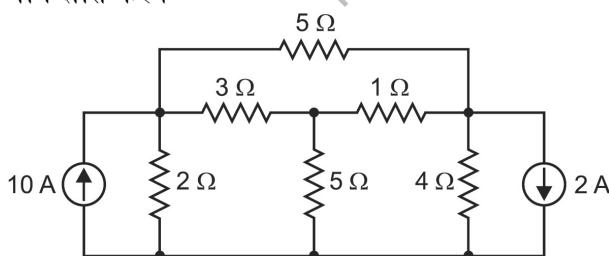
- (a) Describe KCL and KVL with necessary circuit representation.  
आवश्यक सर्किट प्रतिनिधित्व के साथ KCL और KVL का वर्णन करें।
- (b) Describe the Active elements and Passive elements with examples.  
सक्रिय तत्वों और निष्क्रिय तत्वों का उदाहरण सहित वर्णन करें।
- (c) Derive that average power consumed by a pure inductor is zero  
व्युत्पन्न कीजिये कि एक शुद्ध इंडक्टर द्वारा खपत की गई औसत शक्ति शून्य है।
- (d) Draw the phasor diagram of a practical two winding transformer in no-load condition?  
नो-लोड स्थिति में एक व्यावहारिक दो वाइंडिंग ट्रांसफार्मर का फेजर आरेख बनाएं?
- (e) Describe briefly the different types of DC machines?  
विभिन्न प्रकार की डीसी मशीनों का संक्षेप में वर्णन करें?
- (f) Describe briefly different types of cables?  
विभिन्न प्रकार के केबलों का संक्षेप में वर्णन करें?
- (g) Determine the average value of sinusoidal current  $i = I_m \sin\omega t$  in one complete cycle?  
एक पूर्ण चक्र में साइनसोइडल धारा  $i = I_m \sin\omega t$  का औसत मान निर्धारित करें?

## SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

निम्न में से किसी तीन प्रश्नों का उत्तर दीजिए।

- (a) Use nodal analysis to find the currents in various resistors of the circuit shown below.  
नोडल विश्लेषण का उपयोग कर नीचे दिखाए गए सर्किट के विभिन्न प्रतिरोधों में धाराओं का मान ज्ञात करें।



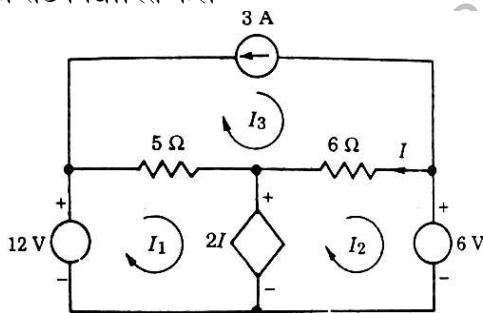
- (b) Determine the mathematical expression for instantaneous power and average power in case of R, L and C, elements connected in series across a single phase AC supply of voltage  $v=V_m \sin(\omega t)$ ? Also draw the instantaneous power waveform?  
 वोल्टेज  $v=V_m \sin(\omega t)$  की एकल फेज एसी आपूर्ति में शृंखला में जुड़े R, L और C तत्व के मामले में तात्कालिक शक्ति और औसत शक्ति के लिए गणितीय अभिव्यक्ति निर्धारित करें। तात्कालिक शक्ति का तरंगरूप भी बनाइये।
- (c) Describe different types of transformer losses and methods to minimize it?  
 विभिन्न प्रकार के ट्रांसफार्मर हानियों और इसे कम करने के तरीकों का वर्णन करें।
- (d) Derive the torque equation for DC machines.?  
 डीसी मशीनों के लिए टॉर्क समीकरण प्राप्त करें।
- (e) Describe briefly the types of batteries and explain anyone with necessary diagram?  
 बैटरियों के प्रकारों का संक्षेप में वर्णन करें और आवश्यक चित्र सहित किसी एक को समझाएँ।

### SECTION C

3. Attempt any one part of the following:  $7 \times 1 = 7$

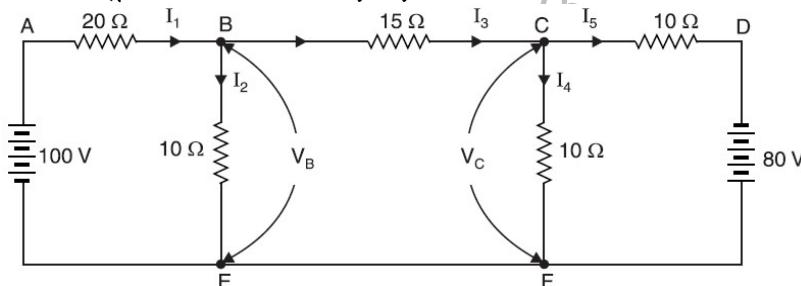
निम्न में से किसी एक प्रश्न का उत्तर दीजिए।

- (a) Determine the set of Mesh equations that are required to solve the network given in below circuit diagram.  
 नीचे दिए गए सर्किट आरेख में दिए गए नेटवर्क को हल करने के लिए आवश्यक मेष समीकरणों का सेट निर्धारित करें।



- (b) Determine the currents in the various branches of the circuit shown below by nodal analysis.

नोडल विश्लेषण द्वारा नीचे दिखाए गए सर्किट की विभिन्न शाखाओं में धाराओं का निर्धारण करें।



4. Attempt any one part of the following:  $7 \times 1 = 7$

निम्न में से किसी एक प्रश्न का उत्तर दीजिए।

- (a) Derive the mathematical relationship between phase and line quantities in a 3-phase star configuration with the help of phasor diagram?  
 फेजर आरेख की सहायता से 3-फेज तारा विन्यास में फेज और लाइन मात्राओं के बीच गणितीय संबंध प्राप्त करें?

- (b) Derive the equation for resonant frequency in case of series RLC circuit. Also draw the phasor diagram of resultant Voltage and Current in series RLC circuit in resonant condition.

श्रृंखला RLC सर्किट और समानांतर RLC सर्किट के मामले में अनुनाद आवृत्ति के लिए समीकरण प्राप्त करें। अनुनाद स्थिति में श्रृंखला आरएलसी सर्किट में परिणामी वोल्टेज और करंट का फेजर आरेख भी बनाएं।

**5. Attempt any one part of the following:**

**7 x 1 = 7**

निम्न में से किसी एक प्रश्न का उत्तर दीजिए।

- (a) A 100 kVA, single-phase transformer has iron loss of 600 W and a copper loss of 1.5 kW at full-load current. Calculate the efficiency at (i) full load and 0.8 lagging pf, and (ii) half load and unity pf?

एक 100 kVA, एकल-फेज ट्रांसफार्मर में पूर्ण-लोड धारा पर 600 W की आयरन हानि और 1.5 किलोवाट की कॉपर हानि होती है। (i) पूर्ण लोड और 0.8 पश्चगामी pf, और (ii) अर्ध लोड और इकाई pf पर दक्षता की गणना करें।

- (b) Draw the complete equivalent circuit model of a real transformer and explain its different parameters?

एक वास्तविक ट्रांसफार्मर का पूर्ण समतुल्य सर्किट मॉडल बनाएं और इसके विभिन्न parameters की व्याख्या करें।

**6. Attempt any one part of the following:**

**7 x 1 = 7**

निम्न में से किसी एक प्रश्न का उत्तर दीजिए।

- (a) Describe the working principle and slip-torque characteristics of a three phase Induction motor?

तीन फेज इंडक्शन मोटर के कार्य सिद्धांत और स्लिप-टॉर्क विशेषताओं का वर्णन करें।

- (b) Describe different types of DC machines with necessary circuit diagrams.

आवश्यक सर्किट आरेखों के साथ विभिन्न प्रकार की डीसी मशीनों का वर्णन करें।

**7. Attempt any one part of the following:**

**7 x 1 = 7**

निम्न में से किसी एक प्रश्न का उत्तर दीजिए।

- (a) Draw the typical constructional diagram of a Copper, 3 core, armoured XLPE cable and describe the purpose of each layer.

कॉपर, 3 कोर, बछतरबंद XLPE केबल का विशिष्ट रचनात्मक आरेख बनाएं और प्रत्येक लेयर के उद्देश्य का वर्णन करें।

- (b) Describe the working principle of an MCB along with the necessary circuit diagrams? आवश्यक सर्किट आरेखों के साथ एमसीबी के कार्य सिद्धांत का वर्णन करें?



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BTECH

**(SEM I) THEORY EXAMINATION 2021-22**  
**BASIC ELECTRICAL ENGINEERING**

**Time: 3 Hours****Total Marks: 100****Notes:**

- Attempt all Sections and Assume any missing data.
- Appropriate marks are allotted to each question, answer accordingly.

<b>SECTION-A</b>		Attempt All of the following Questions in brief	Marks (10X2=20)
Q1(a)		What is use of form factor and peak factor?	
Q1(b)		What is the ratio of no-load speed to full load speed of a 200 kVA, 12 poles, 2200 V, 3 phase, 60 Hz synchronous motor?	
Q1(c)		Write Difference between EMF and Potential Difference	
Q1(d)		Define power factor	
Q1(e)		Is the superposition theorem valid for direct calculation of power? Explain briefly.	
Q1(f)		What is the need of commutator in DC generator?	
Q1(g)		Why is Transformer Ratings done in Volt Amperes (VA).	
Q1(h)		Draw the no load phasor diagram of a transformer	
Q1(i)		For heavy loads, What is the relation between torque (T) and slip (S) in induction motor.	
Q1(j)		What is the difference between asynchronous motor and synchronous motor?	

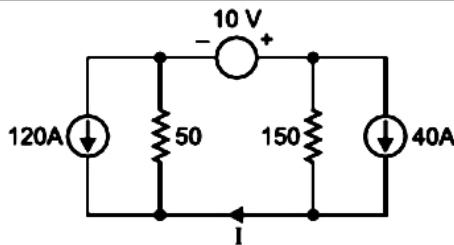
<b>SECTION-B</b>		Attempt ANY THREE of the following Questions	Marks (3X10=30)
Q2(a)		(i) Derive the emf equation of a transformer (ii) Derive the condition for maximum efficiency in single phase transformer	
Q2(b)		i) List all the important parts of a D.C. Motor and explain the importance of each.. ii) Calculate the emf generated by 4 pole wave wound generator having 65 slots with 12 conductors per slot when driven at 1200 rpm. The flux per pole is 0.02 wb.	
Q2(c)		Using Thevenin theorem, find current in $1 \Omega$ resistor in the circuit shown in figure below:	
Q2(d)		Use nodal analysis to find the voltage across and current through $4 \Omega$ resistor in Figure given below:	
Q2(e)		Use superposition theorem to find current I in the circuit shown in Figure below. All resistance are in ohms.	



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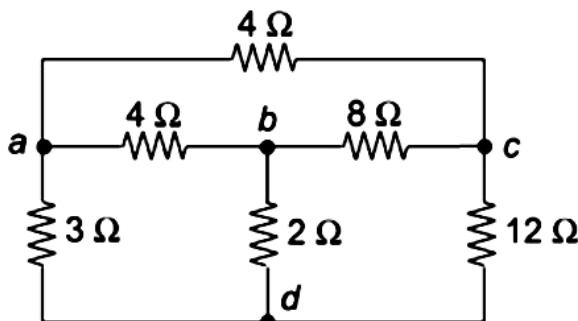
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**BTECH**  
**(SEM I) THEORY EXAMINATION 2021-22**  
**BASIC ELECTRICAL ENGINEERING**

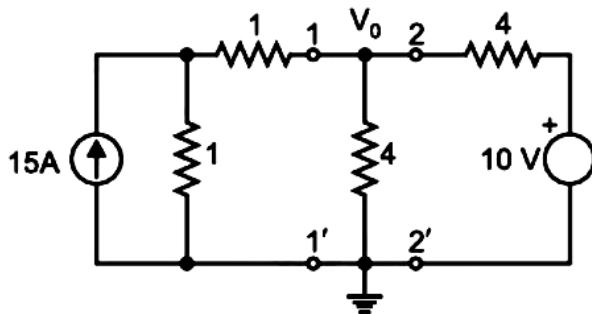


<b>SECTION-C</b>	Attempt ANY ONE following Question	Marks (1X10=10)
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- Q3(a) Reduce the network of Fig. 1 to obtain the equivalent resistance as seen between nodes ad.



- Q3(b) With the help of Norton's theorem, find  $V_0$  in the circuit shown below. All resistances are in Ohms.



<b>SECTION-C</b>	Attempt ANY ONE following Question	Marks (1X10=10)
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- Q4(a) A series R – L – C circuit consists of  $R = 1000 \Omega$ ,  $L = 100 \text{ mH}$  and  $C = 10 \mu\text{F}$ .

The applied voltage across the circuit is 100 V.

- Find the resonant frequency of the circuit.
- Find the quality factor of the circuit at the resonant frequency.
- At what angular frequencies do the half power points occur?
- Calculate the bandwidth of the circuit.

- Q4(b) Three impedances of  $(70.7 + j 70.7) \Omega$ ,  $(120 + j 160) \Omega$  and  $(120 + j 90) \Omega$  are connected in parallel across a 250 V supply. Determine (i) admittance of the circuit (ii) supply current and (iii) circuit power factor.

<b>SECTION-C</b>	Attempt ANY ONE following Question	Marks (1X10=10)
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- Q5(a) A transformer on no-load has a core loss of 50W, draws a current of 2A and has an induced emf of 230V. Determine the no-load power factor, core loss current and magnetizing current. Also, calculate the no-load circuit parameters of the transformer. Neglect winding resistance and leakage flux.

- Q5(b) Explain the performance of principal of operation of single phase transformer.

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**BASIC ELECTRICAL ENGINEERING**


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<b>SECTION-C</b> Attempt ANY ONE following Question		<b>Marks (1X10=10)</b>
Q6(a)	A 4-pole generator with 400 armature conductors has a useful flux of 0.04Wb per pole. What is the emf produced if the machine is wave wound and runs at 1200rpm? What must be the speed at which the machine should be driven to generate the same emf if machine is lap wound?	
Q6(b)	An 8-pole, 400V shunt motor has 960 wave connected armature conductors. The full load armature current is 40A and flux per pole is 0.02Wb. The armature resistance is $0.1\Omega$ and the contact drop is 1V per brush. Calculate the full load speed of the motor.	

<b>SECTION-C</b> Attempt ANY ONE following Question		<b>Marks (1X10=10)</b>
Q7(a)	(i) Explain the slip torque characteristics of the three-phase induction motor (ii) The voltage applied to the stator of a three phase, 4 pole induction motor has frequency of 50 Hz. Th frequency of the emf induced in the rotor is 15.5 Hz. Determine the slip and speed at which motor is running.	
Q7(b)	(i) Write short notes on MCB and MCCB (ii) Write short notes on characteristics of batteries.	



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Subject Code: KEE201T

Roll No:

**BTECH**  
**(SEM II) THEORY EXAMINATION 2021-22**  
**BASIC ELECTRICAL ENGINEERING**

**Time: 3 Hours**

**Total Marks: 100**

**Notes:**

- Attempt all Sections and Assume any missing data.
- Appropriate marks are allotted to each question, answer accordingly.

<b>SECTION-A</b>		Attempt All of the following Questions in brief	Marks (10*2=20)	CO
Q1(a)		Draw the V-I characteristics for ideal voltage source and ideal current source.	1	
Q1(b)		Why is linearity important in circuits?	1	
Q1(c)		Why do we represent A.C. by sinusoidal waveform?	2	
Q1(d)		Why the average power consumed in purely inductive circuit is zero?	2	
Q1(e)		What is the nature of load for negative voltage regulation in the transformer?	3	
Q1(f)		Draw the phasor diagram for an ideal transformer on no load.	3	
Q1(g)		What is the generated EMF in D.C. generator?	4	
Q1(h)		Why synchronous motor is doubly excited?	4	
Q1(i)		What are the common problems that occur during electrical installations?	5	
Q1(j)		Write any two battery characteristics. Also, define any one.	5	

<b>SECTION-B</b>		Attempt ANY THREE of the following Questions	Marks(3*10=30)
Q2(a)		Calculate equivalent resistance across terminals A and B using star-delta or delta-star conversion for the given figure below.	
Q2(b)		<p>Consider the circuit shown in figure below and calculate the following #</p> <p>a. Determine the resonant frequencies, <math>\omega</math>(rad/s) and <math>f</math>(Hz) of the tank circuit.  b. Find the Q of the circuit at resonance.  c. Calculate the voltage across the circuit at resonance.  d. Solve for currents through the inductor and the resistor at resonance.</p>	2



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**(SEM II) THEORY EXAMINATION 2021-22**  
**BASIC ELECTRICAL ENGINEERING**

Q2(c)	State the significance of the regulation of transformer. A 4kVA, 200/400 V, 50 Hz, single phase transformer has equivalent resistance referred to primary as $0.15 \Omega$ . Calculate, (i) The total copper losses on full load (ii) The efficiency while supplying full load at 0.9 power factor lagging (iii) The efficiency while supplying half load at 0.8 power factor leading. Assume total iron losses equal to 60 W.	3
Q2(d)	What are the factors affecting speed of a DC motor? Compare lap and wave type armature winding.	4
Q2(e)	Draw and explain the characteristics of a battery. Calculate the backup of a battery of 150AH connected to load of 150 watts, and the supply voltage is 12V.	5

<b>SECTION-C</b>   Attempt ANY ONE following Question		Marks (1*10=10)
Q3(a)	<p>Determine the current through A-B in the given circuit using Norton's theorem.</p>	1
Q3(b)	<p>Using the Nodal method, find the current through resistor <math>r_2</math> in the given figure below.</p>	1

<b>SECTION-C</b>   Attempt ANY ONE following Question		Marks (1*10=10)
Q4(a)	Derive mathematically dynamic impedance ( $Z$ ) offered by RLC parallel circuit under resonance. Also, draw its phasor diagram.	2
Q4(b)	<p>Two coils having resistance <math>5 \Omega</math> and <math>10 \Omega</math> and inductances <math>0.04 \text{ H}</math> and <math>0.05 \text{ H}</math> respectively are connected in parallel across a <math>200 \text{ V}, 50 \text{ Hz}</math> supply.</p> <p>Calculate:</p> <ol style="list-style-type: none"> <li>Conductance, susceptance and admittance of each coil.</li> <li>Total current drawn by the circuit and its power factor.</li> <li>Power absorbed by the circuit.</li> </ol>	2



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**BTECH**  
**(SEM II) THEORY EXAMINATION 2021-22**  
**BASIC ELECTRICAL ENGINEERING**

<b>SECTION-C</b>		Attempt ANY ONE following Question	Marks (1*10=10)
Q5(a)		What is the purpose of an equivalent circuit of a transformer? Obtain the approximate equivalent circuit of a transformer as referred to the primary with all necessary parameters.	3
Q5(b)		A 20kVA, 2000V/200V, single-phase, 50 Hz transformer has a primary resistance of $1.5 \Omega$ and reactance of $2 \Omega$ . The secondary resistance and reactance are $0.015 \Omega$ and $0.02 \Omega$ respectively. The no load current of transformer is 1A at 0.2 power factor. Determine: (i) Equivalent resistance, reactance and impedance referred to primary (ii) Supply current (iii) Total copper loss Draw approximate equivalent circuit.	3

<b>SECTION-C</b>		Attempt ANY ONE following Question	Marks (1*10=10)
Q6(a)		Derive an expression for torque in DC motor. A 230V DC series motor draws a 50A current. Armature and series field winding resistances are $0.2 \Omega$ and $0.1 \Omega$ , respectively. Calculate (i) brush voltage and (ii) back EMF.	4
Q6(b)		Why is an induction motor called a generalized transformer? Compare the induction motor with the transformer.	4

<b>SECTION-C</b>		Attempt ANY ONE following Question	Marks (1*10=10)
Q7(a)		How do you calculate energy consumption per kWh? Calculate the electricity bill amount for a leap year, if the following devices are used as specified. (A) 3 Bulbs of 40W for 6 hours per day (B) 4 Tube lights of 50W for 8 hours per day Given the rate of electricity is Rs. 7.50 per unit.	5
Q7(b)		Explain the construction, rating, specific applications of at least two types of wires and cables used in electrical installations.	5



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Subject Code: KEE101

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**BTECH**  
**(SEM I) THEORY EXAMINATION 2021-22**  
**BASIC ELECTRICAL ENGG**

**Time: 3 Hours****Total Marks: 100****Notes:**

- Attempt all Sections and Assume any missing data.
- Appropriate marks are allotted to each question, answer accordingly.

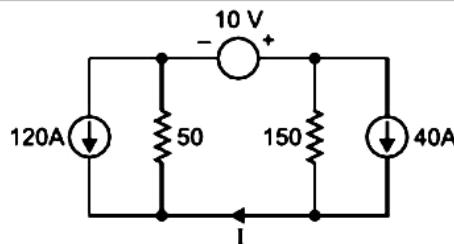
<b>SECTION-A</b>		Attempt All of the following Questions in brief	Marks (10X2=20)
Q1(a)		Define the expression for form factor and peak factor	
Q1(b)		State Kirchoff's law.	
Q1(c)		Define electromotive force	
Q1(d)		Define power factor	
Q1(e)		Write the statement of superposition theorem	
Q1(f)		What is the function of commutator in DC generator	
Q1(g)		What is KVA rating of a transformer	
Q1(h)		Draw the no load phasor diagram of a transformer	
Q1(i)		Define a slip of an induction motor	
Q1(j)		What is called synchronous speed in AC machines	

<b>SECTION-B</b>		Attempt ANY THREE of the following Questions	Marks (3X10=30)
Q2(a)		(i) Derive the emf equation of a transformer (ii) Derive the condition for maximum efficiency in single phase transformer	
Q2(b)		i) List all the important parts of a D.C. Motor and explain the importance of each.. ii) Calculate the emf generated by 4 pole wave wound generator having 65 slots with 12 conductors per slot when driven at 1200 rpm. The flux per pole is 0.02 wb.	
Q2(c)		Using Thevenin theorem, find current in $1\ \Omega$ resistor in the circuit shown in figure below:	
Q2(d)		Use nodal analysis to find the voltage across and current through $4\ \Omega$ resistor in Figure given below:	
Q2(e)		Use superposition theorem to find current I in the circuit shown in Figure below. All resistances are in ohms.	



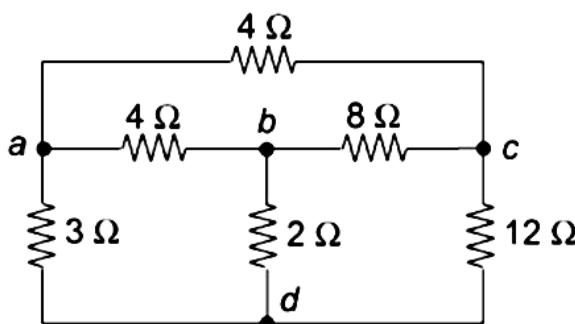
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**BTECH**  
**(SEM I) THEORY EXAMINATION 2021-22**  
**BASIC ELECTRICAL ENGG**

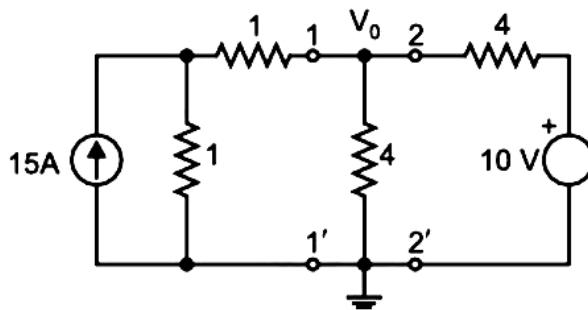


**SECTION-C**    Attempt ANY ONE following Question                          Marks (1X10=10)

- Q3(a) Reduce the network of Fig. 1 to obtain the equivalent resistance as seen between nodes ad.



- Q3(b) With the help of Norton's theorem, find  $V_0$  in the circuit shown below. All resistances are in Ohms.



**SECTION-C**    Attempt ANY ONE following Question                          Marks (1X10=10)

- Q4(a) A series R – L – C circuit consists of  $R = 1000 \Omega$ ,  $L = 100 \text{ mH}$  and  $C = 10 \mu\text{F}$ . The applied voltage across the circuit is 100 V.  
 (i) Find the resonant frequency of the circuit.  
 (ii) Find the quality factor of the circuit at the resonant frequency.  
 (iii) At what angular frequencies do the half power points occur?  
 (iv) Calculate the bandwidth of the circuit.

- Q4(b) Three impedances of  $(70.7 + j 70.7) \Omega$ ,  $(120 + j 160) \Omega$  and  $(120 + j 90) \Omega$  are connected in parallel across a 250 V supply. Determine (i) admittance of the circuit (ii) supply current and (iii) circuit power factor.

**SECTION-C**    Attempt ANY ONE following Question                          Marks (1X10=10)

- Q5(a) A transformer on no-load has a core loss of 50W, draws a current of 2A and has an induced emf of 230V. Determine the no-load power factor, core loss current and magnetizing current. Also, calculate the no-load circuit parameters of the transformer. Neglect winding resistance and leakage flux.

- Q5(b) Explain the performance of principle of operation of single phase transformer.



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Subject Code: KEE101

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**BTECH****(SEM I) THEORY EXAMINATION 2021-22  
BASIC ELECTRICAL ENGG**

<b>SECTION-C</b>   Attempt ANY ONE following Question		Marks (1X10=10)
Q6(a)	A 4-pole generator with 400 armature conductors has a useful flux of 0.04Wb per pole. What is the emf produced if the machine is wave wound and runs at 1200rpm? What must be the speed at which the machine should be driven to generate the same emf if machine is lap wound?	
Q6(b)	An 8-pole, 400V shunt motor has 960 wave connected armature conductors. The full load armature current is 40A and flux per pole is 0.02Wb. The armature resistance is $0.1\Omega$ and the contact drop is 1V per brush. Calculate the full load speed of the motor.	

<b>SECTION-C</b>   Attempt ANY ONE following Question		Marks (1X10=10)
Q7(a)	(i) Explain the slip torque characteristics of the three-phase induction motor (ii) The voltage applied to the stator of a three phase, 4 pole induction motor has frequency of 50 Hz. The frequency of the emf induced in the rotor is 15.5 Hz. Determine the slip and speed at which motor is running.	
Q7(b)	(i) Write short notes on MCB and MCCB (ii) Write short notes on characteristics of batteries.	



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**B.TECH**  
**(SEM I ) THEORY EXAMINATION 2020-21**  
**BASIC OF ELECTRICAL ENGINEERING**

**Time: 3 Hours****Total Marks: 100**

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

**SECTION A**

- 1. Attempt all questions in brief. 2 x 10 = 20**

Qno.	Question	Marks	CO
a.	Define ideal voltage and current source.	2	1
b.	Define Active and Passive Elements.	2	1
c.	Define Form factor and Peak Factor.	2	2
d.	Classify the losses in transformer.	2	3
e.	Explain True power, reactive power and Apparent power	2	3
f.	What is meant by the term speed regulation	2	4
g.	Why transformer is not used on DC	2	4
h.	Define the term slip	2	4
i.	Write down the application of Synchronous Motor.	2	4
j.	Write application of Single Phase Induction Motor.	2	4

**SECTION B**

- 2. Attempt any three of the following:**

Qno.	Question	Marks	CO
a.	Apply mesh analysis , obtain the current through 5 ohm resistance in the following circuit	10	1
b.	Obtain equivalent Star from Delta in Star-Delta Transformation	10	1
c.	Derive expression for average value and RMS value of Half wave rectifier voltage output.	10	2
d.	Why Single Phase induction motor is not self starting. What are different methods to make self starting. Explain one of them	10	3
e.	A balanced star connected load of $(6+j8)$ ohm per phase connected to a balance 3 phase, 400V supply. Find the line current, power factor, power and total volt-amperes.	10	3

**SECTION C**

- 3. Attempt any one part of the following:**

Qno.	Question	Marks	CO
a.	Show the condition for resonance in a parallel R-L-C circuit. State the application of series.	10	2
b.	If load draws a current of 10A at 0.8 p.f lagging, when connected to 100 volt supply, calculate the values of real, reactive and apparent powers. And also find the resistance of load.	10	2



Roll No: \_\_\_\_\_

**4. Attempt any one part of the following:**

Qno.	Question	Marks	CO
a.	<p>Using Thevenin Theorem , Determine the current through 6 ohm</p>	10	1
b.	<p>Find the equivalent resistance of the following circuit and calculate the current supplied by source.</p>	10	1

**5. Attempt any one part of the following:**

a.	Derive the Emf equation of single phase transformer. A single phase 100KVA, 6.6kV/230 V, 50 Hz, transformer has 90% efficiency at 0.8 Lagging power factor both at full load and also at half load. Determine iron and copper loss at full load for transformer.	10	3
b.	Derive the relationship between line current, Phase current, line voltage and phase voltage in a 3-phase star-connected and delta connected circuits.	10	3

**6. Attempt any one part of the following:**

a.	A 4-Pole , 3 phase induction motor runs at 1440 rpm. Supply voltage is 500 V at 50 Hz. Mechanical power output is 20.3 Hp and mechanical loss is 2.23 Hp. Calculate: (i) Mechanical Power Developed (ii) Rotor Cu Loss (iii) Efficiency	10	4
b.	Draw and explain the Torque-Slip Characteristics of Three Phase Induction Motor.	10	4

**7. Attempt any one part of the following:**

a.	Explain (i) MCB (ii) ELCB (iii)MCCB	10	5
b.	Explain different types of Wires and Cables.	10	5

**B TECH**  
**(SEM-I) THEORY EXAMINATION 2019-20**  
**BASIC ELECTRICAL ENGG.**

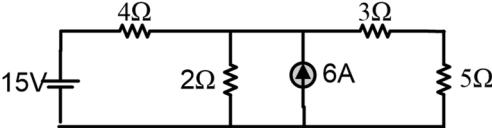
**Time: 3 Hours****Total Marks: 100**

**Note:** 1. Attempt all Sections. If require any missing data; then choose suitably.

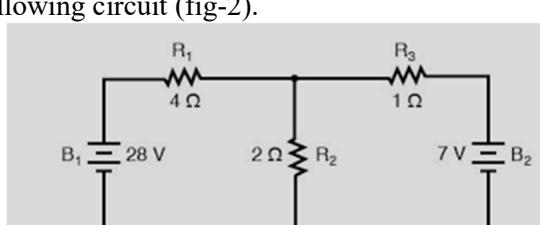
**SECTION A****1. Attempt all questions in brief.****2 x 10 = 20**

Qno.	Question	Marks	C O
a.	What do you understand by unilateral and bilateral elements? Give examples.	2	1
b.	What is the utility of superposition theorem?	2	1
c.	Determine the form factor of AC current $i = 200 \sin(157t + \pi/6)$ .	2	2
d.	Explain the term "Dynamic Impedance" in AC circuits	2	2
e.	How MMF is related to Reluctance. Explain	2	3
f.	Define voltage regulation of a transformer.	2	3
g.	Why commutator is needed?	2	4
h.	Give the expression of speed in terms of poles and frequency of supply.	2	4
i.	Write full form of (i) MCB (ii) MCCB (iii) ELCB (iv) SFU.	2	5
j.	What are the factors that affect the battery capacity?	2	5

**SECTION B****2. Attempt any three of the following:****10 x 3 = 30**

Qno.	Question	Marks	C O
a.	Determine the current flowing through 5 ohms resistance in the network shown below (fig-1) using Thevenin's theorem.    Fig (1)	10	1
b.	The instantaneous values of two alternating voltages are represented by $V_1 = 60 \sin \theta$ and $V_2 = \sin(\theta - \pi/3)$ . Derive expressions for the instantaneous values of (i) the sum and (ii) the difference of these voltages.	10	2
c.	Explain different types of Magnetic materials with examples.	10	3
d.	Derive the expression of torque for dc motor. Also discuss the applications of it.	10	4
e.	An alkaline cell is discharged at a steady current of 4 A for 12 hours, the average terminal voltage being 1.2 V. To restore it to original state of voltage, a steady current of 3 A for 20 hours is required, the average terminal voltage being 1.44 V. Calculate the ampere-hour and watt-hour efficiencies in this particular case.	10	5

**SECTION C****3. Attempt any one part of the following:****10 x 1 = 10**

Qno.	Question	Marks	CO
a.	<p>Using superposition, find the current flowing through 2 ohm resistance in following circuit (fig-2).</p>  <p style="text-align: center;">Fig (2)</p>	10	1
b.	<p>Derive an expression of delta to star and star to delta transformation with example and satisfy the condition of both expressions.</p>	10	1

**4. Attempt any one part of the following:****10 x 1 = 10**

Qno.	Question	Marks	CO
a.	<p>Derive an expression of resonance frequency in series resonance circuit. If the bandwidth of a resonant circuit is 10 KHz and the lower half power frequency is 120 KHz, find out the value of the upper half power frequency and the quality factor of the circuit.</p>	10	2
b.	<p>Derive the relationship between line and phase current &amp; voltage for a star connected 3-phase balanced system. A balanced delta connected load of <math>(12 + j 9) \Omega</math>/phase is connected to 3-phase 400 V supply. Calculate line current, power factor and power drawn by it.</p>	10	2

**5. Attempt any one part of the following:****10 x 1 = 10**

Qno.	Question	Marks	CO
a.	<p>Draw and explain the no load and full load phasor diagrams for a single phase transformer.</p>	10	3
b.	<p>(i) Explain single phase Auto transformer and give its application.  (ii) In a 25 KVA, 2000/200 V transformer, the constant and variable losses are 350 W and 400 W respectively. Calculate the efficiency on unity power factor at (i) full load and (ii) half load.</p>	10	3

**6. Attempt any one part of the following:****10 x 1 = 10**

Qno.	Question	Marks	CO
a.	<p>Draw the slip-torque characteristics of three phase induction motor. A 3-phase, 50 Hz induction motor has 6 poles and operates with a slip of 5 % at a certain load. Determine (i) the speed of the rotor with respect to the stator (ii) the frequency of rotor current (iii) the speed of the rotor magnetic field with respect to rotor.</p>	10	4
b.	<p>(i) Describe any one method of starting single phase induction motor with neat diagram.  (ii) Why Synchronous motor is not self starting?</p>	10	4

**7. Attempt any one part of the following:****10 x 1 = 10**

Qno.	Question	Marks	CO
a.	<p>Explain the requirement of earthing for electrical equipment. What is the difference between neutral and earthing</p>	10	5
b.	<p>Name the various cables used in electrical system based on insulation. Explain any two. What are the features of good conductor in electrical circuit</p>	10	5

**BTECH**  
**(SEM I) THEORY EXAMINATION 2018-19**  
**BASIC ELECTRICAL ENGINEERING**

**Time: 3 Hours****Total Marks: 100****Note:** 1. The question paper contains three sections- A, B & C.

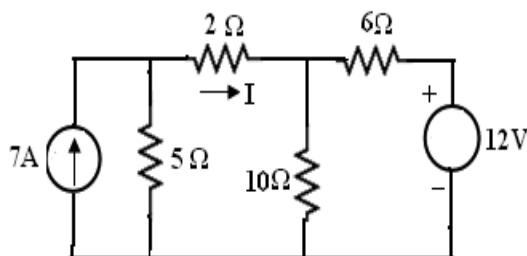
2. Read the instructions carefully in each section
3. Course outcome(CO) has been mentioned against each question.

**SECTION-A****1. Attempt ALL:****[2x10=20]**

- a. Define with examples: (i) Active and passive element (ii) bilateral and unilateral elements. (CO 1)
- b. Explain (i) Ideal current source (ii) ideal voltage source. (CO 1)
- c. A series circuit has  $R = 10\Omega$ ,  $L = 0.02H$  and  $C = 3\mu F$ . Calculate Q-factor of the circuit. (CO 2)
- d. Two ac currents one represented as  $i_1 = 25 \sin(314 t + 20^\circ)$  &  $i_2 = 35 \sin(314 t + 45^\circ)$ . Draw the phasor & show the resultant when they are connected in parallel. (CO 2)
- e. What will happen if the primary of a transformer is connected to dc supply? (CO 3)
- f. How can we change the direction of rotation of DC motor? (CO 4)
- g. Enlist the various methods of starting of single phase induction motor? (CO 4)
- h. Why Earth pin is made thicker and bigger than line and neutral? (CO 5)
- i. What are the advantages of auto-transformer over two winding transformer? (CO 4)
- j. Calculate the energy consumption per day in a house using 5 CFLs of 20 W each, 3 fans of 60 W each for 3 hrs a day. (CO 5)

**SECTION- B****2. Attempt any three parts of the following. Each part carries 10 marks. [3x10=30]**

- (a) Find current through  $2\Omega$  resistance using superposition theorem in figure 1 (CO1)

**Figure 1**

(b) Derive expression of resonance frequency for series RLC circuit. A series circuit consists of a resistance of  $10\Omega$ , and inductance of  $50\text{mH}$  and a variable capacitance in series across a  $100\text{V}$ ,  $50\text{Hz}$  supply. Calculate-

- (i) The value of capacitance to produce resonance.
- (ii) Voltage across the capacitance.
- (iii) Q-factor

(CO2)

(c) The maximum efficiency of a  $100 \text{ KVA}$ ,  $1100/440 \text{ V}$ ,  $50 \text{ Hz}$  transformer is  $96\%$ , This occurs at  $75\%$  of full load at  $0.8 \text{ p.f. lagging}$ . Find the efficiency of transformer at  $3.4 \text{ FL}$  at  $0.6 \text{ p.f. leading}$ . (CO3)

(d) A 4-pole shunt generator with lap-connected armature has field and armature resistance of  $50\Omega$  and  $0.1\Omega$  respectively. If supplying power to  $100\text{W}$  lamp load for  $100 \text{ V}$ . Calculate the armature current and the generated emf. Consider a contact drop of  $1\text{V}$  per brush. (CO4)

(e) Draw the characteristics of battery.

Calculate the backup of battery of  $100\text{AH}$  connected to load of  $100 \text{ watts}$  and supply voltage is  $12\text{V}$ . (CO5)

## SECTION- C

**3. Attempt any ONE question:** [10X1=10]

(a) Give the statement of Norton's Theorem. (CO 1)

Find the current in  $12 \text{ ohm}$  resistance using Norton's theorem for the given circuit.

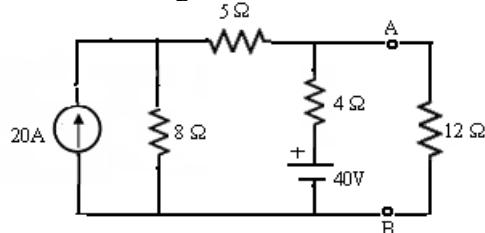


Figure 2

(b) Determine current through  $15 \text{ ohm}$  resistance by node analysis. (CO 1)

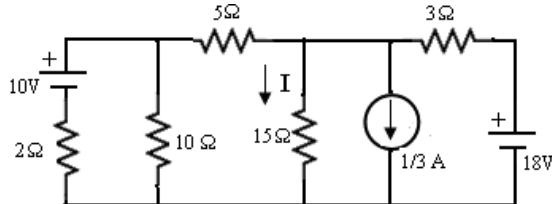


Figure 3

**4. Attempt any ONE question:** [10X1=10]

(a) Derive the expression for resonant frequency & quality factor for an ac circuit under the condition of parallel resonance. (CO 2)

(b) Derive the relation between line current & phase current in case of three phase delta connected balanced load. Three identical coils of resistance  $8\Omega$  and inductive reactance  $6\Omega$  are connected in delta across 400V mains. Determine power, power factor and line current. Draw phasor diagram. (CO 2)

**5. Attempt any ONE question:** [10X1=10]

(a) Discuss the principle of operation of a single phase transformer. Derive EMF equation for a single phase transformer. (CO 3)

(b) What is voltage Regulation in a single Phase Transformer? What should be its value for an ideal transformer? (CO 3)

**6. Attempt any ONE question:** [10X1=10]

(a) Derive the EMF equation of D.C. Generator. An 8 pole lap wound dc generator has 450 armature turns. It operates at 0.02 wb flux per pole and runs at 1000 rpm at no load. Find the emf induced by it. (CO 4)

(b) What is the relation between frequencies of stator & rotor currents? A 3-phase, 50Hz induction motor has 6 poles and operates with a slip of 5% at a certain load. Determine

- (i) The speed of rotor with respect to the stator.
- (ii) The frequency of the rotor current.
- (iii) The speed of the rotor magnetic field with respect to the stator. (CO 4)

**7. Attempt any ONE question:** [10X1=10]

(a) Write short notes on the following: (CO 5)

- (i) MCB (ii) MCCB (c) Fuse (d) Types of wires

(b) Explain following: (CO 5)

- (i) Need of Earthing
- (ii) Battery backup

Kindly read Q.2. as

Q.2.(c) The maximum efficiency of a 100 KVA, 1100/440 V, 50 Hz transformer is 96%, This occurs at 75% of full load at 0.8 p.f. lagging. Find the efficiency of transformer at 1/2 Full Load at 0.6 p.f. leading.

**B TECH**  
**(SEM II) THEORY EXAMINATION 2018-19**  
**ELECTRICAL ENGINEERING**

**Time: 3 Hours****Total Marks: 100****Note:** 1. Attempt all Sections. If you require any missing data, choose suitably.**SECTION A**

<b>1.</b>	<b>Attempt all questions in brief.</b>	<b>2 x 10 = 20</b>	<b>CO</b>
a.	Define the purpose of Earthing the electrical appliances	5	
b.	What are the various three phase transformer connections? Name them.	3	
c.	Explain why transformer cannot be operated on DC.	3	
d.	What is difference between primary and secondary batteries?	5	
e.	Define active and passive elements.	1	
f.	Three resistances each of $20\Omega$ , $30\Omega$ & $50\Omega$ are connected in delta. Calculate corresponding resistances in equivalent star connection.	1	
g.	What is phase angle difference between the voltage and current phasors in purely capacitive circuits?	2	
h.	A 3-phase, 440V, induction motor is wound for 4 poles and is supplied from 50Hz supply system. Calculate the speed of the motor when slip is 5%.	4	
i.	Write condition for series resonance.	2	
j.	Write applications of synchronous motor.	4	

**SECTION B**

<b>2.</b>	<b>Attempt any three of the following:</b>	<b>Marks</b>	<b>CO</b>
a.	Derive the relationship in delta and star connected systems?	10	1
b.	Derive the expression for the average power in a single phase purely Resistive circuit. Also draw the phasor diagram and waveform diagram for this circuit.	10	2
c.	An 1100/110V, 22KVA, $1\phi$ transformer has primary resistance and reactance $4\Omega$ and $6\Omega$ respectively. The secondary resistance and reactance are $0.04\Omega$ and $0.065\Omega$ respectively. Calculate (i) Equivalent resistance and reactance of secondary referred to primary. (ii) Total resistance & reactance referred to primary. (iii) Equivalent resistance and reactance of primary referred to secondary. (iv) Total copper loss	10	3
d.	Derive and explain torque-slip Characteristics of 3-phase Induction motor.	10	4
e.	Explain (i) MCB (ii) ELCB (iii) MCCB	10	5

## SECTION C

- 3. Attempt any one part of the following:** Marks CO
- a. Determine current through  $2\Omega$  resistor using Thevenin theorem. 10 1
- 
- b. Determine current through  $8\Omega$  resistor and power in the  $4\Omega$  resistor in the Network shown in Fig. Using Superposition theorem. 10 1
- 
- 4. Attempt any one part of the following:** Marks CO
- a. Why is a single phase induction motor is not self starting. Also explain the various starting methods. 10 4
- b. A 250V dc shunt motor takes 41A at full load. Resistances of motor armature and shunt field winding are  $0.1\Omega$  and  $250\Omega$  respectively. Find the back emf on full load. What will be generated emf, if working as generator and supplying 41A to a load at terminal voltage of 250V? 10 4
- 5. Attempt any one part of the following:** Marks CO
- a. Derive half power frequencies, bandwidth and quality factor for series resonance occurring in a series R-L-C circuit. 10 2
- b. A balanced delta connected load of  $12+j9$  ohm is connected to 3 phase 400 V supply. Find (i) Line current (ii) power factor (iii) power drawn (iv) reactive volt amp (v) total volt amp 10 2
- 6. Attempt any one part of the following:** Marks CO
- a. What is an Auto Transformer? What are the advantages and disadvantages of using an Auto Transformer? Explain (without derivation) how the efficiency varies when a normal two winding transformer is converted into an Auto Transformer. 10 3
- b. A transformer is rated at 100kVA. At full load its copper loss is 1200Watts and iron losses are 960W. Calculate: (i) Efficiency at full load, unity pf (ii) Efficiency at half load, 0.8 pf lagging. (iii) Efficiency at 75% full load, 0.7 pf lagging (iv) The load KVA at which maximum efficiency occurs (v) The maximum efficiency at 0.85 pf lagging 10 3
- 7. Attempt any one part of the following:** Marks CO
- a. Describe electrical characteristics of lead acid battery. 10 5
- b. Explain the construction, rating and specific applications of at least two types of Wires and Cables used in electrical engineering. 10 5