3[a] Find currents I_1 and I_2 in the circuit shown in Fig.2 7

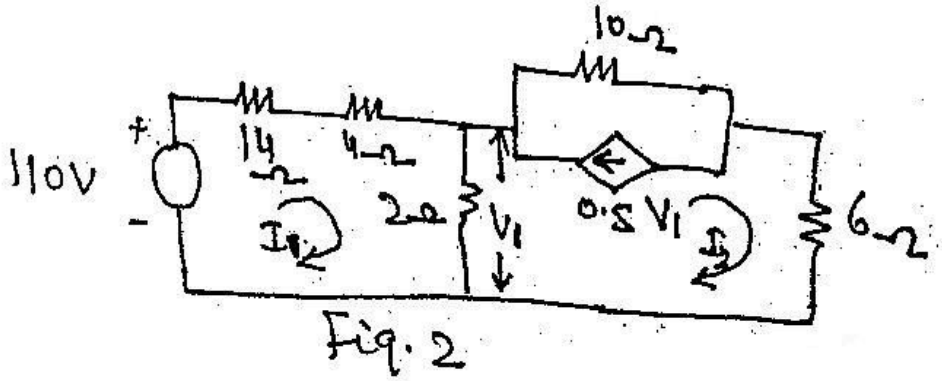

Fig. 2

[b] Obtain a Thevenin's equivalent at terminals a-b for the circuit shown in Fig.3 7

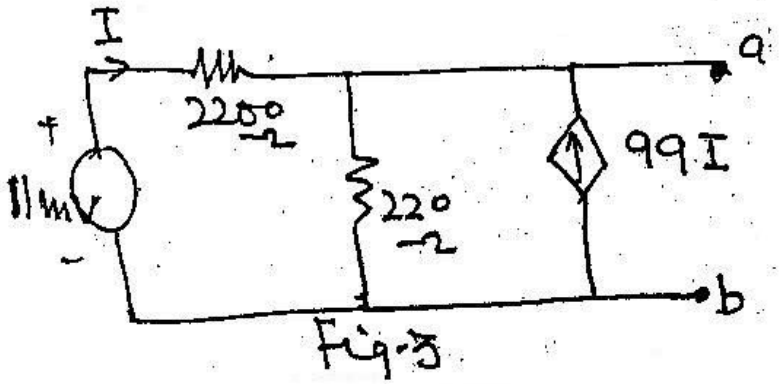

Fig. 3

4[a] An alternative voltage (80 + j 60) v is applied to a circuit and the resulting current flowing in the circuit is (-4 + j 10) A. Find (i) Impedance and admittance of the circuit (ii) Power consumed (iii) Phase angle (iv) Resistive and reactive components. (v) Apparent power. 7

[b] Two impedances z_1 and z_2 are connected in parallel. The first branch takes a leading current of 16 A and has a resistance of 6Ω, while second branch takes a lagging current at power factor 0.8. The total power is 5 kW. The applied voltage being (100 + j 200)V .
Determine : (i) Circuit constant of the network (ii) branch currents (iii) total current. 7

5[a] In a series RLC a circuit consisting of R = 2Ω, L = 1mH and = 0.4 μF. Find (i) resonance frequency

(ii) Half power frequencies

(iii) Quality factor

(iv) Bandwidth

(v) Amplitude of currents at w_0 w_1 and w_2 if applied voltage is 20sinωt

10

[b] Explain the principle of operation of 3-phase induction motor. 4

6[a] Calculate the power supplied to the 10Ω resistor in the ideal transformer shown in Fig.4 10

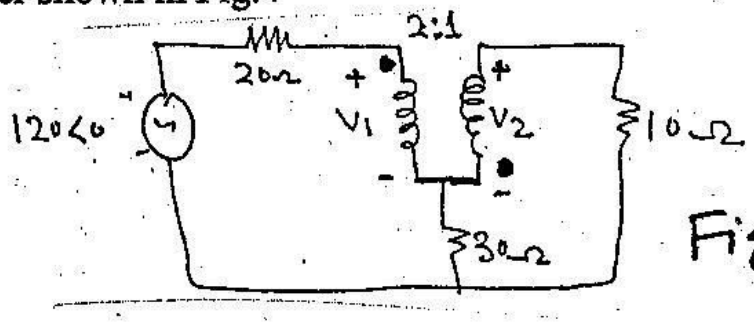

Fig.4

[b] Compare electrical and magnetic quantities. 4

7 Efficiency of 400/200V, 200 kVA single phase transformer is 98.5% at full load at 0.8 pf lagging At half load and at 0.8 pf lagging the efficiency is 97.5% calculate the values of coreloss and copper loss at full load. 7

[b] Consider the circuit in Fig.5 determine coupling coefficient. Calculate the energy stored in the coupled inductors at time t = 1 sec if V = 60 cot (4t + 30°) volt 7

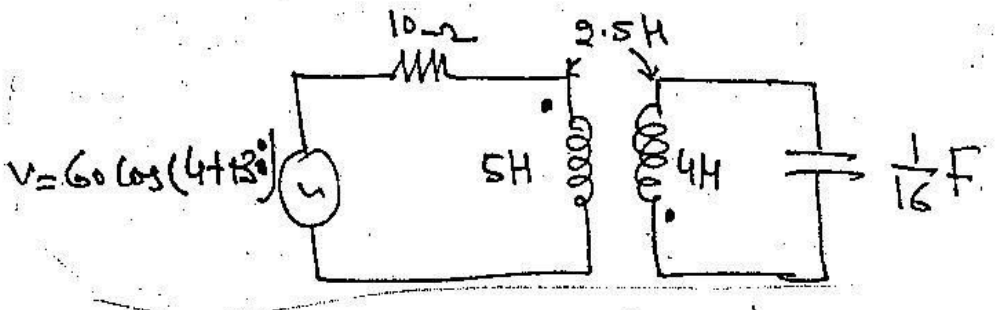

Fig.5

8[a] A star connected 3-phse load has a resistance of 8Ω and inductance 0.0191H in each phase. It is fed from 400V, 50 Hz, 3-phase balanced supply. Determine

i. Line currents in all phases
ii. Power factor
iii. Power
iv. Apparent power
v. If power is measured by two wattmeter method. Determine W_1 and W_2
vi. Draw neatly phasor diagram.

10

[b] Discuss advantages of digital instruments. **4**

Total No. of Pages 4

Roll No. .....

FIRST SEMESTER

B.Tech. (Group A)

END SEMESTER EXAMINATION

NOV.-DEC.-2011

EE-105 ELECTRICAL SCIENCES

Time: 3 Hours

Maximum Marks : 70

Note : Question No. *ONE* is compulsory.
Answer any *FOUR* questions from the remaining.
Assume suitable missing data, if any.

1[a] Explain main features of dependent sources and independent sources.

[b] Show that Norton theorem and Thevenin's theorem are dual to each other.

[c] Show that for a parallel RLC circuit $f_0^2 = f_1 . f_2$, where f_0, f_1 and f_2 are frequencies at resonance and half power points.

[d] While measuring power in a 3 phase circuit by two wattmeter method one of the wattmeters indicates a negative reading explain the reasons.

[e] An induction motor of the same rating that of 3-ϕ transformer, draws more current at no load than a transformer. Explain with justification.

[f] Why is eddy current damping not provided in moving iron instruments?

[g] Explain the significance of BH curve.

7×2=14

2[a] Draw V-I characteristics of the following (i) Ideal voltage and current sources (ii) Ohmic and non-ohmic elements. 4

[b] The current in a 10 Henry inductor is shown in Fig.1. Sketch wave forms for the voltage v(t), the instantaneous power p(t) and the energy stored w(t) as a function of time. 10

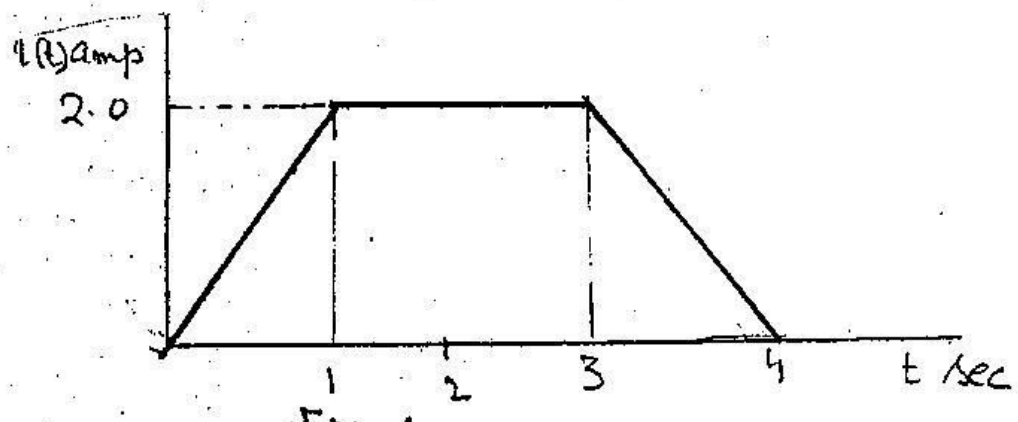

Fig. 1