VIT

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

School of Electrical Engineering

Fall Semester 2022-2023

CAT – II

Programme Name & Branch: B.Tech (BEC & BCE)

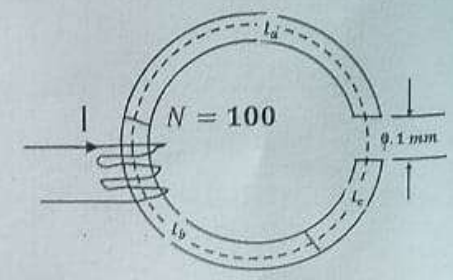
Course Name & Code: BEEE102L - Basic Electrical and Electronics Engineering

Class Number (s): VL2022230105295, 5312, 5350, 5359, 5377, 5387, 5398, 5408, 5422, 5437, 5447, 5461, 5476, 5493, 5520, 5533, 5562, 5567, 5892, 5977, 5989, 7443.
Slot: G2

Faculty Name (s): Anbarasan P, Rajasekar N, Mageshvaran R, Aarthy M, Belwin Edward J, Rashmi Ranjan Das, Vijayakumar D, Sonam Shrivastava, Vidhya Sagar G, Vijaya Priya P, Raju J, Subramanian K, Vanishree J, Thamilmaran A, Brisilla R M, Venkata Lakshmi Narayana K, Himadri Lala, Ponnambalam P, Hemanta Kumar Sahu, Velmurugan V, Sakthivel R, Chilukuri Venkata Mahendra.

Exam Duration: 90 Min. **Maximum Marks: 50**

General instruction(s): Answer ALL questions

Q.No.	Question	Max Marks
1.	A ring is composed of three sections. The cross-sectional area is 0.001 m^2 for each section. The mean arc lengths are l_a = 0.3 m, l_b = 0.2 m and l_c = 0.1 m. An air-gap length of 0.1 mm is cut in the ring. μ_r for sections a, b, c are 5000, 1000, and 10,000 respectively. Flux in the air gap is 7.5×10^{-4} Wb. Find (i) Reluctances of each sections (ii) MMF (iii) Exciting current if the coil has 100 turns 	10

2.	The total inductance of two coils, A and B, when connected in series, is 0.6 H or 0.1 H, depending on the relative directions of the current in the coils. Coil A, when isolated from coil B, has a self-inductance of 0.2 H. Calculate (a) Mutual inductance between the two coils (b) Self-inductance of coil B (c) Coupling factor between the coils. (d) Two possible values of the induced e.m.f. in coil A when the current is decreasing at 500 A per second in the series circuit.	10
3.	a) Convert the decimal number **92.85** to its binary, hexadecimal and octal equivalents. b) Convert the following numbers into their binary equivalents (i) $\mathbf{AE.12_{16}}$ (ii) $\mathbf{67.125_{8}}$	10
4.	Simplify the Boolean functions using Boolean Algebra a) $F = ((XY' + XYZ)' + X(Y + XY')'$ b) $F = C(B+C)(A+B+C)$	10
5.	Plot the logical expression below on a four-variable Karnaugh map. $F(A, B, C, D) = ABCD + AB'C'D' + AB'C + AB$ Obtain the simplified expression. Implement the simplified expression using logic gates.	10