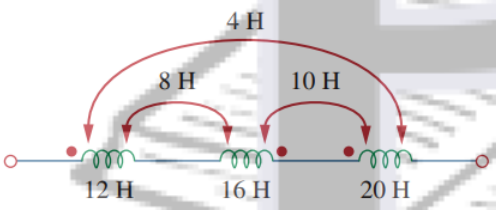
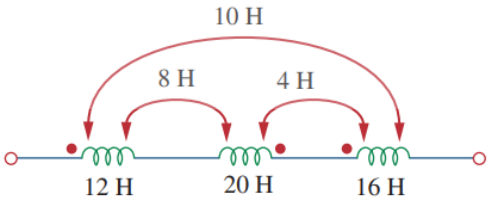
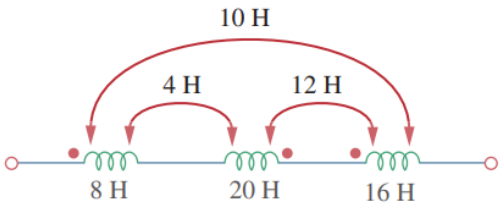
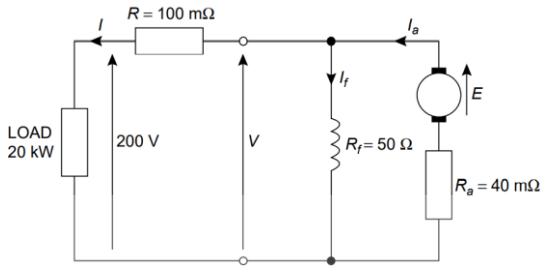
Question Format & QP Setter Information

Name of Examination	**Continuous Assessment Test** (CAT-2), **Fall 2021-22 Semester**, (Dec 2021)		
Slot: A2	Course Mode: **CBL without AL**	**Class Number (s):**VL2021220105993	
Course Code:	EEE101	Course Title:	Basic Electrical Engineering

*General Instructions (if any):**1. OPEN BOOK Examinations, 2. Answer ALL questions***

Q. No.	Sub-division	Question Text	Marks	Unit / Module No.	HOTS? (Y/N)	Difficulty Level E/A/T	CO
Answer All Questions.			Total Marks: 3 × 10 Marks = 30				
1.	a)	Define coefficient of coupling. Determine the coupling coefficient and M if two coils connected in a series-aiding fashion have a total inductance of 600 mH. When connected in a series-opposing configuration, the coils have a total inductance of 400 mH if the inductance of one coil (L_1) is 4 times the L_2.	10				
		(OR)					
	b)	Obtain the total inductance across the terminals and compute the coefficient of coupling k_{12}, k_{23}, k_{13} between coupled coils shown in Figure 1(b).  Figure 1(b)	10	3	N	(E)	CO2
		(OR)					
	c)	Obtain the total inductance across the terminals and compute the coefficient of coupling k_{12}, k_{23}, k_{13} between coupled coils shown in Figure 1(c).  Figure 1(c)	10				
		(OR)					

	d)	Obtain the total inductance across the terminals and compute the coefficient of coupling k_{12}, k_{23}, k_{13} between coupled coils shown in Figure 1(d).  Figure 1(d).	10				
2.	a)	A single-phase 250 kVA transformer has a primary winding resistance of 0.5 Ω and secondary winding resistance of 0.001 Ω. The iron loss is 2.5 kW, and the primary and secondary voltages are 6.5 kV and 400 V, respectively. If the power factor of the load is 0.80 lag, determine the efficiency of the transformer (a) on full-load, and (b) on half-load	10				
		(OR)					
	b)	A 500 kVA transformer has a full-load copper loss of 4 kW and an iron loss of 2.5 kW. Determine (a) the output kVA at which the efficiency of the transformer is a maximum and (b) the maximum efficiency, assuming the power factor of the load is 0.85 lag.	10				
		(OR)		**4**	**Y**	**(T)**	**CO2**
	c)	A single-phase 200 kVA transformer has a primary winding resistance of 0.5 Ω and secondary winding resistance of 0.001 Ω. The iron loss is 1.0 kW, and the primary and secondary voltages are 6.5 kV and 400 V, respectively. If the power factor of the load is 0.75 lag, determine the efficiency of the transformer (a) on full-load, and (b) on half-load	10				
		(OR)					
	d)	A 200 kVA transformer has a full-load copper loss of 1.5 kW and an iron loss of 1.0 kW. Determine (a) the output kVA at which the efficiency of the transformer is a maximum and (b) the maximum efficiency, assuming the power factor of the load is 0.85 lag.	10				
3.	a)	A shunt generator supplies a 20 kW load at 200 V through cables of resistance, R = 100 mΩ. If the field winding resistance, R_f = 50 Ω and the armature resistance, R_a = 40 mΩ, determine (a) the	10				

		terminal voltage, and (b) the e.m.f. generated in the armature for the circuit shown in Figure 3(a).  Figure 3(a)		**4**	**Y**	**(A)**	**CO2**
		(OR)					
	b)	A 200 V DC shunt-wound motor has an armature resistance of 0.4 Ω and at a specific load has an armature current of 30 A and runs at 1350 rev/min. If the load on the motor shaft is increased so that the armature current increases to 45 A, determine the speed of the motor, assuming the flux remains constant.	10				
		(OR)					
	c)	A separately-excited generator develops a no-load e.m.f. of 150 V at an armature speed of 20 rev/s and a flux per pole of 0.10 Wb. Determine the generated e.m.f. When (a) the speed increases to 25 rev/s and the pole flux remain unchanged, (b) the speed remains at 20 rev/s, and the pole flux is decreased to 0.08 Wb, and (c) the speed increases to 24 rev/s and the pole flux is decreased to 0.07 Wb.	10				
		(OR)					
	d)	A short-shunt compound generator supplies 80 A at 200 V. If the field resistance, R_f = 40 Ω, the series resistance, R_{Se} = 0.02 Ω and the armature resistance, R_a = 0.04 Ω, determine the e.m.f. generated, output power, and efficiency.	10				

Dr. M V Chilukuri (8/12/21)
Signature with date