



School of Electrical Engineering
Winter Semester 2022-2023
CAT - II

Programme Name & Branch: B.Tech (Common to all branches)

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

Class Number (s): VL2022230504429, 4440, 4453, 4467, 4466, 4466, 4468, 4473, 4474, 4475, 4479, 4483, 5832

Slot: D1+TD1

Faculty Name (s): Prof. Sonam Shrivastava, Prof. Razia Sultana, Prof. Vanishree, Prof. Thamilmaran, Prof. Raju J., Prof. Subramanian K., Prof. Mageshvaran R., Prof. Chilukuri Venkata Mahendra, Prof. Brisilla R. M., Prof. Satyajit Das, Prof. Thiruvankadam S., Prof. Mallikarjuna Golla, Prof. Mrutunjaya Panda, Prof. Raghuram M.

Exam Duration: 90 Min.

Maximum Marks: 50

General instruction(s): Answer ALL the questions - $5 \times 10 = 50$ Marks

Q.No.	Question	Max Marks
1	A balanced RYB-sequence Y-connected source with phase voltage $V_{RN} = 230 \angle 30^\circ$ V (rms) is connected to a Y-connected load $(8+j6) \Omega$ per phase. Draw the circuit diagram. Calculate the line voltages, phase and line currents, power factor angle, power factor, active power, reactive power and apparent power.	10
2	A ring is composed of three sections. The cross-sectional area is 0.01 m^2 for each section. The mean arc lengths are $l_a = 0.3 \text{ m}$, $l_b = 0.2 \text{ m}$ and $l_c = 0.1 \text{ m}$. An air-gap length of 0.1 mm is cut in the ring. μ_r for sections a,b,c are 6000, 1500, and 10,500 respectively. Flux in the air gap is $8.5 \times 10^{-4} \text{ Wb}$. Find (i) Reluctances of each section and total reluctance (ii) Total MMF (iii) Exciting current if the coil has 100 turns.	10
3	The total inductance of two coils, A and B, when connected in series aiding and opposing is 0.6 H and 0.1 H , respectively. Coil A, when isolated from coil B, has a self-inductance of 0.3 H . Calculate (a) The mutual inductance between the two coils (b) The self-inductance of coil B (c) The coupling factor between the coils. (d) The two possible values of the induced EMF, in coil A when the current is decreasing at 70 A per second in the series circuit.	10

4.	<p>a) Reduce the following Boolean expression using Boolean laws. $AB + (AC)' + AB'C(AB + C)$</p> <p>b) Perform the following number conversions.</p> <p>i. $(767.892)_{10}$ to binary</p> <p>ii. $(A1C0.1BC)_{16}$ to Octal .</p>	5 5
5.	<p>Plot the logical expression below on a four-variable Karnaugh map.</p> <p>$F(A, B, C, D) = ABCD + AB'C'D' + AB'C + AB$</p> <p>Obtain the simplified expression. Implement the simplified expression using logic gates.</p>	10