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(Paper code and roll No. to be filled in your answer book)

Paper code: KEE-101/ KEE-201 Roll No.

B.Tech. (SCOP)

First / Second Semester Examination, 2015-16

Electrical Engineering

Time: 3 Hours **Total Marks: 100**

Note: Attempt all questions. Each questions carry equal marks.

1. Attempt any two parts of the following: **(10x2=20)**

(a)Derive the expressions for converting a delta network to a star equivalent network and star network to delta equivalent network.

(b) State and explain superposition Theorem. Using superposition theorem, determine currents in all the resistors of the following network shown in fig.1.

(c)Determine the mesh currents in the network shown in Fig. 2 by Mesh Analysis method.

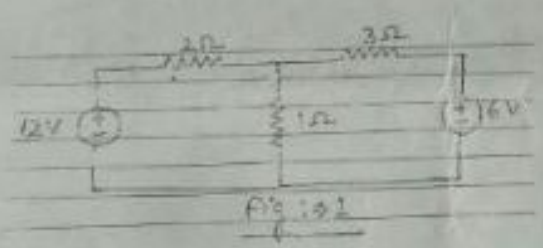

Fig :-1

Fig-2

2. Attempt any two parts of the following: **(10x2=20)**

(a)Find the RMS value, average value, form factor and Peak factor of the voltage waveform shown in fig. 3.

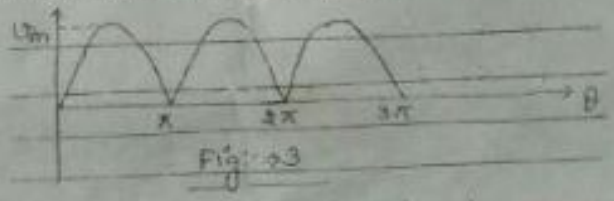

Fig :-3

(b) A parallel circuit consists of two branches, one containing a coil of resistances 5 Ω and inductance 38.2 mH, the other a non inductive resistance 16 Ω in series with a capacitor of

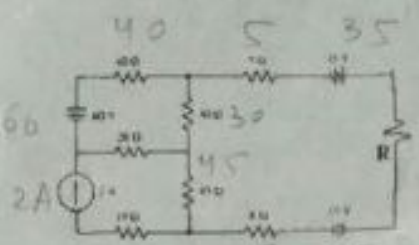

Figure 2

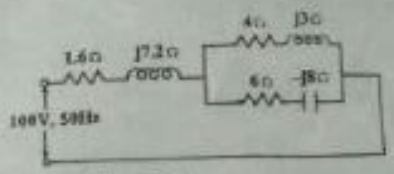

Figure 3

(i) Admittance of each of the parallel branch
(ii) Total Circuit Impedance
(iii) Supply current and power factor
(iv) Total Power supplied by the source

(c) A 480 V source energizes two loads in parallel supplying 2 kVA at a 0.5 lagging power factor to one load and 4 kVA at a 0.6 leading power factor to the other load. Find the source current and also the total impedance of the combination.

3. Attempt any two parts of the following: (10x2=20)

(a) A coil is wound uniformly on an iron core. The relative permeability of the iron is 1400. The length of the magnetic circuit is 70 cm. the cross-sectional area of the core is 5 cm^2. The coil has 1000 turns. Calculate:

(i) Reluctance of the magnetic circuit
(ii) Inductance of coil in henneries
(iii) E.M.F. induced in coil if a current of 10 A is uniformly reversed in 0.2 seconds.

(b) The 100 ohm non inductive resistances are connected in (i) star (ii) delta across a 400 V, 50 Hz, 3 phase supply. Calculate power taken from supply system in each case. In the event of one of the three resistances getting open circuited, what should be the value of total power taken from the mains in each of the two cases?

(c) With neat circuit diagram, explain:

(i) Single phase dynamometer wattmeter and
(ii) Induction type energy meter.

4. **Attempt any two parts of the following:** **(10x2=20)**

(a) Draw the phasor diagram of single-phase transformer for leading power factor load. The efficiency of 400 kVA single-phase transformer is 98.77% at full load 0.8 power factor and 99.13% at half load unity power factor.

Find (i) Iron Losses at full load and half loads

(ii) Copper losses at full load and half loads.

(b) Explain the need of earthing of electrical equipment. Describe the basic components of earthing.

(c) A steel ring of circular section of 1cm in radius is having a mean circumference of 1 m and air gap of 1 mm long. It is uniformly wound with coil consisting of 800 turns and excited with a current of 2.5 A. Neglecting leakage flux, calculate (i) MMF (ii) Magnetic Flux (iii) Reluctance (iv) Flux Density (v) Relative Permeability of steel. Assume that steel part consumes 50% of total ampere turns.

5. **Attempt any two parts of the following:** **(10x2=20)**

(a) A 6 pole 3-phase alternator is coupled to an engine running at 1000 rpm. It is supplied by 3-phase induction motor having full load speed 1480 rpm. Find the number of poles of motor, % slip, and frequency of rotor current.

(b) Explain the principle of operation of synchronous motor and their applications.

(c) A 240 V, 20 HP, 850 rpm shunt motor draws 72 A when operating at rated conditions. The respective resistances of armature and shunt field are 0.242 Ω and 95.2 Ω. Determine the percent reduction in field flux required to obtain a speed of 1650 rpm, while drawing an armature current of 50.4 A.