

I B. Tech II Semester Regular/Supplementary Examinations, April/May - 2019
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Com. to ME, AE, AME, Min E, MET)

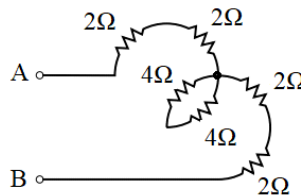
Time: 3 hours

Max. Marks: 70

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

PART -A

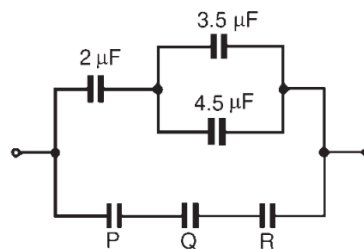
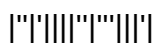
1. a) What is the equivalent resistance between the terminals, AB in the following circuit? (2M)



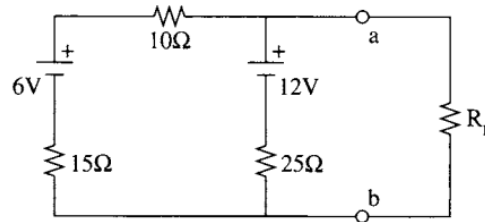
- b) What is the function of commutator in dc generator? (2M)
- c) What is meant by primary and secondary windings of a transformer? (2M)
- d) What are the functions of various winding in the alternator? (2M)
- e) Sketch $v-i$ characteristics of practical diode in forward biased condition. (2M)
- f) Show the forward and reverse biasing in the formation of npn transistor. (2M)
- g) What is the equivalent inductance of a circuit in which L_1 and L_2 connected in series together and the combination is connected in parallel with inductance L_3 ? (2M)

PART -B

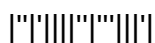
2. a) In the following given circuit, capacitors P, Q and R are identical and the total equivalent capacitance of the circuit is $3 \mu\text{F}$. Determine the values P, Q and R (7M)



- b) Determine the voltage across the terminals 'ab' in the following given circuit (7M)
when $R_L = 0 \Omega$ and $R_L = 10 \Omega$?



3. a) Discuss with suitable diagrams different types of dc generators and their field of applications. (7M)
- b) A 240 V dc motor takes 5A when running on no load. The armature and field resistances are 0.5 and 175 Ω respectively. Determine its efficiency when it is assumed to be taking a full load current of 50A using Swinburne's test. (7M)
4. a) Explain the principle of working of transformer. Why the primary of transformer draws current from the mains when the secondary is open circuited? (7M)
- b) The maximum efficiency of a 10 kVA, 500/5000V single phase transformer is 98% which occurs at 80% of full load at 0.8 power factor lagging. If the equivalent leakage impedance of the transformer referred to primary is 4.55 Ω , find the voltage regulation at full primary load current of 30.1A. (7M)
5. a) Describe the different types of the construction of rotors used in alternators. (7M)
- b) Define slip of induction motor. Why induction motor cannot run at synchronous speed? (7M)
6. a) Describe the operation of full bridge rectifier. What is its output current when rms input voltage is 120V ac and $R_L = 150 \Omega$? (7M)
- b) Draw the OP-AMP circuit which acts as differentiator and explain its operation. (7M)
7. a) Describe the pnp transistor in common base configuration. How the transistor is used as an amplifier? (7M)
- b) Describe the various frequency response characteristic equations of common emitter amplifier. (7M)



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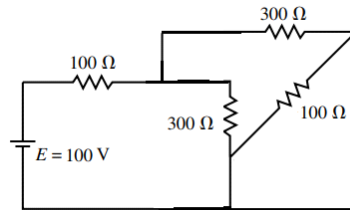
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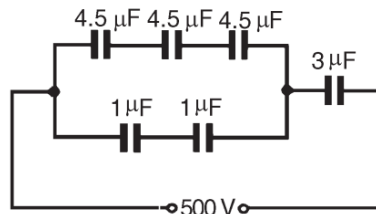
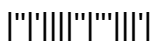
1. a) Determine the current supplied by the source in the following circuit. (2M)



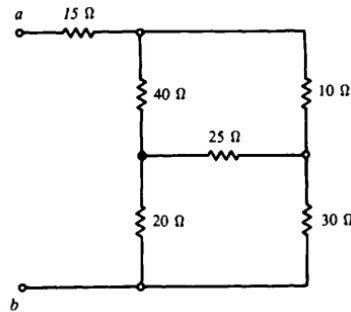
- b) What is principle for varying speed above rated speed in dc motor? (2M)
- c) What are the differences between shell type and core type transformers? (2M)
- d) What is the relation between speed and frequency in the alternator? (2M)
- e) What are the characteristics of p-n junction diode in reverse biasing? (2M)
- f) Show the forward and reverse biasing in the formation of pnp transistor. (2M)
- g) What is the equivalent inductance of circuit in which L_1 and L_2 are connected in parallel together and the combination is connected in series with inductance L_3 ? (2M)

PART -B

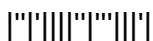
2. a) For the arrangement shown in following figure, find (a) the equivalent circuit capacitance and (b) the voltage across a $4.5 \mu\text{F}$ capacitor. (7M)



- b) If 100V dc supply is given across the terminals 'ab' of the following circuit then (7M)
what is voltage across the 15 Ω resistance?



3. a) Discuss the function of no-volt and over load release in the three point starter. In which circuit these devices are connected and why? (7M)
- b) A 250V 50 kW, long shunt compound generator supplies a load at 220V, and the load consists of five heaters of 5 kW and two hundred lights of 100 W each. The armature and series field and shunt field resistances are 0.05 Ω , 0.04 Ω and 50 Ω respectively. Find the load current, armature current and emf generated. (7M)
4. a) Describe the tests on a single phase transformer that gives its ohmic losses and core losses. (8M)
- b) A 100 kVA, 50Hz, 440/11000 V, single phase transformer has an efficiency of 96%, when supplying full load current at 0.8 power factor lagging and an efficiency of 98% when supplying half full load current at unity power factor. Find the core losses and copper losses corresponding to full load current. What is load current at which maximum efficiency occurs? (6M)
5. a) By means of a neat diagram, describe the main parts of a salient pole alternator. (7M)
- b) Explain the operation of a synchronous motor. Why it will not run at speed other than synchronous speed? (7M)
6. a) Explain the operation of a half-wave rectifier with relevant waveforms. What is its output current when rms input voltage is 120V ac and $R_L = 150 \Omega$? (7M)
- b) Draw the OP-AMP circuit to obtain integration of triangular wave input signal and explain its operation. (7M)
7. a) What are the elements of amplifier and explain the amplification of a small signal into a large signal? (7M)
- b) What are the advantages of feedback amplifier and explain various types of feedback amplifiers? (7M)



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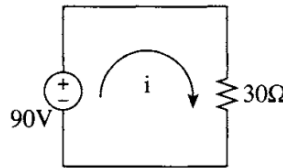
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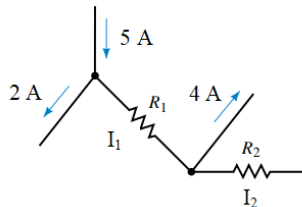
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PART -A

1. a) How do you justify whether the given circuit is series circuit or parallel circuit? (2M)

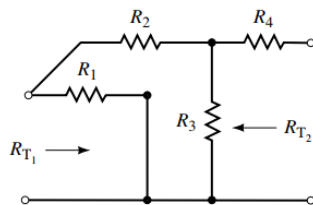


- b) What is the principle to vary speed below rated speed in a dc motor? (2M)
 c) Why the open circuit test in a transformer is conducted on low voltage winding? (2M)
 d) Why the synchronous motor speed is constant? (2M)
 e) Why the p-n junction diode is not conducting in reverse biasing? (2M)
 f) What are the majority and minority carriers in the regions of npn transistor? (2M)
 g) Use Kirchhoff's current law to determine the magnitudes and directions of the currents indicated in the below figure. (2M)

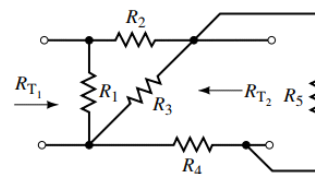


PART -B

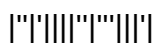
2. a) What is the equivalent resistance when referred from the side R_{T1} and R_{T2} in the following given circuits? (7M)



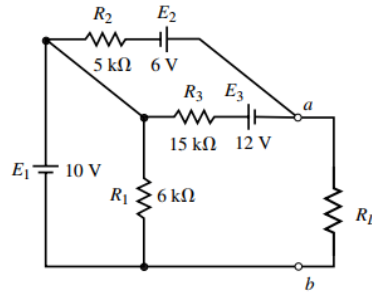
(i)



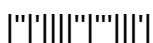
(ii)



- b) Determine the voltage across the terminals 'ab' in the following given circuit when $R_L = 10 \text{ k}\Omega$. (7M)



3. a) Derive the emf and torque equations of a dc motor. (7M)
- b) A 4-pole, 250V dc long shunt compound generator supplies a load of 10kW at the rated voltage. The armature, series field and shunt field resistances are 0.1Ω , 0.2Ω and 220Ω respectively. The armature is lap wound with 50 slots and each slot containing 6 conductors. If the flux per pole is 50 mWb, calculate the required speed of the generator. (7M)
4. a) Define the voltage regulation of a transformer. How it is determined? (7M)
- b) A single phase transformer working at unity power factor has an efficiency of 95% at both half and full load of 5000W. Determine the efficiency at three fourth full load and maximum efficiency. (7M)
5. a) Explain the working of a synchronous motor and describe its constructional details. (7M)
- b) Develop torque – slip characteristics of a 3-phase induction motor and explain. (7M)
6. a) What are the rectifier circuits for full wave rectification? Describe their advantages and disadvantages. (7M)
- b) Explain the operation of OP-AMP as non-inverting amplifier. How it is used as voltage follower? (7M)
7. a) Describe ways of biasing a common-emitter amplifier and state which is the most stable. (7M)
- b) Discuss the role of emitter, base and collector regions in the operation of BJT. (7M)



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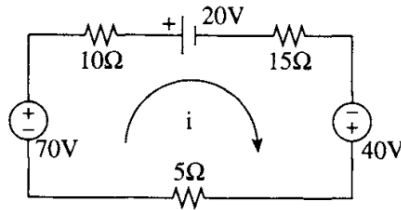
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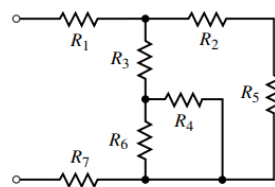
1. a) What is the current flowing in the following given circuit? (2M)



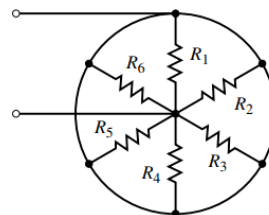
- b) What would happen if a dc motor is directly connected to the dc supply without any starter? (2M)
- c) Why the short circuit test in a transformer is conducted on high voltage winding? (2M)
- d) What is meant by slip in an induction motor? (2M)
- e) What is the difference between ideal and practical diode? (2M)
- f) What are the majority and minority carriers in the regions of pnp transistor? (2M)
- g) What is the difference between active and passive elements? (2M)

PART -B

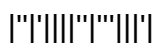
2. a) For the following given circuits, indicate which resistances are connected in series and which resistances are connected in parallel. (7M)



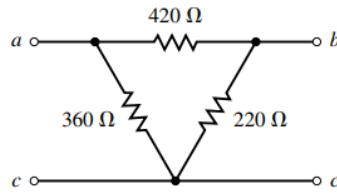
(i)



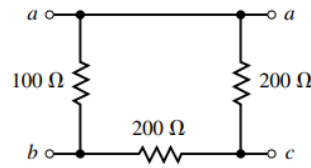
(ii)



- b) Convert each of the following Δ networks into its equivalent Y configuration. (7M)



(i)



(ii)

3. a) Describe different methods of excitations in dc motors with relevant diagrams. (7M)
- b) A 10 h.p., 220V shunt motor takes an armature current of 6A from 220V supply at no-load and runs at 1200 rpm. The armature resistance is 0.4Ω . Calculate speed and torque when the motor takes armature current of 36A with same flux. (7M)
4. a) Develop the phasor diagram of a single-phase transformer under load condition at lagging power factor. (6M)
- b) A 250/500 V, 3000 kVA, single phase transformer has the following results (8M)
Open – circuit test : 250V, 1A, 90W on l.v. side
Short – circuit test : 30V, 12A, 200 W on h.v. side
 Find the voltage regulation at half-full load 0.8 power factor lagging.
5. a) What are the advantages and disadvantages of salient and non-salient pole types of alternators? (7M)
- b) Describe the different types of losses that occur in a three phase induction motor. (7M)
6. a) A half-wave rectifier diode, which has an internal resistance of 20Ω while conducting, is to supply power to a $1\text{ k}\Omega$ load from a 110 V ac (rms) source. Calculate (7M)
 (i) The peak current.
 (ii) The DC load current.
 (iii) The rms load current.
 (iv) The total input power.
- b) Discuss about the ideal characteristics of OP-AMP. Draw the frequency response curves of OP-AMP. (7M)
7. a) Draw the output characteristics of an n-p-n transistor in CE Configuration and indicate the active, cut-off and saturation region. Explain them. (7M)
- b) Discuss briefly about voltage series feedback and current series feedback amplifiers. (7M)

