B. CSE 2ND YEAR 2ND SEMESTER EXAM 2017 (Old)

SUBJECT: ELECTRICAL TECHNOLOGY-B

Time : Three hours

Full Marks 100

Sl. No. of questions		Answer any *five* (5×20) questions	Marks

1. (a) Explain crest and form factors as applicable to sinusoidal waveforms. Find their values. — 6

   (b) Explain the phenomenon of parallel resonance in an AC network using proper circuit and phasor diagram. Consider both inductance and capacitance to be impure. — 6

   (c) An impedance $(10+j15)\Omega$ is connected in series with a capacitor of reactance 10Ω. This combination is connected across an AC voltage source, $v(t) = 110 \times \sqrt{2}\sin(\omega t)V$. Find the current from the source expressed in the form, $I_m\sin(\omega t \pm \theta)A$. Find the real, apparent and reactive power. Show the phasor relationship of the source voltage and source current. — 8

2. (a) Show that two wattmeters method of power measurement is valid in unbalanced three phase AC network. — 8

   (b) With suitable phasor diagram explain why there are only two possible phase sequences in three phase system. — 6

   (c) A balanced delta connected load with per phase impedance $(4+j3)\Omega$ is connected to 110V three phase supply. Find the readings shown by two wattmeters individually, when they are connected to measure power in this system. — 6

3. (a) Explain eddy current loss in magnetic cores and how this loss can be reduced. — 8

   (b) An iron ring of 25cm mean diameter and circular cross section of $1cm^2$ has an air gap of 2mm along the length. It is wound uniformly with 800 turns of suitable wire carrying a current of 2A. Assuming MMF across the iron part is 30% of the total MMF, Find (i) MMF (ii) flux density in the air gap (iii) relative permeability of the material (iv) Inductance across the terminals of the winding. — 12

4. (a) Explain the open circuit and load characteristics of DC shunt generator with proper circuit diagram. — 6

   (b) Why DC series motors are popular in traction applications? Explain with proper derivation. — 6

   (c) A DC shunt motor is running at a particular speed with load. Explain the effect on speed of the motor if (i) supply voltage is reduced to half (ii) armature terminal voltage reduced to half, keeping field current same (iii) field current reduced to half keeping armature terminal voltage same. — 8

5. (a) What do you mean by polarity of a two winding transformer? How is this denoted practically? — 6

   (b) Draw and explain the no-load phasor diagram of a practical transformer with relevant equivalent circuit. — 7

   (c) Derive the condition for maximum efficiency of a power transformer. Explain the effect of power factor on this condition. — 7

6. (a) How is rotating magnetic field produced by the stator of a three phase induction machine? — 8

   (b) What are the different types of starters used for starting a **slip-ring** induction motor? — 6

   (c) Why is an induction machine called universal transformer? — 6

7. (a) Derive the expression for emf generated by a synchronous generator. — 6

   (b) Why is the armature of higher rated alternator placed on stator instead of rotor? — 6

   (c) From the equivalent circuit of the alternator, derive and draw the power-angle characteristics. — 8