

Registration No :

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Total Number of Pages : 02

B.Tech
BE2102

1st Semester Back Examination 2018-19

BASIC ELECTRICAL ENGINEERING

BRANCH : AEIE, AERO, AUTO, BIOMED, BIOTECH, CHEM, CIVIL, CSE, ECE, EEE, EIE, ELECTRICAL, ENV, ETC, FASHION, FAT, IEE, IT, ITE, MANUFAC, MANUTECH, MARINE, MECH, METTA, METTAMIN, MINERAL, MINING, MME, PE, PLASTIC, TEXTILE

Time : 3 Hours

Max Marks : 70

Q.CODE : E999

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

The figures in the right hand margin indicate marks.

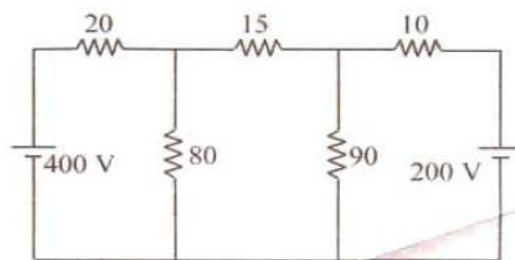
Q1 Answer the following questions :

(2 x 10)

- A 110-V line is protected a 15-A fuse. Will the fuse "carry" a 6-ohm load? Justify.
- A circuit delivers energy at the rate of 20 W and the current is 10 A. Determine the energy of each coulomb of charge in the circuit.
- A cable consists of two conductors which, for the purposes of a test, are connected together at one end of the cable. The combined loop resistance measured from the other end is found to be 100 Ω when the cable is 700 m long. Calculate the resistance of 8 km of similar cable.
- State and explain Norton's theorem.
- A coil of 200 turns is wound uniformly over a wooden ring having a mean circumference of 600 mm and a uniform cross-sectional area of 500 mm². If the current through the coil is 4.0 A, calculate the magnetic field strength.
- Define maximum power transfer theorem.
- Calculate the 'slip' and 'slip-speed of an eight-pole induction motor running at 730 RPM while drawing power from a 50 HZ three-phase balanced system.
- State the principle of operation of synchronous motor.
- What are the different torques seen in the deflecting type instruments. Write down their functions.
- Draw the torque-speed characteristics of shunt and series motor.

Q2 a) By applying nodal method of network analysis, find current in the 15 ohm resistor of the following network.

(5)



b) Derive the expression for rms and average values for sinusoidal alternating current.

(5)

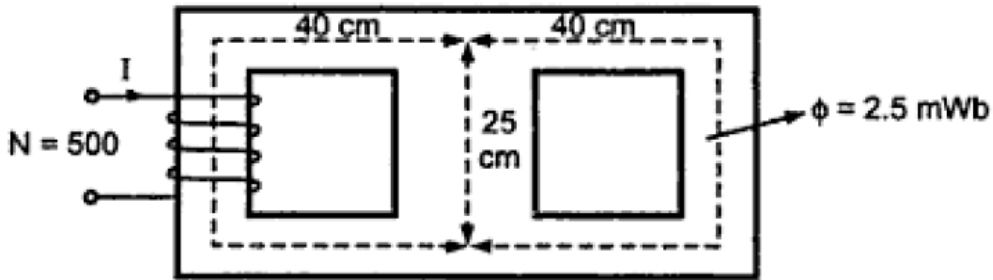
Q3 a) A resistance of 10 Ω is connected in series with an inductive reactance of 5 Ω across a 100 V, 50 Hz power supply. Determine:

(5)

- the impedance of the load circuit;
- the current drawn from the supply;
- the power factor;
- the real power drawn from the supply;
- the reactive power drawn from the supply;

- b) A 100 kW, 500 V, 750 r/min, d.c. shunt generator, connected to constant-voltage busbars, has field and armature resistances of 100Ω and 0.1Ω respectively. If the prime-mover fails, and the machine continues to run, taking 50 A from the busbars, calculate its speed. Neglect brush-drop and armature reaction effects. (5)

- Q4 a) A cast steel structure is made of a rod of square section 2.5×2.5 cm as shown in figure. What is the current that should be passed in a 500 turn coil on the left limb so that a flux of 2.5 mwb is made to pass in the right limb. Assume permeability as 700 and neglect leakage. (5)



- b) A symmetrical 440V, 3-phase system supplies a star-connected load with the branch impedances $Z_R = 100 \text{ ohm}$, $Z_Y = j5 \text{ ohm}$, $Z_B = -j5 \text{ ohm}$. Calculate the voltage drop across each branch and the potential of the neutral point to earth. The phase sequence is RYB. Draw the vector diagram. (5)

- Q5 a) With schematic diagram explain the operation of electro-dynamometer type wattmeter. Draw its advantages and disadvantages. (5)

- b) A moving coil instrument has resistance of 10 ohm and gives full scale deflection when carrying a current of 50 mA. Show it can be adapted to measure voltage up to 750 V and current upto 1000A. (5)

- Q6 a) A single phase, 50 Hz transformer has 80 turns on the primary winding and 400 turns on the secondary winding. The cross-sectional area of the core is 200 cm^2 . If the primary winding is connected to a 240V, 50Hz supply, determine (5)

- induced emf in the secondary winding
- the maximum value of flux density in the core

- b) Write down the construction and principle of operation of single phase transformer. (5)

- Q7 Why poly-phase power is required? Derive the relation of line and phase voltage of a star and delta connected power supply and compare the results. Draw the phasor diagram for each. Find the average power for both the cases. (10)

- Q8 Write short answer on any TWO : (5 x 2)

- Auto-transformer
- R-L-C series resonance
- Current growth in R-L circuit
- Torque-slip characteristics of induction motor