SRK/KW/14/6917

Faculty of Engineering & Technology
First Semester B.E. (CBS) Examination
BASIC ELECTRICAL ENGINEERING
Paper-4

Time—Two Hours] [Maximum Marks—40

INSTRUCTIONS TO CANDIDATES

(1) All questions carry equal marks and are compulsory.
(2) Due credit will be given to neatness and adequate dimensions.
(3) Assume suitable data wherever necessary.
(4) Illustrate your answers wherever necessary with the help of neat sketches.

1. (a) Explain ideal voltage source and practical voltage source. 4

(b) Calculate the value of current I supplied by the battery. Use star delta transformation. Refer 'Fig. 1(b)'. 6

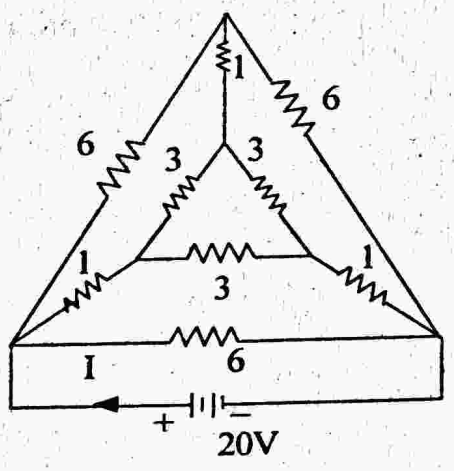

Fig. 1(b)

OR

2. (a) State and explain Kirchoff's laws for Electric Circuit. 3

(b) Find current I, in the circuit shown in 'fig 2(b)' by using superposition theorem. 5

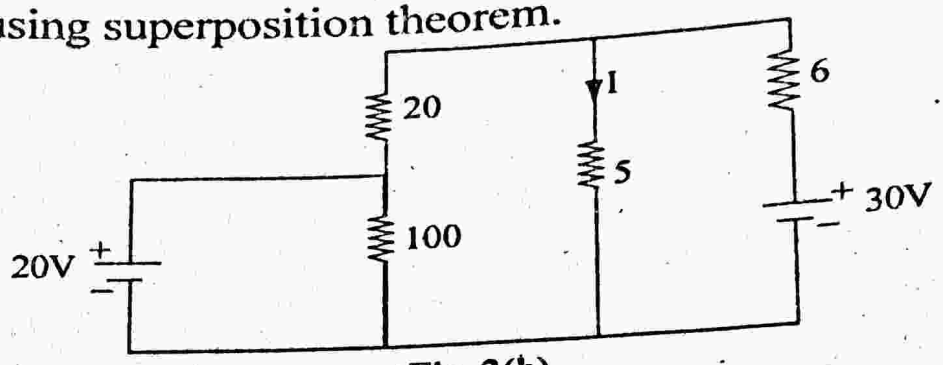

Fig. 2(b)

(c) Convert 5A, 5 Ω current source into voltage source. 2

3. (a) Define :

(i) Series magnetic circuit

(ii) Reluctance

(iii) Magnetic Flux Density. 3

(b) A soft iron ring of 20 cm mean diameter and circular cross section of 4 cm diameter is wound with a magnetising coil. A current of 5A flowing in the coil produces a flux of 2·5 m wb in the air gap which is 2·2 mm wide. Taking relative permeability to be 1000 at this flux density and allowing for leakage coefficient of 1·2, find the number of turns of the coil. 7

OR

4. (a) Explain Magnetic leakage & Fringing. 4

(b) A metal ring of mean diameter of 80 cm is made out of two semicircular pieces of cast iron and cast steel having same cross section and separated at junctions by pieces of copper each of 1 mm thickness. If the ring is uniformly wound with 1000 turns. Calculate the value of current required to produce a flux density of 0.85 Wb/m^2 in the ring. Given that relative permeability of cast iron is 200, that of cast steel is 1200 and for copper $\mu r = 1$. 6

5. (a) Derive the expression for instantaneous current and voltage for purely inductive circuit. 3

(b) Define :

(i) Phase

(ii) Power Factor

(iii) RMS value. 3

(c) A series combination of R and C is connected in series with a variable pure inductor and put across the 200 V, 50Hz, supply. The maximum current obtainable is 0.314 A and the voltage across C is 300 V. Find circuit constants. 4

OR

6. (a) Derive the relation between line voltage and phase voltage, line current and phase current for star (Y) connected 3 phase AC source. 5

(b) A 400 V, 3 ϕ supply is connected across a balanced load of three impedances each consisting of 32 Ω resistance and 24 Ω inductive reactance. Determine the current drawn from the power mains, if the three impedances are (i) (Y)- star connected and

(ii) (Δ) Delta connected. 5

7. (a) Derive EMF equation for two winding single phase transformer. 3

(b) Justify : Transformer is called as constant flux machine. 4

(c) The no load current of a transformer is 5 A at 0.3 p.f. when supplied at 230 V, 50 Hz. The number of turns of the primary winding is 200. Calculate :

(i) Maximum flux in the core

(ii) Core loss

(iii) Magnetising current. 3

OR

8. (a) Explain OC test on single phase transformer with circuit diagram and necessary equations. 4

(b) A 10 kVA single phase transformer has a maximum efficiency of 98% at full load, 0.8 p.f. Determine copper loss and efficiency at half load. Wwhat is iron loss ? 6