**P-304**

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| Seat No. | |
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# F.E. (All Branches) (Semester - I & II) (Revised) Examination, April - 2016

## BASIC ELECTRICAL ENGINEERING

## Sub. Code : 59178

**Day and Date : Saturday, 23 - 04 - 2016** **Total Marks : 100**

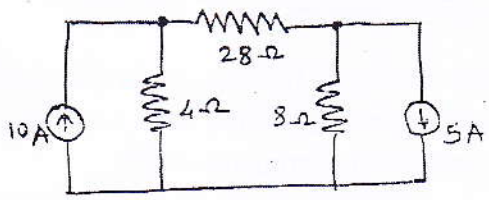
**Time : 10.30 a.m. to 1.30 p.m.**

**Instructions :**
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat labeled diagrams as a part of explanation.**
4) **In case of missing data, assume suitable value. State it clearly.**

## SECTION - I

**Q1)** Answer any TWO: **[2 × 9 = 18]**

a) Find the current (magnitude and direction) in all resistances by nodal analysis or mesh analysis.




b) Draw and explain Magnetization curve for a magnetic material. What is magnetic saturation and why it should be avoided?

c) An electric heater working at 200 volts at an efficiency of 75% is used to heat 10kg of water with specific heat of 4200J/kg °C from 30°C to 90°C in 28 min. Find

i) Input power

ii) Current,

iii) Resistance of the heater

*P.T.O.*

**Q2)** Answer any TWO: **[2 × 9 = 18]**

a) Define power factor in AC circuit. State the causes and drawbacks of low power factor.

b) Define RMS value & derive the expression for RMS value of sinusoidal current by analytical method.

c) A voltage v = (100sin 314t) is applied to a series circuit consisting of 10 ohm resistance, 0.0318 Henry inductance and a capacitor of 63.6 micro farad. Find Impedance, equation for current, power factor and active power.

**Q3)** Answer any TWO: **[2 × 7 = 14]**

a) State the various types of earthing electrodes & explain the structure of any one with a neat sketch.

b) Describe working of CFL (Compact Fluorescent Lamp). State its advantages & disadvantages.

c) Draw & explain the single line diagram of a typical power system from the point of generation to the point of utilization. Explain why a step up transformer is used before transmission?

## SECTION -II

**Q4)** Answer any TWO: **[2 × 7 = 14]**

a) When supply voltage is V, power taken by load is P and pf of load is cos $\phi$, state the expression for line current

i) in a single phase system

ii) in a 3 phase 3 wire system.

Hence comment on the copper required and copper loss in the two systems.

b) Draw the circuit diagram of delta connected circuit and prove that in this balanced system, phase current = line current/$\sqrt{3}$.

c) With respect to the diagram of a star connected circuit, define and explain line voltage, line current, phase voltage, phase current.

**Q5)** Answer any TWO: **[2 × 9 = 18]**

a) With a neat diagram, explain the construction of stationary armature and smooth cylindrical rotor of a single phase alternator. Explain why slip rings and brushes are required in an alternator?

b) Explain the power losses in a transformer. Why is the copper loss less in an autotransformer?

c) A 200V/400V, 50Hz single phase transformer operates on rated supply at no load by taking 1A at 0.2pf. The emf per turn is 2 V. Find

i) Maximum flux in the core

ii) Secondary winding turns

iii) Iron loss at full load.

**Q6)** Answer any TWO: **[2 × 9 = 18]**

a) In a shaded pole induction motor, explain:

i) How shifting flux is produced?

ii) How torque is produced?

b) Draw figures for the stator and rotor and explain the construction of a permanent split phase induction motor.

c) State the important features of an universal motor. State the applications of universal motor.