

II B .Tech. I Semester Regular Examinations, November -2005
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Automobile Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Define the following terms with an example :
 - i. Active elements
 - ii. Passive elements
 - iii. Bilateral elements
 - iv. Lumped elements [8]
- (b) An RLC circuit has $R=1\text{ K}\Omega$, $L = 100\text{ mH}$, $C = 10\text{ }\mu\text{F}$. If a voltage of 100 is applied across the series combination , determine
 - i. resonant frequency
 - ii. Q-factor and
 - iii. Half-power frequencies and draw the circuit diagram. [8]
2. (a) Derive an expression for emf equation of a generator. [8]
- (b) The output of a shunt generator is 24 kW at a terminal Voltage of 200 V armature resistance = $0.05\text{ }\Omega$, shunt field resistance = $40\text{ }\Omega$, If iron and friction losses equal the Copper losses at this load , find
 - i. Out put of the engine driving the generator
 - ii. efficiency of the generator. [8]
3. (a) A 6-pole , 500-v , wave connected motor has 1200 armature conductors and useful flux/ Pole of 20mwh. The armature and field resistances are $0.5\text{ }\Omega$ and $250\text{ }\Omega$ respectively. What will be the speed and torque developed by the motor when it draws 20 Amp from the supply mains ? Neglect armature reaction . If magnetic and mechanical losses amount to 900 W, find
 - i. Useful torque
 - ii. o/p in KW and
 - iii. efficiency at this load. [10]
- (b) What are various types of motors and what are their applications? [6]
4. (a) How do you determine core losses in transformer using open-circuit test ? Explain. [8]
- (b) A transformer has a reactive drop of 5% and a resistance drop of 2.5 % . Find the lagging Power factor at which the Voltage regulation is maximum and the value of this regulation. [8]
5. (a) Explain how P-type and n-type semi conductor is formed. Give examples of each. [8]

- (b) Explain forward and reverse biased P-n diode with its Characteristics. [8]
- 6. (a) Explain the input and output characteristics of CB Configuration. [8]
- (b) Explain the applications of CRO. [8]
- 7. (a) What is feed back in amplifiers? Compare advantages and disadvantages of positive and negative feedback. [8]
- (b) Explain the principle of RC phase shift oscillator using BJT. [8]
- 8. (a) Explain the applications of dielectric heating. [8]
- (b) Explain the principle of R-2R D/A converter. [8]

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1. (a) Define the following terms with an example:
 - i. Unilateral elements
 - ii. Distributed elements
 - iii. Linear elements
 - iv. active elements
- (b) In the given circuit shown in figure1, find the value of the resistance R and the current through it, when the branch AD carries no current.

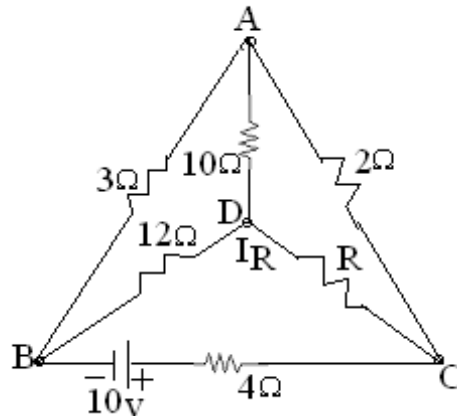


Figure 1:

2. (a) Explain about various losses occurring in a generator. [8]
- (b) A shunt generator delivers 195 A at a terminal potential difference of 250V. The armature resistance and shunt field resistance are 0.02Ω and 50Ω respectively. The iron and friction losses equal 950 W. Find
 - i. emf generated
 - ii. cu losses
 - iii. output of the prime mover
 - iv. Commercial , mechanical , and electrical efficiencies. [8]
3. (a) What are the factors that control the speed of d.c motors?. Explain any two methods for controlling the speed of shunt motors. [8]

- (b) A series motor is run on a 440-V circuit with a regulating resistance of $R-\Omega$ for speed adjustment. The armature and field coils have a total resistance of 0.3Ω . On a certain load with $R = \text{Zero}$, the current is 20 A and speed is 1200 rpm, with another load and $R = 3 \Omega$, the current is 15 A. Find the new speed and also the ratio of the two values of the power output of the motor. Assume the field strength at 15A to be 80 % of that at 20 A. [8]
4. (a) Explain the function of a transformer. Derive an expression for emf equation of a transformer. [8]
- (b) A 30-KVA, 2400/ 120-V, 50-HZ, transformer has a high Voltage winding resistance of 0.1Ω and a leakage resistance of 0.22Ω . The low Voltage winding resistance is 0.35Ω and the leakage resistance is 0.012Ω . Find the equivalent winding resistance, reactance and impedance referred to high Voltage side and low Voltage side. [8]
5. (a) Derive the condition for maximum torque under running conditions for an induction motor. [8]
- (b) Calculate the torque exerted by an 8-pole, 50-HZ, 3- ϕ induction motor operating with a 4% slip which develops a maximum torque of 150 Kg-m at a speed of 660 rpm. The resistance per phase of the rotor is 0.5Ω . [8]
6. (a) Explain how pn-junction diode acts as half wave rectifier with relevant circuit and waveforms. [8]
- (b) Explain the working of transistor in CC Configuration. [8]
7. Draw the block diagram of CRO and explain the function of each block clearly. [16]
8. (a) Explain the principle of RC phase shift oscillator using BJT. [8]
- (b) Explain the working principle of energy storage welding circuit. [8]

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1. (a) The voltage applied to the series RLC circuits is 0.85 V. The Q of the coil is 50 and the value of the capacitor is 320PF. The resonant frequency of the circuit is 175kHz. Find the value of the inductance, the circuit current and the voltage across the capacitor. Draw the phasor diagram.
- (b) Determine the voltage across the capacitor in the circuit shown in figure 2 [16]

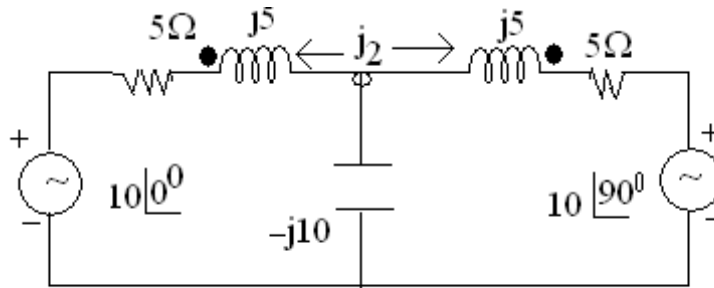


Figure 2:

2. (a) Explain the principle of a generator. What are the various types of generators? Explain with neat diagram. [8]
- (b) A 4-poles, Lap-wound, d-c shunt generator has a useful flux per pole of 0.07 wb. The armature winding consists of 220 turns each of 0.004 Ω resistance. Calculate the terminal Voltage when running at 900 rpm if the armature current is 50 A. [8]
3. (a) Explain the significance of back emf in d.c motors. Distinguish between a d.c motor and generator. [8]
- (b) The armature winding of a 200-V, 4-pole, series motor is lap-connected. There are 280 slots and each slot has 4 conductors. The current is 45-A and the flux per pole is 18 mwb. The field resistance is 0.3 Ω, the armature resistance = 0.5 Ω and the iron and friction losses total 800W. The pulley diameter is 0.406m. Find the Pull in Kg at the rim of the pulley. [8]
4. (a) What are the parameters that can be determined by O.C and S.C test of a transformer. Explain the procedure to find them. [8].

- (b) The equivalent circuit for a 200/400-V step-up transformer has the following parameters referred to the Low- Voltage side: [8]
Equivalent resistance = $0.15\ \Omega$
Equivalent reactance = $0.37\ \Omega$
Core component resistance = $600\ \Omega$
Magnetizing reactance = $300\ \Omega$
When the transformer is supplying a load of 10-A at a Power factor of 0.8 lag, calculate
- i. The primary current
 - ii. Secondary terminal Voltage.
5. (a) Explain the principle of forward and reverse biased Pn-junction V-I characteristics. [8]
(b) Compare the performance characteristics of pnp and npn transistor. [8]
6. (a) Compare and contrast the CE , CB and CC Configurations of a transistor. [8]
(b) Explain the applications of CRO. [8]
7. (a) Explain the principle of successive approximation type A-to-D converter. [8]
(b) Classify timers according to their applications and functionality. [8]
8. (a) Explain the principle of various types of resistance welding. [8]
(b) Explain the applications of dielectric heating. [8]

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1. (a) Define the terms:
 - i. average value
 - ii. RMS value
 - iii. Form factor
 - iv. KVL and KCL laws.
- (b) In the given circuit shown in figure3, determine the power out put of the source and the power in each of the network resistors.

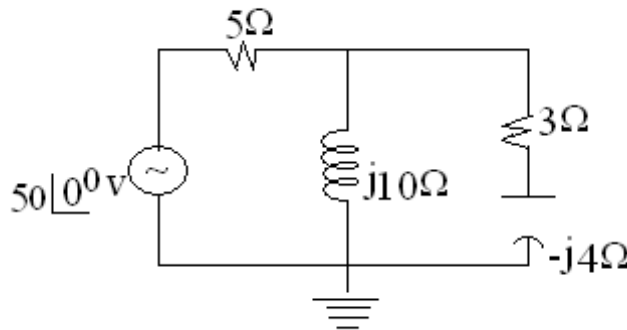


Figure 3:

2. (a) Distinguish between a generator and motor. Explain various types of generators. [8]
- (b) A Shunt generator delivers 195 A at a terminal potential difference of 250V . The armature resistance and shunt field resistance are 0.02 Ω and 50 Ω respectively. The iron and friction losses equal 950 W. Find
 - i. emf generated
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- (b) The armature winding of a 200-V , 4-pole , series motor is lap-connected . There are 280 slots and each slot has 4 conductors. The current is 45-A and the flux per pole is 18 mwb. The field resistance is 0.3Ω , the armature resistance= 0.5Ω and the iron and friction losses total 800 W. The pulley diameter is 0.406m. Find the pull in Kg at the rim of the pulley. [8]
4. (a) Derive the condition for maximum torque under running conditions for an induction motor. [8]
- (b) Calculate the torque exerted by an 8-pole , 50-HZ, 3- ϕ induction motor operating with a 4% slip which develops a maximum torque of 150 Kg-m at a speed of 660 rpm. The resistance per phase of the rotor is 0.5Ω . [8]
5. (a) Explain how p-type and n-type semi conductor is formed. Give examples of each. [8]
- (b) Compare the performance characteristics of pnp and npn transistor. [8]
6. (a) What is the purpose of filter circuit? Explain. What are various types of filters? Briefly explain and compare them. [8]
- (b) Explain the applications of CRO. [8]
7. (a) What is the need for feedback in amplifier and oscillator circuits? What type of feedback is employed in them? Compare their advantages and disadvantages. [8]
- (b) Explain the principle of flash type A-to-D converter. [8]
8. (a) Explain the working principle of energy storage welding circuit. [8]
- (b) Illustrate the applications of dielectric heating. [8]
