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KC-6007

B. E. I (Sem. I & II) (All Branches) Examination

November/December – 2012

Electrontechniques

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

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. I (Sem. I & II) (All Branches)**

Name of the Subject :

☛ **Electrontechniques**

☛ Subject Code No. : **6 0 0 7** ☛ Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) Attempt all the questions.

(3) Figures to the right indicate full marks.

(4) Assume suitable data if necessary.

1 (a) Answer the following questions : **10**

(i) Three 10 Ω resistances are connected in parallel across 100V supply. Power consumed by them is _____ W.

(ii) Deine : KVL

(iii) Define : Inductance

(iv) What is an ideal voltage source ?

(v) Conductance is defined as reciprocal of _____ and has unit _____.

(b) State "True" or "False" for the following sentences. **5**

(i) Ideal current source is assumed to have infinite internal resistance in parallel with it.

(ii) Unit of Mutual inductance is Henry.

(iii) Charge of one electron is 1.6×10^{-19} coulombs.

(iv) Potential can also be expressed in Joules/coulombs.

(v) Resistance is the property of the material.

(c) Explain Ohm's law and state properties of resistance. **5**

2 (a) State and explain Faraday's law of Electromagnetic induction. 4

(b) Explain self inductance of a coil and hence derive the expression for self inductance of a coil. 6

(c) For the circuit shown below find the equivalent resistance between terminals 'A' and 'B'. 5

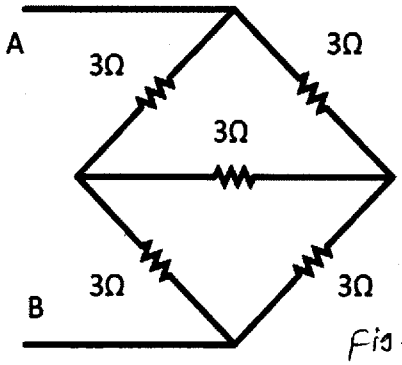

Fig. (1).

OR

2 (a) Two capacitors of $2\,\mu F$ and $4\,\mu F$ are connected in parallel across 100 V DC. Determine the energy stored in each capacitor and equivalent capacitance. 5

(b) State and explain Norton's theorem. 5

(c) Using superposition theorem find current through each branch of the following circuit. 5

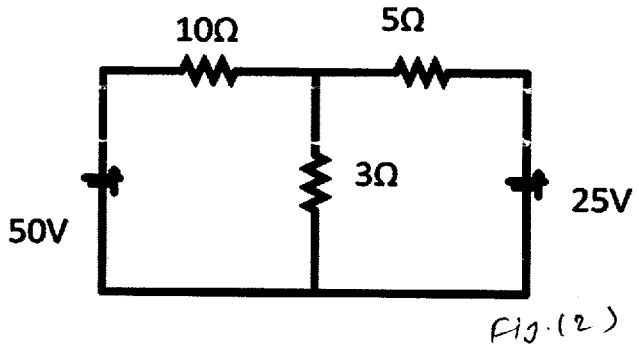

Fig. (2)

Fig.

3 Attempt any three : 15

(i) Derive the expression for the energy stored in a capacitor.

(ii) Derive the expression $K = M/\sqrt{L_1 L_2}$ with usual notations.

(iii) State and explain maximum power transfer theorem.

(iv) Calculate current supplied by 3V battery for the following circuit.

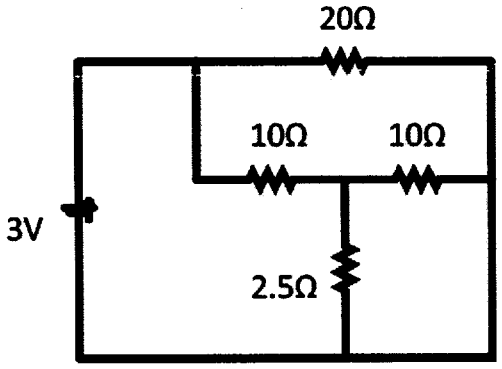

Fig (3).

Fig.

4 (a) Answer the following questions :

(i) Power factor of purely capacitive circuit is _____.

(ii) For sinusoidal waveform the value of form factor is_____.

(iii) Define : Frequency.

(iv) Define : Average value.

(v) If R = 10 Ω and phase angle is 30 degree lagging, Value of Z = _____ ohm.

(vi) At resonance condition in series R-L-C circuit, power factor is_____.

(vii) In case of balanced three phase system, $V_R + V_Y + V_B$ = _____

(viii) Define : Q-factor.

(ix) Admittance is inverse of _____.

(x) Unit of capacitive reactance is _____.

(b) State "True" or "False" for the following sentences. **5**

(i) Average power of purely capacitive circuit is zero.

(ii) In case of R-L series circuit, power factor is always lagging.

(iv) Q-factor in case of R-L-C series circuit gives voltage amplification.

(v) Using two wattmeter method, reactive power cannot be measured. Inverse of resistance is called conductance.

(c) Derive expression for average value of sinusoidal waveform. **5**

5 (a) Derive expression for current, impedance, power factor and power in case of R-L series circuit fed with alternating supply. 8

(b) In case of an R-L series circuit, if voltage applied is 200V, 50 Hz, current in the circuit is 5A, and p.f. is 0.8 lag, find value of R, L, power consumed by the circuit and voltage across each element. 7

OR

5 (a) Explain resonance in parallel R-L-C circuit. 7

(b) In case of parallel R-L circuit, if voltage applied is 200V, 50 Hz, total current is 10A and p.f. is 0.8 lag, find value of R,L power consumed and current in each branch. 8

6 Attempt any three : 15

(i) Determine relationship between line value and phase value of voltage and currents in case of three phase balanced star connected load.

(ii) Prove that using two wattmeter method, the three phase power = W_1+W_2 with usual notations.

(iii) A three phase load connected with two watt meter method to measure power. If total power of the load is 10 KW and p.f. is 0.8 lag, find reading of each wattmeter and reactive power consumed by the load.

(iv) Discuss resonance in series R-L-C circuit.