

Code No: A109210303

R09

Set No. 2

II B.Tech I Semester Examinations, MAY 2011
ELECTRICAL AND ELECTRONICS ENGINEERING
Common to Civil Engineering, Mechanical Engineering, Production
Engineering, Automobile Engineering

Time: 3 hours

Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

1. Derive the emf equation for a single phase transformers and deduce Expression for transmission ratio in all parametric forms. [15]
2. Write short notes on the following:
 - (a) Function of a commutator in DC machines
 - (b) Armature reaction in DC motors and remedies
 - (c) Speed-torque characteristics of a DC motor
 - (d) back emf in DC motors. [15]
3. Write short notes on the following:
 - (a) Kirchoff's current law
 - (b) Kirchoff's voltage law
 - (c) Dependent sources
 - (d) Independent sources. [15]
4.
 - (a) Derive the relationship between α and β .
 - (b) Why does the CE Configuration provide large current amplification while the Configuration does not? [15]
5. Explain synchronous impedance method of determining the regulation of an Alternator. [15]
6.
 - (a) Write any four applications to CRO
 - (b) Mention the source of electrons in a cathode ray tube. [15]
7. A dynamometer wattmeter reading power correctly on DC is used to measure power in a circuit consisting of a resistance of 2 ohms and an inductance of 0.25H. The supply is from a 100V, 50Hz mains. The Voltage circuit of the wattmeter has a resistance of 1000 ohms and an inductance of 5.6mH. What will be the reading of the wattmeter on the 50Hz mains? Neglect the impedance of the current coil. The pressure coil is connected on the load side of the instrument. [15]
8. In a bridge rectifier, the transformer is connected to 220 V, 60 Hz mains and the turns ratio of the step down transformer is 11:1. Assuming the diodes to be ideal, find

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- (a) the voltage across the load,
- (b) I_{dc} and
- (c) PIV.

[15]

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1. (a) State the voltage current relationships for:
 - i. Resistance
 - ii. Inductance and
 - iii. Capacitance.
- (b) Determine the voltage drop across the 10 ohms resistance for the following figure 1b. [15]

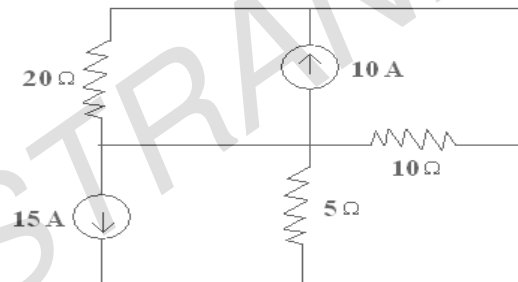


Figure 1b

2. (a) Explain the classification of electrical instruments.
- (b) Explain the significance of controlling torque and damping torque relevant to the operation of indicating instruments. [15]
3. (a) Draw the circuit diagram of an half wave rectifier and explain its operation.
- (b) Derive expressions for rectification efficiency, ripple factor, transformer utilisation factor, form factor and peak factor of an half wave rectifier with resistive load. [15]
4. A 3-phase, star connected synchronous motor takes 48 KVA at 693 V, the power factor being 0.8 lagging. The induced emf is increased by 30%, the power taken remaining the same. Find increased new current and power factor. The machine has a synchronous reactance of 2 ohms per phase and negligible resistance. [15]
5. (a) Derive the relations between I_B , I_E and I_c in CB configuration?
- (b) Explain the laboratory setup for obtaining the CC characteristics. [15]
6. Explain the term current density. Obtain the expression for current density 'J' in terms of dimensions of the conductor, velocity and carrier concentration of charge carrier. [15]

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7. A 6-pole, 12 KW, 240 V, DC-machine is wave connected, if the same machine is lap connected, all other things remain same. Calculate its voltage, current and power ratings. [15]
8. (a) Draw and explain no-load phasor diagram for a single phase Transformer.
- (b) A single phase transformer with 10:1 turn ratio and rated at 50 KVA, 2400/240 V, 50 Hz is used to step down the voltage of a distribution system. The low tension voltage is to be Kept constant at 240 V. Find the value of load impedance of the low tension side so that the transformer will be loaded fully. Find also the value of maximum flux inside the core if the low tension side has 23 turns. [15]

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1. Explain the following terms:
 - (a) deflecting torque
 - (b) controlling torque
 - (c) damping torque. [15]
2. (a) Explain how the losses in transformer vary with the load.
 (b) A single phase 2300/230 V, 50 Hz core type transformer has core section of 0.05 m^2 . If the permissible maximum Flux density is 1.1 wb/m^2 , calculate the number of turns on primary & secondary sides. [15]
3. What is the speciality of a dual beam CRO? Explain its working with a block diagram. [15]
4. (a) Explain the internal and external characteristics of DC generators Shunt, series & compound.
 (b) A shunt generator has an induced voltage of 254 volts. When the machine is loaded, the terminal voltage drops down to 240 volts neglecting armature reaction, determine the load current, if the armature resistance is 0.04 ohms, and the field circuit resistance is 24 ohms. [15]
5. (a) What are the different types of energy sources used in electrical circuits? Explain them with examples.
 (b) For the Figure 5b find:
 - i. The current I, and
 - ii. The voltage across 30 ohms. [15]

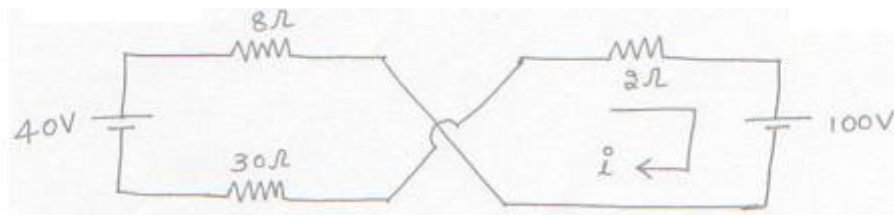


Figure 5b

6. Draw diagrams indicating the biasing arrangements in P-N-P and N-P-N transistors working in active region. [15]

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7. (a) Compare the performance of inductive, L-section and π -section filters.
(b) An L-C filter is to be used to provide a D.C, output with 1% ripple from a full-wave rectifier operating at 50 Hz. Assuming $L/C = 0.01$, determine the required values of L and C. [15]
8. A 3-phase star connected synchronous motor has synchronous reactance of 4 ohms per phase and is working on 1100 V bus bar. Calculate the power factor of this machine when taking 90 KW from the mains, the excitation being adjusted to a value corresponding to an induced emf of 1200 V. Neglect armature resistance.[15]

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1. (a) Explain the principle of operation of DC motors. What is back emf in DC motors? What are its effects?
 (b) How is back emf produced in a DC motor? Also derive an expression for this emf. [15]
2. A single phase 10 KVA, 2000/200 V, 50 Hz transformer has impedance drop of 10% and resistance drop of 5 %. Find the voltage regulation:
 (a) at full load at 0.8 power factor lagging.
 (b) at half the F.L at 0.6 P.f leading. [15]
3. (a) Explain the following terms in a P-N junction diode:
 i. Maximum forward current
 ii. Peak inverse voltage and
 iii. Maximum power rating.
 (b) Explain the terms:
 i. Static resistance,
 ii. dynamic resistance,
 iii. junction resistance and
 iv. reverse resistance of a diode. [15]
4. (a) Compare the performance of a transistor in different configurations.
 (b) Define α , β and γ of a transistor. Show how they are related to each other? [15]
5. Two Batteries A and B with internal resistance R_A and R_B are properly connected in parallel to supply a current of 160 A to a load resistance R_L . Given that $E_A=120V$, $R_A=0.15$ ohms, $R_B=0.1$ ohms and $I_B=60A$. Calculate:
 (a) E_B and
 (b) the power drawn by load. [15]
6. Explain the classification of instruments based on display with required examples. [15]

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7. A 4-pole, 50 Hz induction motor has a full load slip of 5 %. Each rotor phase has a resistance of 0.3 ohms and a stand still reactance of 1.2 ohms. Find the ratio of the maximum torque to the full load torque and the speed at which the maximum torque occurs. [15]
8. (a) What is ion spot in a Cathode Ray Tube using magnetic deflection system?
(b) Define the “luminous efficiency” of a phosphor used in a Cathode Ray Tube? [15]

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