

PART B
General Engineering
(ELECTRICAL)

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 600 W. What is the resistance of each coil? 15
- (c) Determine the current through the 5Ω resistor in the circuit of Figure 1. 15

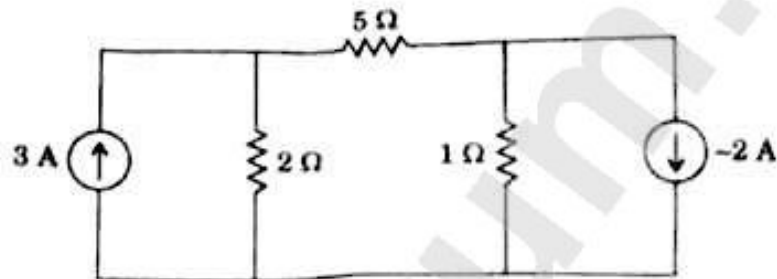


Figure 1

- (d) Find the voltage across the 5Ω resistance in the network shown in Figure 2 using Thevenin's theorem. 15

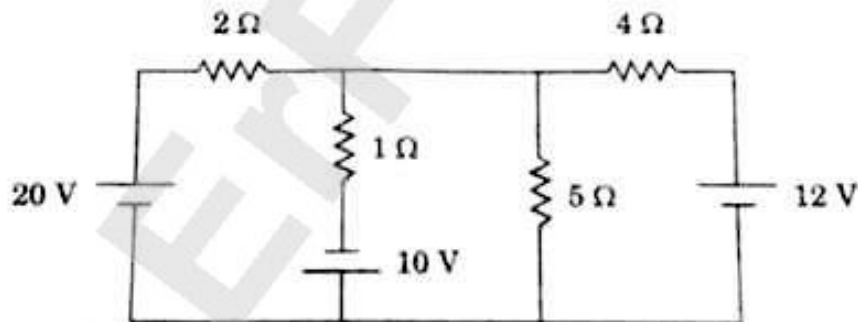


Figure 2

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. 15

- (c) An iron choke takes 4 A current when connected to a 20 V dc supply. When connected to a 65 V, 50 Hz ac supply, it takes 5 A current. Determine the power drawn by the coil. 15
- (d) Define the following terms. 20
- Mutual inductance
 - Resonance
 - MMF
 - Q-factor

3. (a) Prove that the reactive power in ac circuit is equal to $VI \sin \phi$. 10
- (b) A 50 μ A meter movement with an internal resistance of 1 k Ω is to be used as a dc voltmeter of range 50 V. 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. 10
- (d) Explain in brief: 30
- Megger
 - Two-wattmeter method
 - Signal generator
 - Earth fault detection
 - 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 400 V, 50 Hz 6-pole star connected induction motor develops maximum torque at a speed of 940 rpm. If the rotor resistance per phase is 0.1 Ω , 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