



DHARMSINH DESAI UNIVERSITY, NADIAD

FACULTY OF TECHNOLOGY

FIRST SESSIONAL EXAM

SUBJECT: (ESC104) BASIC ELECTRICAL ENGINEERING (ICT)

Examination : B.Tech Semester I
Date : 20/09/2023
Time : 1 Hour and 15 Minutes

Seat No. : 112.
Day : Wednesday
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.

- CO4 U (a) A magnetic flux of 1000000000 lines is equivalent to (12)
[1]
(i) 10×10^8 Maxwells (ii) 10 Weber
(iii) 1000×10^6 Flux lines (iv) all of these
- CO4 R (b) Which of the following statements is true about magnetic lines of force? [1]
(i) Magnetic lines of force are always closed. (+1)
(ii) Magnetic lines of force always intersect each other.
(iii) Magnetic lines of force tend to crowd far away from the poles of the magnet
(iv) Magnetic lines of force do not pass through the vacuum.
- CO4 R (c) Define: Leakage co-efficient. Why leakage coefficient is always greater than one [2]
if leakage flux is included? (+2)
- CO4 N (d) A magnetizing force of 8000 A/m is applied to a circular magnetic circuit of [2]
mean diameter 30 cm by passing a current through a coil wound on the circuit. If
the coil is uniformly wound around the circuit and has 750 turns, find the current
in the coil. (+2)
- CO4 R (e) State and explain the laws of electromagnetic induction and the rule which [2]
determines the direction of the induced emf. (+1)
- CO4 N (f) A coil of resistance 100Ω is placed in a magnetic flux of 0.1 mwb. The coil has [2]
500 turns and a galvanometer of 400Ω resistance is connected in series with it.
The coil is moved in 0.1 sec from the given field to another field of 0.3 mwb.
Find the average induced emf and average current through the coil. (+2)
- CO4 N (g) A straight conductor 25 cm long carries 100 A and lies perpendicular to a uniform [2]
field of 0.5 wb/m^2 . Find (i) the mechanical force acting on the conductor. (ii) the
emf generated in the conductor if it is moving perpendicular to the force at a
uniform speed of 1.27 m/sec.

Q.2 Attempt Any TWO from the following questions.

- CO1 N (a) Determine the current I_1 and I_2 for the circuit shown in Fig 1. [12]
[6]
- CO1 E (b) Find the equivalent resistance between A and B terminal for the circuit shown in [6]
Fig. 2 using Star and Delta method.
- CO1 E (c) (1) A platinum coil has a resistance of 3.146Ω at 40°C and 3.767Ω at 100°C . [4]
Determine (i) Resistance at 0°C and (ii) The temperature coefficient at 0°C .
- CO1 E (2) Determine I_1 in the circuit shown in Fig. 3. All resistors are in Ohms. [2]

- Q.3** [12]
CO4 U (a) Attempt Any ONE from the following questions. [6]
 (a) An iron rod of 1 cm radius is bent to a ring of mean diameter 30 cm and wound with 450 turns of wire. An air gap of 0.1 cm is cut across the bent the ring. Assume the relative permeability of iron as 1000. Find out the current, having a useful flux of 0.5 mwb at airgap and leakage factor required is 1.25. Find-out leakage flux also. Neglect fringing effect.
- CO4** N (b) The self-inductance of a coil of 400 turns is 0.3 H. If 80% of the flux is linked with a second coil of 8200 turns, calculate the mutual inductance between the coils and emf induced in both coils, when current in first coil changes at the rate 150 A/s. [6]
- OR**
- CO4** U (a) A ring has a diameter of 40 cm and a cross-sectional area of 1.5 cm^2 . The ring is made up of semicircular sections of cast iron and cast steel having same length, with each joint having an air-gap of 0.3 mm. Find the total MMF required to produce a flux of $8 \times 10^{-4} \text{ Wb}$. The relative permeabilities of cast steel and cast iron are 800 and 166 respectively. Neglect fringing and leakage effects. [6]
- CO4** N (b) Two long single-layer solenoids have the same length and the same number of turns but are placed co-axially one within other. The diameter of the inner coil 7.5 cm and that of the outer coil is 10 cm. Calculate the coefficient of coupling between the coils. [6]

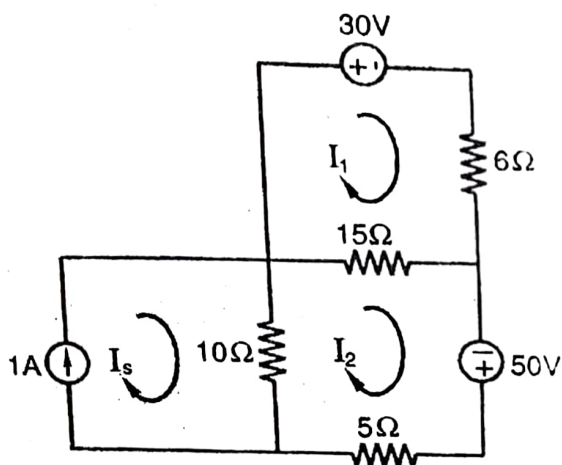


Fig. 1 [Q.2 (a)]

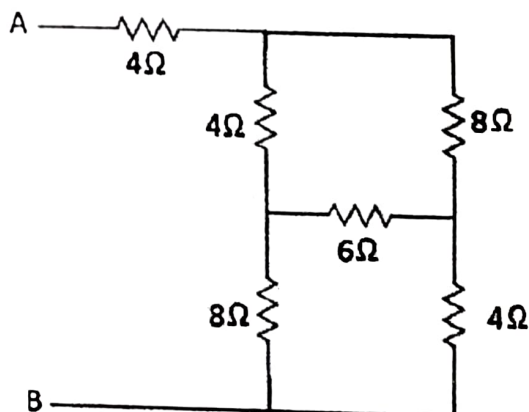


Fig. 2 [Q.2 (b)]

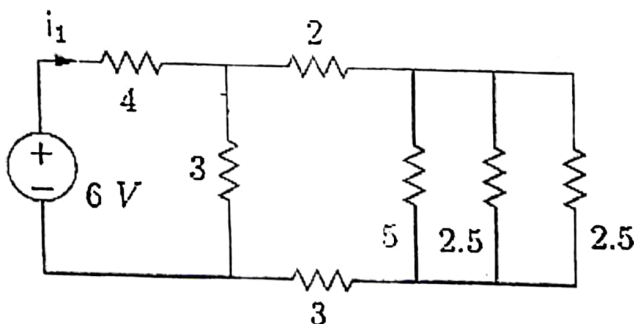


Fig. 3 [For Q.2 (c) -2]



DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
SECOND SESSIONAL

SUBJECT: (ESC104) BASIC ELECTRICAL ENGINEERING

Examination : B.Tech Semester I (ICT)	Seat No. : 112	
Date : 25/10/2023	Day : Wednesday	
Time : 11:45 am To 01:00 pm	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.

- | | | | |
|-----|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| CO5 | R | (a) Draw B-H magnetization curve and give the significance of area of Hysteresis loop. | [12] |
| CO5 | U | (b) Write down the advantage of auto transformer over ordinary transformer. | [2] |
| CO5 | A | (c) A 2200/250 V, 50 Hz transformer takes no load primary current 1.1 A at a power factor of 0.7 on open circuit. Find out magnetizing and working components of no load primary current. | [2] |
| CO5 | U | (d) How can eddy current and hysteresis loss be minimized? | [2] |
| CO5 | R | (e) Explain Diamagnetic material in brief. | [2] |
| CO5 | U | (f) Draw the star-delta connection of 3-phase transformer and write down its application. | [2] |

Q.2 Attempt Any TWO from the following questions.

- | | | | |
|-----|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| CO5 | E | (a) A 25 KVA, 1-phase transformer is connected to 2000 V, 50 Hz supply. It has 600 primary turns and 150 secondary turns. It has primary resistance and secondary resistance 0.35 ohm and 0.5 ohm respectively. Find out secondary voltage on open circuit, Maximum value of flux in core and total copper loss. | [12] |
| CO5 | E | (b) The combined inductance of two coils connected in series is 0.55H and 0.20H, depending on the relative direction of current in coils. If one of the coils, when isolated, has a self-inductance of 0.11H, then calculate mutual inductance and coefficient of coupling. | [6] |
| CO5 | E | (c) A 10 KVA, 220/440 V, 50 Hz transformers have an iron loss of 120 W and full load copper loss 300 W. Find out efficiency at unity power factor and 0.8 power factor lagging. Also find out its regulation if full load output voltage is 387 V. | [6] |

Q.3 Attempt following questions.

- | | | | |
|-----|---|-------------------------------------------------------------------------------------------------------------------------------|------|
| CO2 | A | (a) For the circuit shown in Fig.1, find the current flowing through 10Ω resistor of circuit using Thevenin's theorem. | [12] |
| CO2 | A | (b) For the circuit shown in Fig.2, calculate the current I_o using superposition theorem. | [6] |

-----OR-----

- | | | | |
|-----|---|------------------------------------------------------------------------------------|-----|
| CO2 | A | (a) For the circuit shown in Fig. 3, find the Norton's equivalent between a and b. | [6] |
| CO2 | A | (b) Find out average value and RMS value of the signal shown in Fig. 4. | [6] |

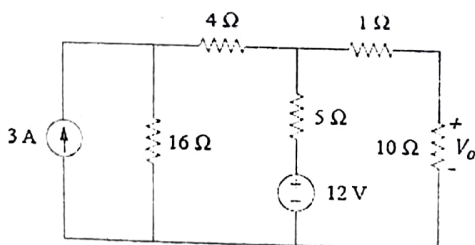


Fig. 1

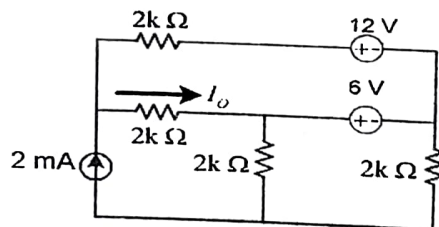


Fig. 2

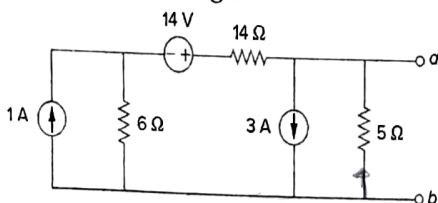


Fig. 3

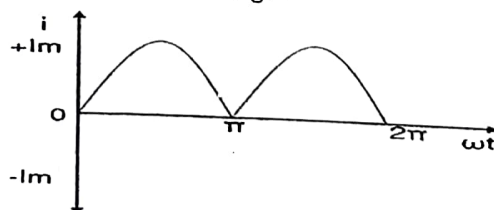


Fig. 4



DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
THIRD SESSIONAL EXAM

SUBJECT: (ES104) BASIC ELECTRICAL ENGINEERING (ICT)

Examination : B.Tech Semester I
Date : 19/12/2023
Time : 1 Hour and 15 Minutes

Seat No. : 112
Day : Tuesday
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]
- CO6 R (a) What is the function of commutator in dc machine? [2]
- CO6 A (b) A 4-pole, 50 Hz, 3-phase induction motor has rotor frequency 4 Hz. Find out slip and motor speed. [2]
- CO6 U (c) Draw the Speed-Torque characteristics of dc series and dc shunt motor. [2]
- CO6 U (d) A 3-phase induction motor never runs at synchronous speed. State true/false with justification. [2]
- CO6 R (e) State the types of rotor used in alternator and 3-phase induction motor. [2]
- CO6 A (f) The 4-poles dc generator has the armature wave-connected with 615 conductors rotating at 550 rpm. The flux per pole is 0.05 Wb. Calculate generated emf. [2]
- Q.2 Attempt Any TWO from the following questions.** [12]
- CO3 A (a) In a series circuit containing pure resistance and a pure inductance, the current and the voltage are expressed as: $i(t) = 5\sin(314t + 2\pi/3)$ & $v(t) = 15\sin(314t + 5\pi/6)$ [6]
- (a) What is the impedance of the circuit? (b) What is the value of the resistance & the inductance? (d) What is the average power drawn by the circuit? (e) What is the power factor?
- CO3 A (b) Two impedances given by $Z_1 = (10 + j5)$ and $Z_2 = (6 - j8)$ are joined in parallel. [6]
- If the total current is 15A, what is the power taken by each branch? Find also the p.f. of individual branch and of combination. Draw the phasor diagram.
- CO3 A (c) A resistance of 20 ohm, inductance of 0.2 H and capacitance of 150 μF are [6]
- connected in series and are fed by a 230 V, 50 Hz supply. Find X_L , X_C , Z , Y , power factor, active power and reactive power.
- Q.3 Attempt Any ONE from the following questions.** [12]
- CO6 U (a) "A single phase induction motor has zero starting torque". Prove it using double [6]
- field revolving theory with necessary diagram
- CO6 A (b) A short-shunt DC compound generator supplies 50 A at 220 V. If the shunt field [6]
- resistance is 40 Ω , the series field resistance is 0.02 Ω and the armature resistance is 0.04 Ω , determine the armature current and e.m.f. generated. Neglect brush drop.
- OR**
- CO6 U (a) Discuss the construction and working operation of an alternator in detail. [6]
- CO6 A (b) A DC shunt motor takes an armature current of 95 A at 250 V. The armature circuit [6]
- resistance is 0.5 Ω . The machine has 4-poles and the armature is wave-connected with 615 conductors. The flux per pole is 0.05 Wb. Calculate the (i) back emf (ii) the speed of motor and (iii) the gross torque developed by motor.

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