SRM Institute of Science and Technology
College of Engineering and Technology

Mode of Exam
OFFLINE

Common to EEE, ECE, Mechanical, Mechatronics and CSE

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

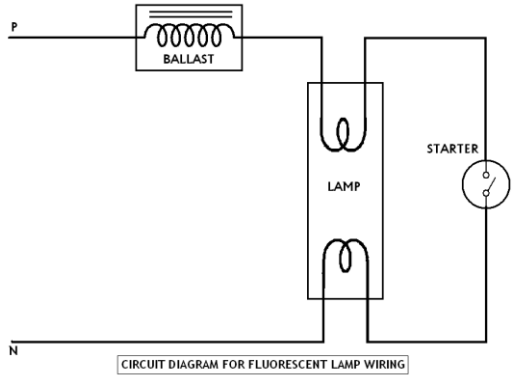
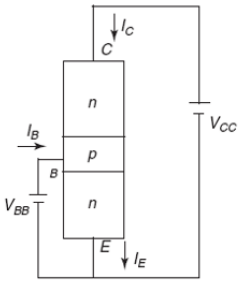
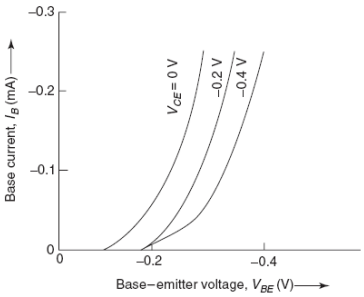
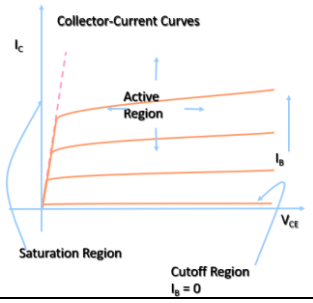
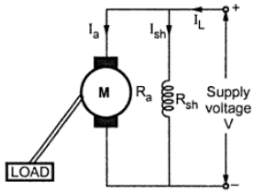
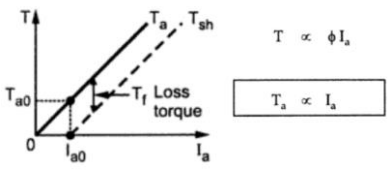
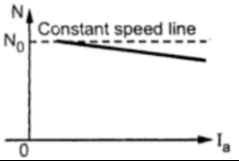
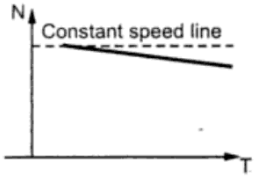
Academic Year: 2021-22 (EVEN) **SET-A**

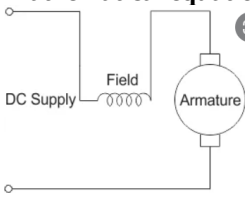
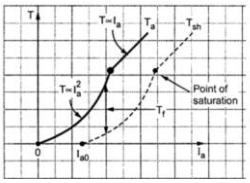
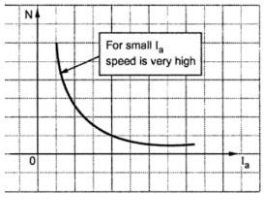
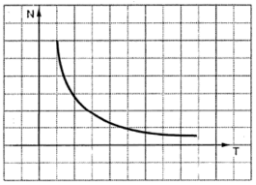
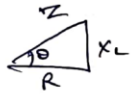
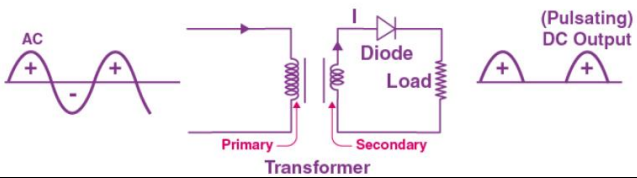
Test: CLAT-2 **Date: 03/06/2022**
Course Code & Title: 18EES101J – Basic Electrical and Electronics Engineering **Duration:** 100 Mins
Year & Sem: I & II **Max. Marks:** 50

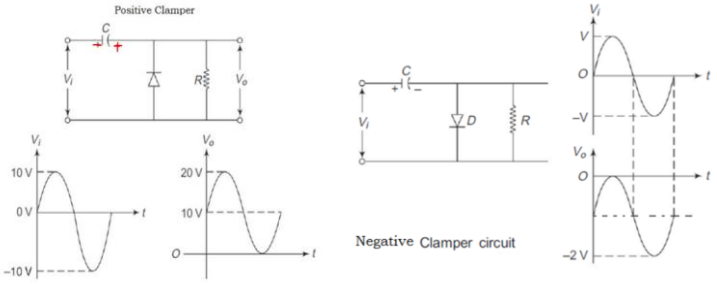
Course Articulation Matrix:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	L	L	M	-	M	M	M	M	-	M	-	-	-
CO2	H	M	L	L	M	-	M	M	M	M	-	M	-	-	-
CO3	H	-	L	L	M	-	M	M	M	M	-	M	-	-	-
CO4	H	-	L	M	M	-	M	M	M	M	-	M	-	-	-
CO5	H	M	M	M	M	-	M	M	M	M	-	M	-	-	-
CO6	-	-	L	2	M	-	M	M	M	M	-	M	-	-	-

Part - A (10 x 1 Marks = 10 Marks)						
Q. No	**Answer all the questions**	**Marks**	**BL**	**CO**	**PO**	**PI Code**
1	$18+15\angle -90$ (In capacitor, Voltage lags Current by an angle 90°) $= 23.43\angle -39$ ↳ magnitude 23.43 V	1	1	2	1,2	
2	Zero	1	1	2	1,2	
3	Leads voltage by an angle 90^0	1	1	2	1,2	
4	1.11	1	1	2	1,2	
5	To limit high current at starting	1	1	2	1,2	
6	DC measurement only	1	1	3	1,2	
7	Reverse bias	1	1	3	1,2	
8	40.6 %	1	1	3	1,2	
9	Saturation region	1	1	3	1,2	
10	Drain	1	1	3	1,2	
Part - B (4 x 4 Marks = 16 Marks)						
11	**Circuit diagram of electric and magnetic circuit- 1 M** **Any 3 differences – 3 M** **Flux | Current,** **MMF | EMF,** **Reluctance | Resistance**	4	1	2	1,2	

12	EMF equation derivation $E_{1rms} = 4.44 \phi_m f N_1$ $E_{2rms} = 4.44 \phi_m f N_2$ Entire Procedure → 4 M	4	2	2	1,2	
13	 CIRCUIT DIAGRAM FOR FLUORESCENT LAMP WIRING **Neat circuit diagram with parts indication – 2 M** **Operation – 2 M**	4	1	3	1,2	
14	 **Input (V_{BE} Vs I_B) and output (V_{CE} Vs I_C) characteristics - 4 M**  	4	2	3	1,2	
	Part – B **(2 x 12 Marks = 24 Marks)**					
15(a)	**Working principle of DC Motor- 2 M** **Mathematical equations and circuit of DC shunt motor- 5 M**    $N \propto \frac{V - I_a R_a}{\phi}$ $\propto V - I_a R_a$ 	12	2	2	1,2	

	Mathematical equations and circuit of DC series motor- 5 M   $\phi \propto I_a$ $T_a \propto \phi I_a \propto I_a^2$   $N \propto \frac{E_b}{\phi} \propto \frac{V - I_a R_a - I_a R_{se}}{I_a}$ $T \propto I_a^2$ and $N \propto \frac{1}{I_a}$ $N \propto \frac{1}{\sqrt{T}}$					
	(or)					
15(b)	Given $P = 800\,w = I^2R$ $= (5)^2 R$ ($\because$ Current = 5 A) $R = 32\,\Omega$ Given supply 230v, 50Hz $\|Z\| = \frac{V}{I} = \frac{230}{5} = 46\,\Omega$ $\sqrt{R^2 + X_L^2} = 46$ $X_L = 33.04\,\Omega$ $\omega L = 33.04\,\Omega$ $L = \frac{33.04}{2\pi \times 50} = 105.169\,mH$ Power factor  $\cos\theta = \frac{R}{Z} = 0.6956$ lag ($\because$ Inductive load) Active Power = $VI\cos\theta = I^2R = 800w$ Reactive Power = $VI\sin\theta = 826.193$ VAR **Calculated values** **Resistance – 32 Ohm (4 Marks)** **Inductance – 105.169 mH (4 Marks)** **Power factor – 0.6956 Lag (2 Marks)** **Active power – 800 W (1 Mark)** **Reactive power – 826.193 VAR (1 Mark)** **All the parameters should be denoted with units.**	12	2	2	1,2	
16(a)	**operation of half wave rectifier with necessary waveforms – 4 Marks**  	12	2	3	1,2	

	Average and RMS values calculation – 4 Marks **RMS voltage of a half wave rectifier, $V_{RMS} = V_m / 2$ and Average Voltage $V_{AVG} = V_m/\pi$, V_m is the peak voltage.** **Ripple factor and efficiency calculation – 4 Marks** **Ripple factor, $\gamma = \sqrt{\left[(V_m/2) / (V_m/\pi) \right]^2 - 1} = \sqrt{(\pi/2)^2 - 1} = 1.21$** **Efficiency = $(V_{AVG} / V_{rms})^2 \times 100 = 40.5\ \%$**					
	(or)					
16(b)	**Clipper and clamper definition- 4 M** **Positive and negative clamper circuit diagram, waveforms and operation- 8 M**  Negative Clamper circuit	12	2	3	1,2	

Question Paper Setter

Approved by Audit Professor/ Course Coordinator