Solved Paper 2016

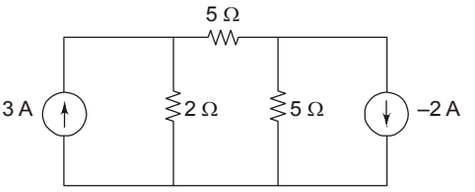
Electrical Engineering

(Paper II)

1. (*a*) A conducting wire has a resistance of 5Ω. What is the resistance of another wire of the same material but having half the diameter and four times the length? (15)

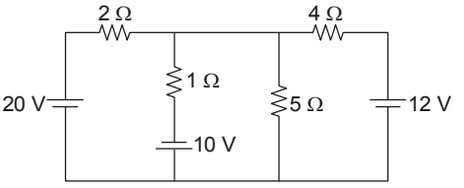
(*b*) Two coils connected in parallel across a 100 V dc supply, take 10 A current from the supply. Power dissipated in one coil is 600W. What is the resistance of each coil? (15)

(*c*) Determine the current through the 5Ω resistor in the circuit of Figure 1. (15)



(*d*) Find the voltage across the 5Ω resistance in the network shown in Figure 2 using Thevenin's theorem.

(15)



2. (*a*) An aeroplane with a wing span of 52 metres is flying horizontally at 1100 km/h. If the vertical component of the earth's magnetic field is 38×10^{-6} T. Find the emf generated between the wing-tips. (10)

(*b*) A coil of 200 turns is wound uniformly over a wooden ring having a mean circumference of 60 cm and a uniform cross-sectional area of 500 mm^2. If the current through the coil is 4 A, calculate the (i) magnetic field strength, (ii) flux density, and (iii) total flux. (10)

(*c*) An iron choke takes 4 A current when connected to a 20 V dc supply. When connected to a 65V, 50Hz as supply, it takes 5A current. Determine the power drawn by the coil (15)

(*d*) Define the following terms

(*i*) Mutual inductance

(*ii*) Resonance

(*iii*) MMF

(*iv*) Q-factor

3. (*a*) Prove that the reactive power in ac circuit is equal to VI sin ϕ.

(*b*) A 50 μA meter movement with an internal resistance of 1 kΩ is to be used as a dc voltmeter of range 50V. Calculate the

(i) multiplier resistance required and

(ii) voltage multiplying factor. (10)

(*c*) In a gravity controlled instrument the controlling weight is 0.005 kg and acts at a distance of 2.4 cm from the axis of the moving system. Determine the deflection in degrees corresponding to deflecting torque of 1.05×10^{-5} kgm.

(*b*) Explain in brief (30)

(*i*) Megger

(*ii*) Two-wattmeter method

(*iii*) Signal generator

(*iv*) Earth fault detection

(*v*) AC bridge

4. (*a*) Explain the braking methods of DC series motors. (20)

(*b*) Explain the parallel operation of 3-phase transformers. (10)

(*c*) Draw and explain equivalent circuit of a 1-phase transformer. Draw its phasor diagram for leading power factor load. (20)

(*d*) A 3-phase 400V, 50 Hz 6-pole star connected induction motor develops maximum torque at a speed of 940 rpm. If the rotor resistance per phase is 0.1W, determine the standstill rotor reactance. (10)

5. (*a*) How is the rating of circuit breakers decided? Explain in brief. (10)

(*b*) Explain Merz-Price protection of generators with appropriate circuit diagram. (10)

(*c*) Define the following terms (30)

(*i*) Demand factor

(*ii*) Tariff

(*iii*) HRC fuses

(*iv*) Diversity factor

(*v*) Derating factor of a cable

(*d*) What are the different methods of power factor improvement? (10)

6. (*a*) Explain earthing practices in brief. (15)

(*b*) With the help of neat and labelled circuit diagram. explain the process of electroplating. (15)

(*c*) How is the synchronous motor started? Explain the various methods of starting of a synchronous motor in brief. (15)

(*d*) What are the different configurations of an NPN transistor? Explain each in brief with neat and labelled circuit diagram. (15)