

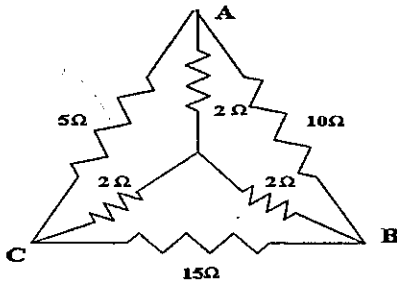
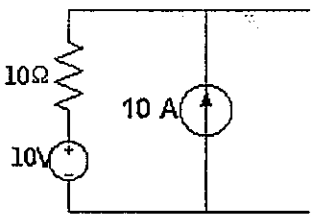
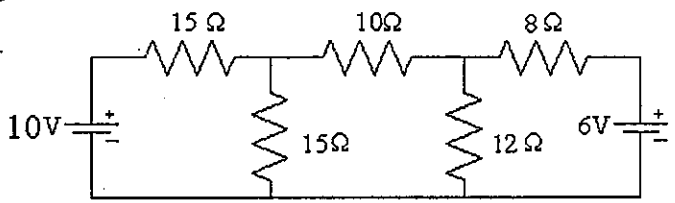
MECHANICAL ENGINEERING 1ST YEAR 1ST SEM SUPPLE EXAMINATION, 2017(Old)

(1st/2nd Semester/Repeat/Supplementary/Annual/BI-Annual/Old)

SUBJECT: - ELECTRICAL TECHNOLOGY-I (OLD)

Time: Three hours

Full Marks 100
(50 marks for each part)

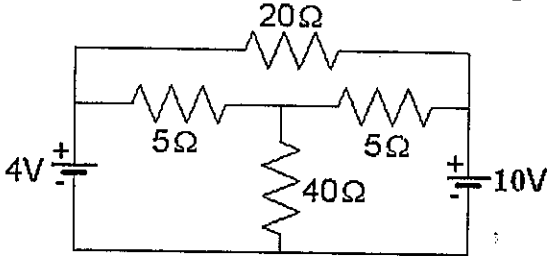
| No. of Questions | Part-I | Marks |
|--|---|-------|
| <i>Answer any three; 2 marks kept for well organized answers</i> | | |
| 1. a) | In magnetic loss test of a specimen with unit volume, the measured values of total iron loss (Hysteresis loss+ eddy current loss) at a given peak flux density were 3.6 watt at 40 Hz and 7.8 watt at 60 Hz. Estimate hysteresis and eddy current losses in Watt at 50 Hz for the same peak flux. | 8 |
| b) | Using Star – Delta transformation, find the value of total resistance between the nodes A and B of the circuit given in Fig. 1. <div style="text-align: center;">  <p>Fig. 1</p> </div> | 8 |
| 2.a) | Convert the circuit shown in the figure (Fig. 2) into equivalent voltage source. <div style="text-align: center;">  <p>Fig. 2</p> </div> | 3 |
| b) | Explain Two wattmeter method for measurement of power for 3 phase circuit. | 8 |
| c) | In power measurement by two wattmeter method, the wattmeters read 7W and 13W respectively. Find the total Active and Reactive power consumed and the power factor of the load. | 5 |
| 3. a) | Using Superposition theorem find the value of current passing through 8 Ω resistor in Fig.3. <div style="text-align: center;">  <p>Fig. 3</p> </div> | 8 |

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Time: Three hours

Full Marks 100

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| | | |
|-------|--|--------|
| b) | <p>State Norton's Theorem. Find out the value of current through the 20Ω resistor in the following circuit as shown in the figure given below (Fig. 4) using Norton's theorem.</p>  <p style="text-align: center;">Fig. 4</p> | 8 |
| 4. a) | <p>An iron ring has a mean diameter of 20 cm and a cross sectional area of 5 cm^2. It is wound with a coil of 100 turns. An air gap of 1 mm width is cut in the ring. Determine the current required in the coil to produce a flux of 1.5 mWb in the air gap if the relative permeability of iron under this condition is 800. Neglect leakage and fringing.</p> | 8 |
| b) | <p>A balanced 3 phase star connected load of $(6-j8)\Omega$ per phase is given a balanced 3 phase supply of 400 V, 50Hz. Find i) total active and reactive power consumed. ii) Line and Phase currents (with phasor diagram).</p> | 8 |
| 5. | <p>Write notes on the followings</p> | 8X2=16 |
| a) | <p>Hysteresis and Eddy current losses</p> | |
| b) | <p>Maximum Power Transfer Theorem</p> | |

B. Mechanical Engineering 1st year, 1st semester Supplementary EXAMINATION, 20 17(Old)
(1st/2nd Semester/Repeat/Supplementary/Annual/Bi-Annual)

SUBJECT Electrical Technology-I
(Name in full)

PAPER.....

Time : Two hours/Three hours/Four hours/Six hours

Full Marks 100
(50 marks for each part)

Use a separate Answer-Script for each part

| No. of questions | Part-I /Part II | Marks |
|------------------|--|-------|
| | <u>Answer any three questions (3 × 16), 2 marks for organized answer</u> | |
| 1. a) | Derive the expression of electromagnetic torque generated in a dc motor. | 5 |
| b) | Derive the expression of emf induced in a dc machine by clearly mentioning the considered assumptions. | 5 |
| c) | A lap connected 6 Pole, 200 V DC generator has 1000 number of conductors in winding. The motor is running with 800 rpm. If the numbers of turns in each field coil is 800, what is the average value of the emf induced in each coil on breaking the field if the flux dies away completely in 0.2 second? | 6 |
| 2. a) | Discuss about the different characteristics of dc Shunt & Series and compound generators. | 8 |
| b) | Discuss about the Voltage Buildup process of DC Shunt Generator. | 6 |
| c) | What are the possible sources of failure of the Voltage Build up? | 2 |
| 3. a) | What do you mean by armature reaction effect for dc machine? | 6 |
| b) | What are the available methods to minimize the armature reaction effect for dc generator? | 2 |
| c) | Develop the equivalent circuit of a single phase transformer step by step. How it differs from the ideal transformer. | 8 |
| 4. a) | Discuss different Speed Control Strategies for DC motor. | 6 |
| b) | Derive the expression of emf for a single phase transformer. | 8 |
| c) | Why DC series motors are generally not used with conveyor belt? | 2 |
| 5. a) | Draw the per phase equivalent circuit of a 3 phase Induction Motor running at a Slip "s". Hence, derive the expression of electromagnetic torque for it. | 12 |
| b) | Define synchronous impedance for alternators. | 2 |
| c) | 'Voltage regulation for an alternator can be negative.'-Justify | 2 |