

**B.Tech. (Common For All Branch G-Scheme)**

**2<sup>nd</sup> Semester Examination, May-2024**

**BASIC ELECTRICAL ENGG.**

**Paper : ESC-EE-101 G**

*Time allowed : 3 hours*      *[Maximum marks : 75]*

*Note:* Attempt *five* questions in all, selecting *one* question from each unit. *Question No. 1* is compulsory. All questions except question No.1 carry equal marks.

1. (i) Distinguish between :      2.5
- (a) Active and Passive elements
  - (b) Loop and Mesh
- (ii) Define the following terms :      2.5
- (a) Phase
  - (b) Peak factor
  - (c) R.M.S. value
  - (d) Impedance triangle
  - (e) Reactive power

- (iii) A moving coil ammeter can read upto 2A has a resistance of 0.2  $\Omega$ . How could this instrument be adopted to read :
- (a) Voltage upto 300 volts
  - (b) Current upto 100 Amps.      2.5
- (iv) Explain what is meant by regulation of a transformer.      2.5
- (v) Write short note on "All-day efficiency of transformer".      2.5
- (vi) A coil takes a current of 10 A at a phase angle of 30° when connected to a 250V, 50Hz supply. Calculate the resistance and inductance of the coil.      2.5
- (vii) Define the following terms of rotating electrical machines :      2.5
- (a) Field coils
  - (b) Armature winding
  - (c) Commutator
  - (d) Back E.M.F.

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- (viii) Which type of motors are self-starting & why? 2.5
- (ix) What is earthing? Name the different methods of earthing. 2.5
- (x) What is a circuit breaker? Name atleast four types of circuit breaker. 2.5

**Unit-I**

- 2. (i) State super position theorem. Determine the potential difference across  $120\ \Omega$  resistor in the network shown in fig. 1 using superposition theorem. 6.25

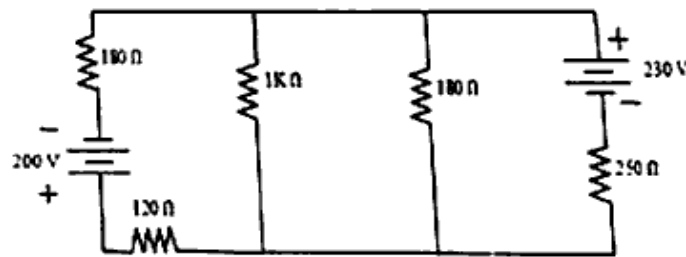


Fig-1

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- (ii) Show that the power consumption, when three identical impedances are connected in delta across a balanced 3-phase supply is three times that when the same impedances are connected in star across the same 3-phase supply. 6.25
3. (i) Explain with mathematical expression that power consumed in a pure capacitance is zero. What do you understand by active and apparent power? 6.25
- (ii) State an application of Thevenin's and Norton's theorem. Using Thevenin's theorem, find the current in section XY of distribution network shown in fig 2. 6.25

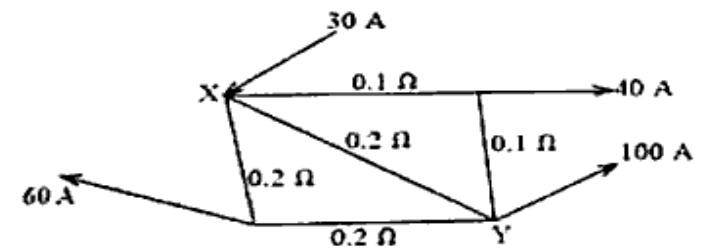


Fig-2

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**Unit-II**

4. (i) Explain two-wattmeter method to measure power in a 3-phase unbalanced load. Show the phasor relationship between line voltage and line current with phase voltage and phase current in star-connected circuit. 6.25
- (ii) Explain open circuit and short circuit tests of transformer in detail. 6.25
5. (i) Explain series resonance. What is resonance curve ? Explain how it is obtained using suitable equations. Determine Q-factor for a series resonance circuit. <https://www.mdustudy.com> 6.25
- (ii) Explain the principle of working of an auto-transformer. In what ways does an auto-transformer differ from a conventional two-winding transformer ? 6.25

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**Unit-III**

6. (i) Explain the production of revolving field & hence, principle of operation of three-phase induction motor. 6.25
- (ii) A D.C. shunt motor runs at 1000 r.p.m. on 200 V supply. Its armature resistance is  $0.8 \Omega$  and the current taken is 40 A, in addition to the field current. What resistance do you connect in series with the armature to reduce the speed to 600 r.p.m., the current in the armature winding the same ? Neglect armature reaction. Give applications of D.C. shunt motor. 6.25
7. (i) A D.C. shunt machine connected to 250V mains, has an armature resistance of  $0.12 \Omega$  and field resistance of  $100 \Omega$ . Calculate the ratio of speed as a generator to motor when the line current in each is 80 A. 6.25

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- (ii) Derive an expression for the torque developed in an induction motor. Give differences between squirrel cage and slip-ring induction motors. 6.25

**Unit-IV**

8. (i) Explain different types of wiring with reference to their field of application, advantages and disadvantages. 6.25
- (ii) Explain the construction and working principle of a dynamo-meter-type wattmeter and show how its deflecting force is proportional to the average value of power. 6.25
9. (i) Explain ELCB, MCB, MCCB, fuse. 6.25
- (ii) Describe a PMMC instrument in detail. Further, discuss its advantage and disadvantages. 6.25

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