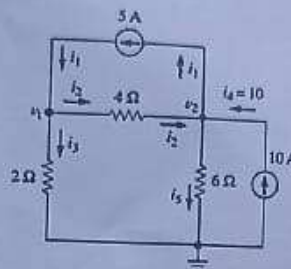


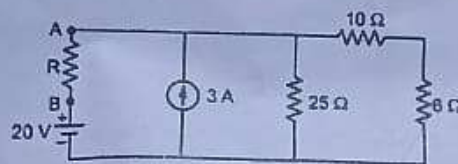
KEEPING MOBILE PHONE/SMART WATCH, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE

Answer any FIVE Questions  
(5 X 20 = 100 Marks)

1. a) Using node voltage analysis to find all branch current and branch voltage for the circuit shown in Figure. [10]



- b) Find the value R for maximum power and what is the value of maximum power? [10]

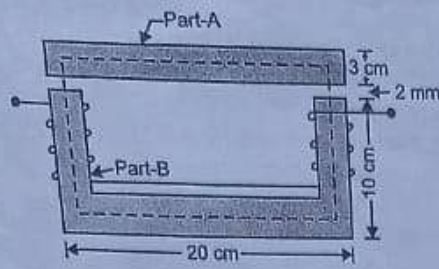


- a) A choke coil and pure resistance are connected in series across 230V, 50Hz, ac supply. If the voltage drop across coil is 190V and across resistance is 80V while current drawn by the circuit is 5A. Calculate, [10]

- Internal resistances of coil
- Inductance of coil
- Resistance R
- Power factor of the circuit
- Power consumed by the circuit

- b) Three  $50\Omega$  non-inductive resistances are connected in (i) star, (ii) delta across a 400 V, 50Hz, three phase supply. Calculate the power taken from the supply system in each case. In the event of one of the three-resistance getting opened, what would be the value of the total power taken from the mains in each of the two cases. [10]

2. a) The magnetic frame shown in figure is built-up of iron of square cross-section, 3cm side. Each air gap is 2mm wide. Each of the coil is wound with 1000 turns and the exciting current is 1.0A. The relative permeability of part A and part B may be taken as 1000 and 1200 respectively. [10]



Calculate,

- i. Reluctance of part-A and part-B
  - ii. Reluctance of air-gaps
  - iii. Total reluctance of the complete magnetic circuit.
  - iv. MMF produced
  - v. Flux set-up in the circuit
- b) The combined inductance of two coils connected in series is 0.6H or 0.1H [10]  
depending on the relative directions of the currents in the coils. If one of the coils when isolated has a self-inductance of 0.2H, calculate,
- i. Mutual inductance
  - ii. Coupling coefficient
  - iii. The two possible values of the induced emf in coil 2 when the current is increasing at 500A/s in series combinations.
4. a) What are the differences between separately excited dc generator and self-excited dc generator? Also, with help of equivalent circuit diagram write voltage, current and power equation of all types of dc generators. [10]
- b) Why single-phase induction motor is not self-starting? Explain working principle and operation of a single-phase capacitor start induction motor with circuit diagram. [10]
- a) Perform the following code conversion and operation [10]
- i. Binary  $(01011.1011)_2$  to decimal
  - ii. Hexadecimal  $(1E2)_{16}$  to decimal
  - iii. Binary  $(1110110001010)_2$  to octal
  - iv. Octal  $(24)_8$  to binary
  - v. Decimal  $(2861)_{10}$  to hexadecimal
- b) Simplify the following expression using K-map [10]
- $$\bar{A}B + ABD + A\bar{B}\bar{C}\bar{D} + BC$$
6. a) Explain the operation of P channel enhancement MOSFET and also draw its characteristics. [10]
- b) Write short notes on following [5]
- i. Single phase full wave rectifier [5]
  - ii. Regulated power supply

