REG.NO.: 23BEE0116

VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF ELECTRICAL ENGINEERING
CONTINUOUS ASSESSMENT TEST - I
WINTER SEMESTER 2024-2025

SLOT: B1

Programme Name & Branch	: B. Tech. - EEE
Course Code and Course Name	: BEEE215L
Faculty Name(s)	: Dr. J. Belwin Edward
Class Number(s)	: VL2024250500954
Date of Examination	: Tuesday, 28-Jan-2025
Exam Duration	: 90 minutes

Time : 09:30 – 11:00 Hrs
Maximum Marks: 50

General instruction(s):

- Answer All Questions
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level
  (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- **Course Outcomes**
  - CO1. Apply the concept of rotating machines and the principle of electromechanical energy conversion in single and multiple excited systems
  - CO2. Analyze the output of DC machines and transformers and evaluate their performance.

Q. No	Question	M	CO	BL
1.	The ring-shaped core shown in Figure 1 is made of three sections with the following details.	10	CO1	BL3

Section	Length (in cm)	Area of cross section (in cm^2)	Relative Permeability
1	12	5	800
2	18	4	100
3	22	3	1200

The flux density in the smallest area of cross-section is 3T. If the current through the coil is 2A, compute the number of turns of the coil. Also find the change in number of turns of the coil needed to maintain the above stated condition when an air-gap of 5mm is introduced in section 3.

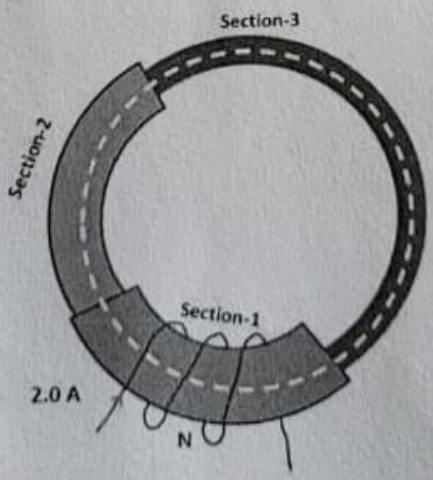

Figure 1

REG.NO.:

VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF ELECTRICAL ENGINEERING
CONTINUOUS ASSESSMENT TEST - I
WINTER SEMESTER 2024-2025

SLOT: B1

2.	a) State Lorentz force law	3	CO1	BL1
	b) Derive the expression for the Energy (W_{fld}) and the force exerted in a singly excited magnetic field system as a function of λ and x.	7		
3.	Classify dc generators. Draw the circuit diagram and write the following equations for each type of dc generator. i. Relation between armature, load current and field current ii. Emf equation in terms of current, voltage and resistance iii. Internal and external power equations	10	CO2	BL2
4.	A 4-pole, compound wound generator supplies 25 kW at a terminal voltage of 500 V. The armature resistance is 0.03 Ohms, series field resistance is 0.04 ohm and shunt field resistance is 200 Ohm. The brush drop may be taken as 1.0 V per brush. Determine the e.m.f. generated and the number of conductors if the speed is 1200 r.p.m. and flux per pole is 0.02 Weber when the machine is connected in (i) Long shunt and (ii) Short shunt. Neglect armature reaction.	10	CO2	BL2
5.	a) Write short notes on armature reaction.	4	CO2	BL3
	b) A 4-pole wave-wound motor armature has 800 conductors and delivers 200 A. It has 180 commutator segments and, If the brushes are advanced 5-segments from the no-load neutral axis. Calculate, Shift in MNA. i. demagnetising amp-turns/pole ii. cross- magnetising amp-turns/pole iii. the additional field current for neutralizing the demagnetisation of the field winding has 1300 turns/pole.	6		

****