Code No: R1621012 **R16** SET - 1

II B. Tech I Semester Regular/Supplementary Examinations, October/November - 2018
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Com to CE & PE)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) What are the basic circuit components? Write their V-I relationships (2M)
   b) What are the types of DC generators (2M)
   c) What are the various types of losses in a transformer (3M)
   d) What is the principle of operation of alternators (3M)
   e) What are the characteristics of operation amplifiers (2M)
   f) What is the transistor biasing? (2M)

PART -B

2. a) State and explain Ohm's law (5M)
   b) A 10mF, a 20mF and a 40mF capacitor are connected in series to a 400 volts source of e.m.f. (9M)
      i) What is the equivalent capacitance
      ii) What is the magnitude of charge across each capacitor
      iii) What is the potential difference across each capacitor

3. a) Explain the speed control methods of DC motors (7M)
   b) A 4 pole, D.C. generator has a wave-wound armature with 792 conductors. The flux per pole is 0.0121 Wb. Determine the speed at which it should be run to generate 240 volts on no load. (7M)

4. a) Explain the basic principle of transformer (5M)
   b) The turns-ratio of transformer is 100/200, the primary winding is connected to a source of 3.0kV, 50Hz, supply. Calculate the following (9M)
      i) Value of maximum flux in the core
      ii) Primary and secondary currents
      iii) The real and reactive power supplied by the source to the transformer primary

5. a) Define regulation and how do you find regulation of an alternator ? (5M)
   b) A 3-phase induction motor is wound for 4 poles and is supplied from 50 Hz systems. Calculate (i) the synchronous speed, (ii) the speed of the motor when slip is 4% and (iii) the rotor current frequency when the motor runs at 600 r.p.m. (9M)

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6. a) What is a rectifier? Explain operation of bridge rectifier (7M)
   b) Compare half wave and full wave rectifiers (7M)

7. a) Compare the characteristics of transistor amplifiers in the three configurations? (7M)
   b) One NPN transistor is used in the self biasing arrangement the circuit component values are V_{CC} = 4.5volts, Rc=1.5kΩ,Re =0.27kΩ ,and R1=27kΩ if β=44.Find the stability factor also determine the quiescent point $Q(V_{CE}, I_C)$? (7M)

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2. Answer **ALL** the question in **Part-A**
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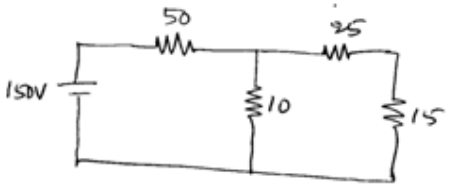
PART –A

1. a) States the Kirchhoff's laws (3M)
   b) What is the function of commutator in DC machines (2M)
   c) What is the principle of operation of single phase transformers (3M)
   d) What is meant by synchronous speed? (2M)
   e) What are the application of OP-AMPs (2M)
   f) Draw the circuit diagram and frequency response of CE amplifier (2M)

PART -B

2. a) Calculate the magnitude and direction of current in the 10 ohms resistor. As shown in following figure that the power delivered by source is equal to power dissipated in the resistors. (All resistance is in ohms). (7M)



   b) Two resistances of 10Ω and 40Ω respectively are connected in parallel. A third resistance of 5Ω is connected in series with the combination and a D.C supply of 240 V is applied to the ends of the completed circuit. Calculate the current in each resistance. (7M)

3. a) What are the various types of DC Motors and mention their applications (5M)
   b) A 4-pole long shunt compound generator supplies 110A at terminal voltage of 450V. It armature resistance is 0.04Ω, series field resistance is 0.06Ω and shunt field resistance 120Ω. Find the generated e.m.f take drop per brush as 2V. Neglect armature reaction. (9M)

4. a) Explain the effect of turns ratio on EMF's induced in the transformer (4M)
   b) A 50Hz single phase transformer has 6600V/400V, having e.m.f per turn is 10V and the maximum flux density in the core is 1.6 Tesla. Find the (10M)
   i) Suitable number of primary and secondary turns
   ii) Cross sectional area of the core

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5. a) Explain the slip-torque characteristics of 3-ϕ induction motor (6M)

   b) A 3-phase induction motor has two poles and is connected to 400V, 50 Hz supply. Calculate the actual rotor speed and rotor frequency when slip is 4%. (8M)

6. a) Explain the working of P-N junction diode (7M)

   b) Define and explain forward current, peak inverse voltage and reverse current in a P-N junction diode (7M)

7. Explain the principle of operation of NPN and PNP transistor. Derive an expression for current relations for different configurations. (14M)

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2. Answer **ALL** the question in **Part-A**
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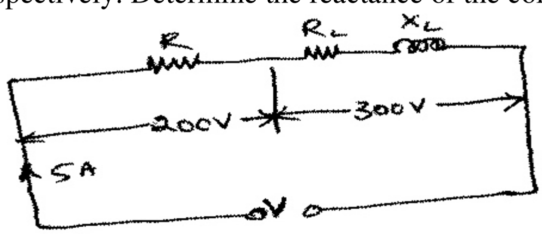
PART –A

1. a) What are the types of network elements.Explain (2M)
 b) What are the types of DC motors (2M)
 c) Define the efficiency and regulation of transformer (2M)
 d) What is the effect of airgap in an induction motors (3M)
 e) What is the significance of the PN junction diode (2M)
 f) Compare CE, CC and CB amplifiers (3M)

PART -B

2. a) State and explain ohms Law. What is the limitation of the Law? (7M)
 b) A circuit consists of a pure resistance and a coil connected in series. Powers dissipated in the resistance and in the coil are 1000W and 250W respectively. Voltage drops across the resistance and the coil are 200 V and 300 V respectively. Determine the reactance of the coil and the supply voltage. (7M)



3. a) Explain the principle of operation of DC Motor (7M)
 b) Calculate the generated e.m.f of a 4-pole, wave-wound armature having 40 slots with 18 conductors per slot when driven at 1200 rpm. The flux / pole is 0.018 wb. (7M)

4. a) Explain the ideal transformer on No-load with necessary diagrams (5M)
 b) A single-phase, 50Hz transformer has 100 turns on primary winding and the secondary winding turns are 500 turns. The cross sectional area of the core is 220 cm^2. A 240 V, 50Hz voltage source is connected to the primary winding of the transformer. Calculate (9M)
 i) The e.m.f induced in the secondary winding
 ii) The maximum value flux density in the core (B_m)
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5. a) What is synchronous speed? Establish the relation among frequency, speed and no of poles. (6M)
   b) A three-phase induction motor is wound for four poles and is supplied from a 50-Hz supply. Calculate (i) the synchronous speed, (ii) the speed of the rotor when the slip is 3%, and (iii) the rotor frequency when the speed of the rotor is 900 rpm. (8M)

6. a) Explain the intrinsic and extrinsic semi conductor (7M)
   b) Explain the rectifying action of the P-N junction diode (7M)

7. Explain the operation of CE configuration and also explain the input and output characteristics. (14M)

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2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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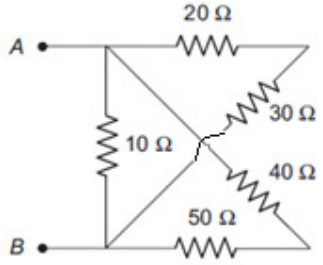
PART –A

1. a) State the Ohm's law with units (2M)
   b) What is the function of hold-on coil in three point starter (2M)
   c) What is the need of transformer (2M)
   d) Define the synchronous impedance (3M)
   e) What is meant by intrinsic and extrinsic semi conductors (3M)
   f) What is the need of feedback amplifier (2M)

PART -B

2. a) Find the equivalent resistance in between the terminals *A* and *B* of the circuit shown in Figure (7M)



   b) A coil of insulated wire of resistance 8Ω and inductance 0.003H is connected to an a.c. supply at 240V, 50-Hz. Calculate: (7M)
   (i) the current p.f and the power ,
   (ii) the value of capacitance which when connected in series with the above coil, causes no change in the values of the current and power taken from the supply.

3. a) Explain the basic principle of operation of DC generator (7M)
   b) A 6 pole wave wound dc generator is having 50 slots with 25 conductors per slot and rotating at 1500 rpm. The flux per pole is 0.015 wb, calculate the emf generated? (7M)
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4. a) Deduce the EMF equation of single phase transformer (7M)
   b) A 3300/250 V, 50 Hz, single-phase transformer is built on a core having an effective cross sectional area of 125 cm^2 and 70 turns on the low voltage winding. Calculate (i) maximum value of flux density (ii) the number of turns on h.v. winding? (7M)
5. a) Explain why the speed of the induction motor never equal to be the synchronous speed? (5M)
   b) Explain the determination of voltage regulation by synchronous impedance method? (9M)
6. a) Draw and explain the equivalent circuit of the P-N junction diode (7M)
   b) Draw a neat sketch of a full wave rectifier and explain its operation. (7M)
7. a) Compare CE, CC and CB amplifier interms of voltage and current gains and input and output impedances. (7M)
   b) How a transistor acts as an amplifier? Explain? (7M)