DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
SECOND SESSIONAL
SUBJECT: (ESC104) BASIC ELECTRICAL ENGINEERING (ICT)

Examination	: B.Tech Semester I	Seat No. : 032
Date	: 09/11/2022	Day : Wednesday
Time	: 1 Hour and 15 Minutes	Max. Marks : 36

INSTRUCTIONS:
1. Figures to the right indicate maximum marks for that question.
2. The symbols used carry their usual meanings.
3. Assume suitable data, if required & mention them clearly.
4. Draw neat sketches wherever necessary.

Q.1 **Do as directed.** **[12]**

CO5 A (a) A coil having an inductance of 40 mH is carrying current of 2 A. find the self-induced **[1]** emf in the coil, when the current is reversed in 0.05 seconds.

CO4 U (b) State TRUE\FALSE with justification : "Relative permeability of air is unity." **[1]**

CO4 R (c) Reciprocal of reluctance is **[1]**
(A) Reluctivity   (B) Permeance   (C) Permeability   (D) Susceptibility

CO5 U (d) The Fleming's left hand rule is applicable for **[1]**
(A) DC generator   (B) DC motor   (C) Alternator   (D) Transformer

CO4 A (e) What is fringing effect? How does it affect magnetic circuits? **[2]**

CO1 A (f) The field coil of a shunt motor has a resistance of 45 Ω at 20 °C. Find the average **[2]** temperature of the winding at the end of the run when the resistance is increased to 48.5 Ω. The temperature coefficient of the resistance is 0.004 / °C at 0 °C.

CO1 A (g) Find i_1 for the **Fig 1**. **[2]**

CO1 A (h) Two resistors 12 Ω and 6 Ω are connected in parallel and this combination is **[2]** connected in series with a 25 Ω resistance and a battery with an internal resistance of 0.25 Ω. Draw the circuit and determine the EMF of the battery if the potential difference across 6 Ω resistance is 6 Volts.

Q.2 Attempt *Any TWO* from the following questions. **[12]**

CO4 A (a) An iron ring 100 cm mean diameter, and 10 cm² cross section has 1000 turns of copper **[6]** wire wound on it. If the relative permeability of the material is 1500, and it is required to produce a flux density of 1 Wb/m² in an air gap of 2 mm width in the ring, find (1) reluctance of ring; (2) flux required, (3) mmf required (4) current produced. Neglect leakage and fringing

CO4 A (b) A ring has mean diameter of 15 cm, a cross-section of 1.7 cm² and has radial gap of 0.5 **[6]** mm cut in it. It is uniformly wound with 1500 turns and having current of 1 A produce a flux of 0.1 mWb across gap. Calculate relative permeability of iron. Neglect leakage and fringing.

CO4 A (c) Find the ampere-turns required to produce a flux of 0.4 mwb in the air gap of a **[6]** magnetic circuit which has an air gap of 0.55 mm. The iron ring has 4 cm² cross section. Magnetic Circuit has 60 cm mean length. Take μ_r = 1300 and leakage coefficient = 1.15. Neglect fringing.

Q.3 Attempt *Any ONE* from the following questions. **[12]**

CO5 A (a) A conductor of length 70 cm carries a current of 8 Amp. placed at right angles to a **[6]** magnetic field of strength 2 Wb/m². Calculate the force in newtons exerted on it. If the force causes the conductor to move at a velocity of 50 m/s, find the emf induced in it.

CO1 A (b) Use the Superposition theorem to find Va for the network shown in **Fig 2**. **[6]**

OR

CO5 A (a) Coils P and Q with 60 and 600 turns respectively, are wound side by side on a closed **[6]** iron circuit of cross section 50 cm² and mean length 1.2 m. Estimate (1) mutual inductance between the coils (2) self-inductance of each coil and (3) emf induced in both the coils, when current in coil P grows steadily from 0 to 5 A in 0.01 sec. Take relative permeability of iron is 1000.

CO1 A (b) Find the currents through all the resistors shown in the **Fig 3**. using KVL or KCL. **[6]**
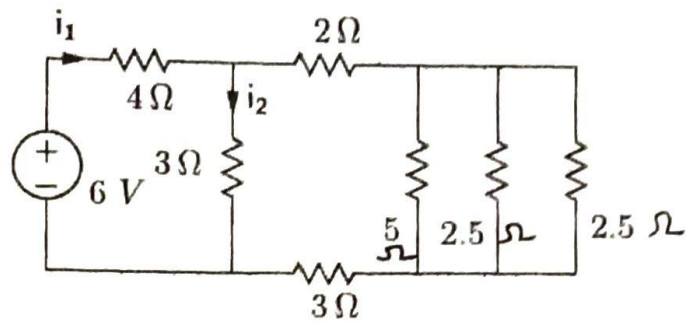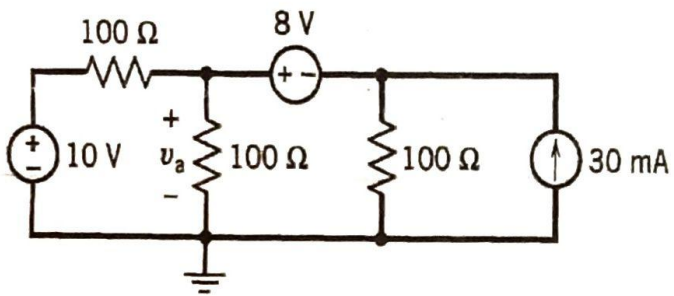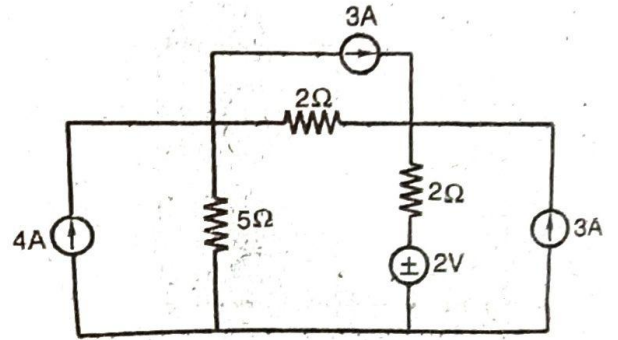
Fig: 1

Fig: 2

Fig: 3

Blooms Taxonomy levels: R-Remembering, U- Understanding, A-Applying, N-Analyzing, E- Evaluating, C-Creating