CMR
INSTITUTE OF
TECHNOLOGY

Internal Assesment Test II									
Sub:	BASIC ELECTRICAL ENGINEERING							Code:	18ELE13
Date:	02/03/2021	Duration:	90 mins	Max Marks:	50	Sem:	1	Section:	A,B,C,D,E,F,G

Note: Answer any **FIVE FULL** Questions
Sketch neat figures wherever necessary. Answer to the point. **Good luck!**

		Marks	OBE	
			CO	RBT
1a	Show that in a pure inductor the current lags behind the voltage by 90°. Also draw the voltage and current waveforms.	[5]	CO2	L2
1b	A coil of power factor 0.6 is in series with 100μF capacitor. When connected to a 50Hz supply, the potential difference across the coil is equal to potential difference across the capacitor. Find the resistance and inductance of the coil.	[5]	CO2	L3
2	With a neat diagram, explain how the 3-phase active power can be measured by two wattmeter method. Hence, obtain the expression for power factor. Draw the phasor diagram.	[10]	CO3	L3
3a	Three similar coils each having resistance of 10 Ω and reactance of 8 Ω are connected in star across a 400 V, 3-phase supply. Determine (i) Line current; (ii) Total power; and (iii) reading of each of the two wattmeters connected to measure the active power.	[6]	CO3	L4
3b	What is meant by power factor in an ac circuit? What is its significance?	[4]	CO2	L1
4a	Three coils each of impedances $20\angle 60°$ Ω are connected in star to a 3-phase 400 V, 50 Hz supply. Find the reading on each of the two wattmeters connected to measure the power input.	[4]	CO3	L4
4b	Deduce the relationship between the phase and line currents of a 3-phase delta connected system.	[6]	CO3	L3
5a	A resistance of 7 Ω is connected in series with a pure inductance of 31.8 mH and the circuit is connected to a single phase 100 V, 50 Hz, sinusoidal supply. Calculate (i) Circuit current; (ii) Phase angle; (iii) Power factor; and (iv) Power.	[5]	CO2	L3
5b	Show that voltage and current in a pure resistive circuit are in phase and power consumed in the circuit is equal to product of rms value of voltage and current.	[5]	CO2	L2
6a	Derive the expression for power in AC circuit in terms of voltage, current and power factor of the circuit.	[5]	CO2	L2
6b	Two impedances $Z_1 = (0.167–j0.167)$ Ω and $Z_2 = (0.1+j0.05)$ Ω are connected in parallel across a 100 V, 50 Hz ac supply. Calculate the current in each branch and total current. Also, find the power factor of the circuit.	[5]	CO2	L3
7a	With a neat connection diagram explain three-way control of lamp. Also develop the truth table indicating the state of lamp for different positions of switches.	[6]	CO5	L2
7b	Write short note on (i) MCB; and (ii) Precautions against electric shock.	[4]	CO5	L2
8a	What is earthing? Why is earthing required? With a neat sketch explain plate earthing.	[6]	CO5	L2
8b	Given v(t) = 200 sin(377t) V and i(t) = 8 sin(377t-30°) A for an AC circuit. Determine: (i) Reactive Power; (ii) True power; and (iii) Apparent power.	[4]	CO5	L2

Scheme of Evaluation – IAT 2.

1).

a) Derivation for pure Inductor — 4 M.

Voltage & Current Wavefam – 1 M

5m

1)

b)

$R = 19.09\,\Omega$ — 2 M

$L = 0.0811\,H$ — 2 m.

Steps — 1m.

5 m

2)

3-ϕ Active power derivation – 4 M.

Power factor measurement – 6 M.

(Phasor diagram – 2m)

10 m

3) a)

i) $I_L = 18.0337\,A$ → 2m.

ii) $P = 9.7562\,kW$ → 2m

iii) $W_1 = 2.6249\,kW$ → 1m

$W_2 = 7.1312\,kW$ → 1m

6m

5)b) definition of P.f → 2m.

Significance → 2m

4m

4) a)

$W_1 = 0$ → 2m

$W_2 = 2309.398W$ → 2m

4m

4) b)

$I_L = \sqrt{3}\, I_{ph}$ derivation → 3m.

$V_L = V_{ph}$ → 1m.

phasor diagram → 2m

6m

5) a)

i) $I_L = 8.1978\,A$ → 1m

ii) $\phi = -54.98^\circ$ → 1m

iii) $\cos\phi = 0.5739$ → 1m

iv) $P = 470.44W$ → 1m

Steps → 1m

5m

5)b)

6)a)

6)b

5) b)

Pure resistive circuit derivation → 2m.

Instantaneous power → 2m

phasor diagram → 1m

5m

6) a)

Derivation of voltage
Current
P-f
} 5m.

6) b) $\bar{I} = (1099.15 - j100.67)A$ → 2m.

$\bar{I}_1 = (299.34 + j299.34)A$ → 1m.

$\bar{I}_2 = (799.81 - j400.01)A$ → 1m

$\cos\phi = 0.9958$ → 1m

5m

7) a) Circuit diagram → 2m.

Explanation → 2m

Truth table → 2m

6m

7) b) MCB → 2m.

Electric shock → 2m

4m

8) a) What is Earthing → 1m

why Earthing required → 1m.

plate Earthing diagram → 2m.

Explanation → 2m

6m

8) b) (i) Q = 1400 VAR → 1m

(ii) P = 692.811 W → 1m.

(iii) S = 800.015 VA → 1m

Steps → 1m

4m