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

Vellore – 632 014, Tamil Nadu, India
SCHOOL OF ELECTRICAL ENGINEERING
WINTER SEMESTER 2023-2024
CAT-II
SLOT: E1

Programme Name & Branch : B.Tech.   Course Code: **BEEE102L**
Course Name   : **Basic Electrical and Electronics Engineering**
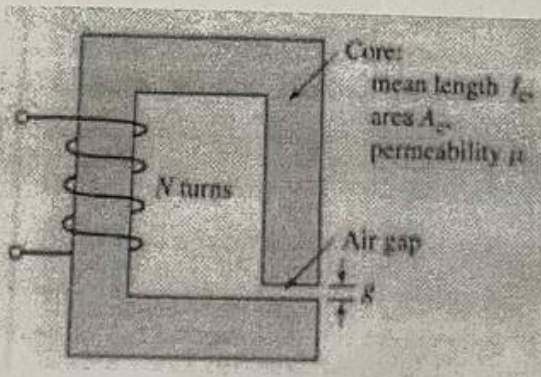Faculty Members   : Dr. Vijayakumar D., Dr. J. Hussain, Dr. M.Panda, Dr. Albert Alexander S., Dr. M. Chankaya, Dr. Gayathri V.

Class Number (s)   : **VL2023240504548,4566,4569,4572,4577**
Date of the Examination : **05.04.2024**
Duration: 90 minutes   **Max. Marks : 50**

General instruction(s): Answer ALL the questions.

Q. No	Question	Marks
1.	a) Convert the octal number a) 321 and b) 1024 to its equivalent hexadecimal.	5
	b) Determine, the POS and SOP form of $Z = \Sigma m (0, 1, 3, 6, 7, 8, 9, 13, 15)$.	5
2.	a). A mild steel ring has a radius of 50 mm and a cross sectional area of 400 mm². A current of 0.5 A flows in a coil wound uniformly around the ring and the flux produced is 0.1 mWb. If the relative permeability at this value of current is 200 find (a) the reluctance of the mild steel and (b) the number of turns on the coil.	5
	b). A solenoid of 800 turns is wound on an iron core of relative permeability 600. The length and radius of the solenoid are 20 cm and 3 cm respectively. Calculate the average emf induced in the solenoid if the current in it changes from 0 to 6 A in 0.8 second.	5
3.	Using k-map realize the following expression using minimum number of gates $Y = \bar{A}\,\bar{B}\,\bar{C}D + \bar{A}\,\bar{B}CD + \bar{A}B\bar{C}D + \bar{A}B\,\bar{C}D + AB\bar{C}D + ABCD$.	10
4.	A magnetic circuit with a single air gap is shown in Figure 1. The core dimensions are: Cross-sectional area $A_c = 1.8 \times 10^{-3}$ m², Mean core length $l_c = 0.6$ m, air gap length $g = 2.3 \times 10^{-3}$ m, N = 83 turn. Assume that the core is of infinite permeability and neglects the effects of fringing fields at the air gap and leakage flux. (a) Calculate the reluctance of the core R_c and that of the gap R_g. For a current of $i = 1.5$ A, calculate (b) the total flux ϕ, (c) the flux linkages λ of the coil, and (d) the coil inductance L.	10
5.	Sketch the logic circuit using universal gate for expression F=((C'.B.A)'(D'.C.A)'(C.B'.A)')'. Use suitable gates such as NAND or NOR gate based on the expression given.	10

Fig. 1.

Core:
mean length l_c
area A_c
permeability μ

N turns

Air gap
g