Registration No. :

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B. Tech.
BE 2102

Second Semester Examination – 2013

BASIC ELECTRICAL ENGINEERING

QUESTION CODE : A 436

Full Marks – 70

Time : 3 Hours

Answer Question No. 1 which is compulsory and any five from the rest.

The figures in the right-hand margin indicate marks.

1. Answer the following questions :   2×10

   (a) Define Electrical conductance and specify its unit.

   (b) Differentiate between electrical power and energy with a suitable example.

   (c) What do you understand controlled current source ?

   (d) Explain the significance of power factor.

   (e) Two impedances of $0.5 < -90°$ and $3+j4\ \Omega$ are connected in series. Find out the resultant impedances in polar form.

   (f) An AC current is expressed by $i = 200\sin 200\eta t$. After how many second the current will achieve a value of 100 A ?

   (g) Define R.M.S value of an alternating quantity.

   (h) Explain briefly magneto motive force.

   (i) Write the expression for back emf and also Explain each term.

   (j) Why the cores used in a transformer are laminated ?

2. (a) Applying Nodal analysis to the circuit given below Fig (1) calculate the current in 8 Ω resistor.   5
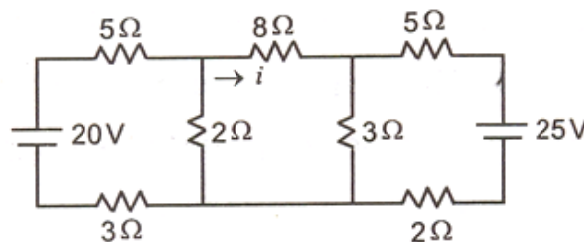
Fig(1)

(b) In the circuit given below in Fig (2) two batteries P and Q supplying a common load through their internal resistances. Calculate   5

   (i) The load current and the current supplied by the batteries

   (ii) Voltage across the load

   (ii) Power delivered to the load
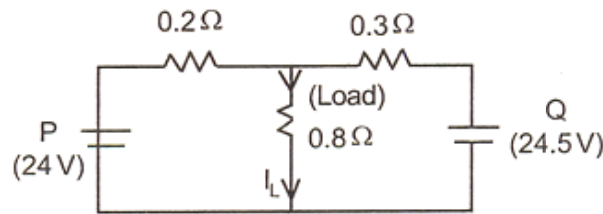
Fig(2)

3. (a) A single phase AC supply voltage of 230V at 50Hz is applied to a coil of inductance 5 H and resistance of 2.5 Ω in series with a capacitance of C. Calculate the value of capacitance C so as to obtain a potential difference of 255V across the coil.   5

   (b) Show from the fundamentals that the current in a series RL circuit lags the applied voltage by an angle less than 90°.   5

4. (a) Explain the significance of B-H Curve by drawing a suitable diagram. Also explain the methods adopted to reduce hysteresis loss and eddy current loss.

   5

   (b) An iron ring with mean length of magnetic path of 30cm and of small cross section has an air gap of 2mm.It is wound uniformly with a coil of 660 turns. A current of 2 amp in the coil produces flux density of 24π mWb/m^2. Calculate the relative permeability of iron.   5

5. (a) A resistance R and a capacitance of 4 µF are connected in series across a 230V DC supply through a switch. A voltmeter is connected across the capacitance. Find 5

   (i) The resistance R such that the voltmeter reads 165V after 6 sec of closing the switch

   (ii) initial charging current

   (iii) current in the circuit at t = 6s

   (b) Three equal impedances are star connected to a 3 ph, 400 V, 50Hz supply. If the inductive reactance and resistance of each branch are 8 Ω and 6 Ω respectively, Find the 5

   (i) Impedance of each phase

   (ii) Line current

   (iii) Active Power consumed.

6. (a) A 20 KVA single phase transformer has 200 turns on the Secondary. The primary is connected to a 1000V and 50 Hz supply. Determine the 5

   (i) The secondary voltage on open circuit.

   (ii) The maximum value of the flux.

   (iii) The primary and secondary current on full load.

   (b) A current of 20A flows in a circuit with a 30° angle of lag when the applied voltage is 230V. Find the value of resistance and reactance. Also find the real and reactive power consumed in the circuit. 5

7. (a) What is the basic principle of operation of D.C generator ? Also state various parts of D.C generator. 5

(b) A 240V DC shunt motor takes 32A at full load. Find the back emf on full load if the resistance of the motor armature and shunt field windings are 0.5 Ω and 120 Ω respectively.   5

8. Write short notes on any **two** :   5×2

   (a) Electric power and sign conventions

   (b) A/D and D/a conversion

   (c) Generation of AC power.

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