

Paper Id: 120105

Roll No:

**B.TECH**  
**(SEM I) OVER THEORY EXAMINATION 2019-20**  
**BASIC ELECTRICAL ENGINEERING**

**Time: 3 Hours**

**Total Marks: 100**

**Note:** Attempt all Sections. If require any missing data; then choose suitably.

**SECTION A**

- 1. Attempt all questions in brief. 2 x 10 = 20**
- a. State Max Power Transfer Theorem.
  - b. Determine the form factor of ac current  $i = 400 \sin(157t + \pi/6)$ .
  - c. For ideal voltage & current source what will be the value of internal resistance.
  - d. Draw impedance diagram for capacitive circuit.
  - e. Define Reluctance, Flux Density in Magnetic circuit
  - f. Write Ideal Transformer conditions.
  - g. Explain different errors occur in measuring instruments.
  - h. What is phase sequence in a Balance 3-phase system?
  - i. An 6 pole lap connected armature has 860 conductors a flux 0.05 Wb per pole and speed of 360 rpm find generated e.m.f
  - j. Write applications of single phase induction motor.

**SECTION B**

- 2. Attempt any three of the following: 10x3=30**
- a. Derive the equation from star to delta conversion.
  - b. Explain series Resonance. A circuit of a resistance of  $10\Omega$ , and inductance of 0.5 H and a variable capacitance n series across a 230 V, 50Hz supply. Calculate: (i) The value of capacitance to produce resonance (ii) The voltage across the capacitance and inductance (iii) The Q-factor of the circuit.
  - c. Explain similarities & dissimilarities between Magnetic circuit and electric circuit.
  - d. Explain 2 wattmeter methods to calculate 3 phase power. In the two wattmeter method of power measurement in a three phase circuit, the readings of the wattmeter's are 1000 W and 400 W. What is the total power and power factor of the load?
  - e. Why single phase induction motor is not self-starting machine? Explain any method of starting it.

**SECTION C**

- 3. Attempt any one part of the following: 10x1=10**
- a. Explain superposition theorem & by using this theorem compute the current I in  $1\Omega$  resistance Fig.2

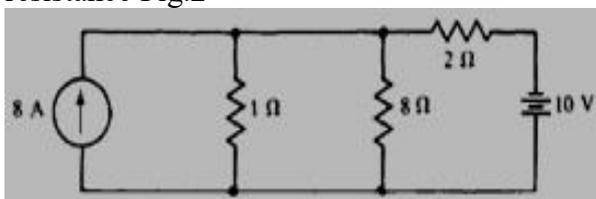
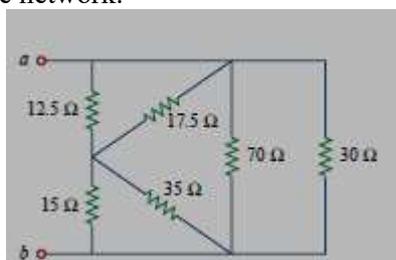


Fig.2

- b. By using star- delta transformation Determine the effective resistance between terminals ab in the network.

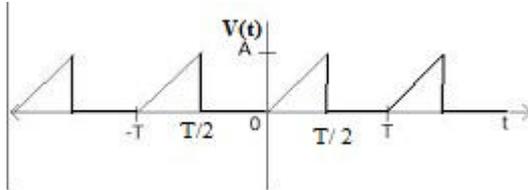


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**4. Attempt any one part of the following: 10x1=10**

- a. Explain Inductive circuit & draws its phasor diagram. A coil having a resistance of  $20 \Omega$  and inductance of  $0.75 \text{ H}$  is connected in series. The whole circuit has been connected to a single phase  $230\text{-V}$ ,  $50 \text{ Hz}$  Supply. Calculate impedance, current, power factor, power and apparent power of the circuit
- b. Find AVERAGE and RMS value for following waveform-

**5. Attempt any one part of the following: 10x1=10**

- a. Explain essential parts in electrical instruments also explain principle of operation of moving iron instruments.
- b. For a Star connected 3 phase balanced system. Prove that  $V_L = \sqrt{3}V_{ph}$ ,  $I_L = I_{ph}$ . A 3 phase  $400\text{v}$  supply is connected to 3 phase star connected balance load the line current is  $30\text{A}$  Power consumed by load is  $10\text{kW}$  find impedance of load, phase current, power factor.

**6. Attempt any one part of the following: 10x1=10**

- a. A coil of  $1000$  turns is wound uniformly on an iron ring of mean circumference  $50 \text{ cm}$  and across sectional area  $5 \text{ cm}^2$ . Current  $12 \text{ Amp}$  is flowing through coil. Relative permeability of the material is  $4000$ . Find (i) MMF (ii) Magnetizing force (iii) Total flux (iv) Reluctance.
- b. Derive the max efficiency condition a single phase transformer. A single phase  $100 \text{ KVA}$ .  $1100/230\text{V}$ ,  $50 \text{ Hz}$  transformer has  $95 \%$  efficiency at  $.8$  lagging power factors both at full load and also at half load. Determine iron and copper loss at full load for transformer. Classify the different types of transformer also Derive the EMF equation of a single phase transformer.

**7. Attempt any one part of the following: 10x1=10**

- a. Explain working principle of 3 phase induction motor. A 3 phase 4 pole induction motor is connected to 3 phase  $50\text{Hz}$  ac supply find  
 (i) Synchronous speed  
 (ii) The rotor speed when slip is  $4\%$   
 (iii) Rotor frequency when rotor speed is  $600 \text{ rpm}$
- b. Draw & Explain speed torque characteristics of DC shunt Motor, DC Series Motor.