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

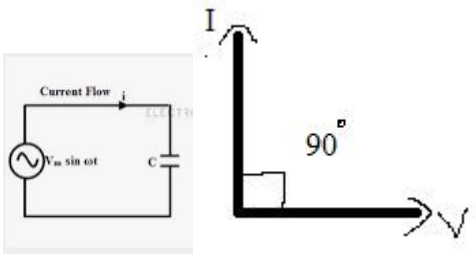
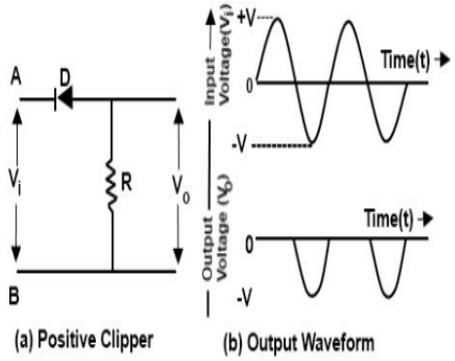
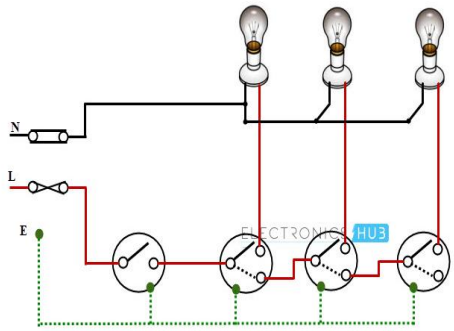
Academic Year: 2021-22 (EVEN) **SET-C**

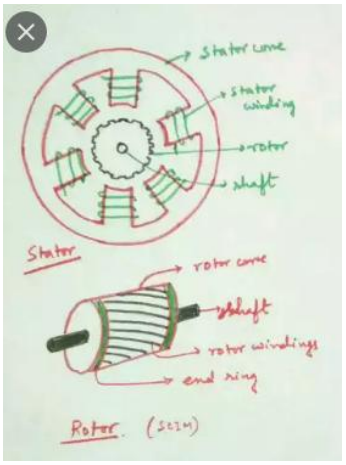
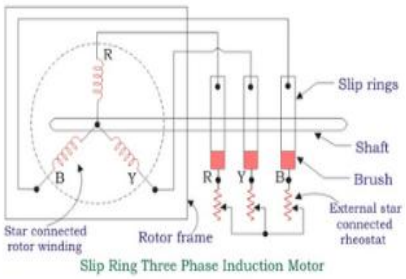
Test: CLAT-2 **Date: 03/06/2022**
Course Code & Title: 18EES101J – Basic Electrical and Electronics Engineering **Duration:** 100 Mins
Year & Sem: I & II **Max. Marks:** 50

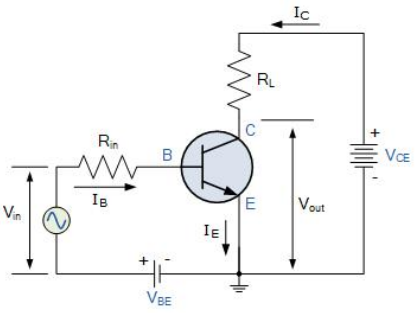
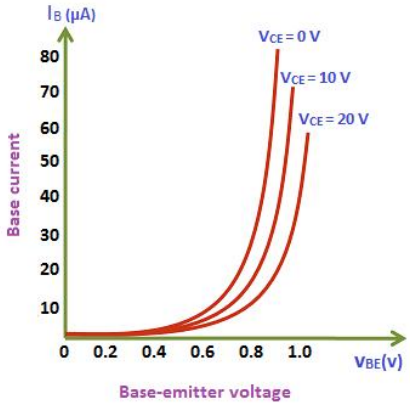
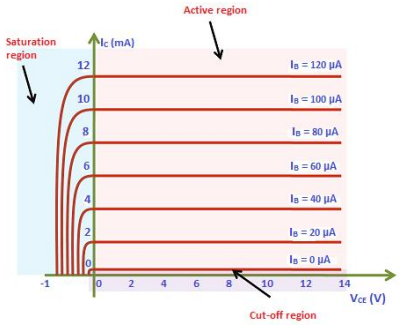
Course Articulation Matrix:

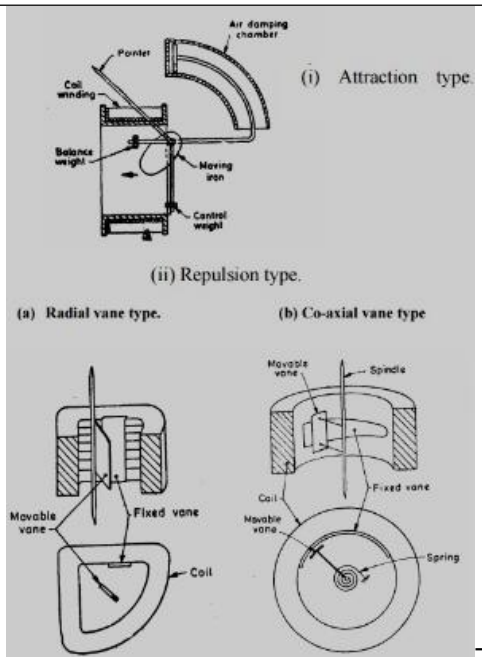
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	L	L	M	-	M	M	M	M	-	M	-	-	-
CO2	H	M	L	L	M	-	M	M	M	M	-	M	-	-	-
CO3	H	-	L	L	M	-	M	M	M	M	-	M	-	-	-
CO4	H	-	L	M	M	-	M	M	M	M	-	M	-	-	-
CO5	H	M	M	M	M	-	M	M	M	M	-	M	-	-	-
CO6	-	-	L	2	M	-	M	M	M	M	-	M	-	-	-

Part - A (10 x 1 Marks = 10 Marks)						
Q. No	**Answer all the questions**	**Marks**	**BL**	**CO**	**PO**	**PI Code**
1	Emf is induced in a conductor when it cuts the magnetic flux	1	1	2	1,2	
2	Transformer is used to step down or up the AC voltages and currents	1	1	2	1,2	
3	Not self-starting	1	1	2	1,2	
4	It restricts the armature current as there is no back emf at starting	1	1	2	1,2	
5	$\frac{\emptyset PNZ}{60*A}$	1	1	2	1,2	
6	Rectifier	1	1	3	1,2	
7	81.2%	1	1	3	1,2	
8	coal-salt mixture	1	1	3	1,2	
9	High voltage and current gain	1	1	3	1,2	
10	Base	1	1	3	1,2	
Part - B (4 x 4 Marks = 16 Marks)						

11	 - 2marks $P = (V_m \sin\omega t)(I_m \sin(\omega t + {}^{\pi}/_{2}))$ - 1 mark $i = \frac{d}{dt} C V_m \sin\omega t = C V_m \frac{d}{dt} \sin\omega t$ or $i = \omega C V_m \cos\omega t = \frac{V_m}{1/\omega C} \sin(\omega t + {}^{\pi}/_{2})$ or $i = \frac{V_m}{X_C} \sin(\omega t + {}^{\pi}/_{2}) \ldots\ldots\ldots\ldots (4)$ -1 mark	4	1	2	1,2	
12	 diagram -3M,explanation – 1M	4	2	2	1,2	
13	1. The transformer works on the principle of **Faraday's law of electromagnetic induction and mutual induction**. There are usually two coils primary coil and secondary coil on the transformer core. The core laminations are joined in the form of strips. (2 marks) 2. **Used in high-voltage level applications such as distribution transformers, auto, and power transformers**. (2 marks)	4	1	3	1,2	
14	 diagram -2 marks, explantion -2 marks	4	2	3	1,2	
	Part – B **(2 x 12 Marks = 24 Marks)**					
15(a)	The working of the three-phase induction motor is **based on the principle of electromagnetic induction**. When three-phase stator winding of an	12	2	2	1,2	

	induction motor is energized from a 3 phase supply, a rotating magnetic field is set up which rotates around the stator at synchronous speed (N_s).- 4 M. Rotor types- 1. Squirrel cage 2. Slip ring – 8M  - 					
	(or)					
15(b)	$I_{rms} = \sqrt{\frac{1}{\pi}\int_0^{\pi} I^2 . d\theta}$ $I_{rms}^2 = \frac{1}{\pi}\int_0^{\pi} I_m^2 \sin^2\theta \, d\theta = \frac{I_m^2}{\pi}\int_0^{\pi}\sin^2\theta . d\theta$ $= \frac{I_m^2}{\pi}\int_0^{\pi}\left(\frac{1-\cos 2\theta}{2}\right).d\theta = \frac{I_m^2}{2\pi}\int_0^{\pi}(1-\cos 2\theta).d\theta$ $= \frac{I_m^2}{2\pi}\left|\theta - \frac{1}{2}\sin 2\theta\right|_0^{\pi}$ $= \frac{I_m^2}{2\pi}\left|\left(\pi - \frac{1}{2}\sin 2\pi\right) - \left(0 - \frac{1}{2}\sin 2\times 0\right)\right|$ $= \frac{I_m^2}{2\pi}\left|\pi - 0 - 0 + 0\right| = \frac{\pi}{2\pi} I_m^2 = \frac{I_m^2}{2}$ $I_{rms} = \sqrt{\frac{I_m^2}{2}} = \frac{I_m}{\sqrt{2}} = 0.707\, I_m$ - 4 M *Average Output Current* $= \left(\frac{1}{2\pi}\right)\left[\int_0^{\pi} ImSin\omega t d(wt) + \int_{\pi}^{2\pi} 0 d(\omega t)\right]$ $= \left(\frac{1}{2\pi}\right)\int_0^{\pi} ImSin\omega t d(wt)$ $= \left(\frac{Im}{2\pi}\right)\int_0^{\pi} Sin\omega t d(wt)$ $= \left(\frac{-Im}{2\pi}\right)[cos\pi - cos0]$ $= \left(\frac{Im}{\pi}\right)$ - 4 M $Peak\ Factor = \frac{Peak\ value}{RMS\ Value} = \frac{V_m}{0.707\, V_m} = 1.414$ -2M	12	2	2	1,2	

	$Form\ Factor = \frac{RMS\ value}{Average\ Value} = \frac{0.707\ V_m}{0.637\ V_m} = 1.11$ - 2M					
16(a)	 -3M  I/P characteristics CE configuration -2M  O/P Characteristics CE Configuration -2M Explanation-5	12	2	3	1,2	
(or)						

16(b)	 - 10 M **Moving coil instruments** / **Moving Iron instruments** 1. It works on the principle of DC motor / 1. It works on the principles of magnetism. 2. Deflection torque is proportional to square of current / 2. Deflection torque is proportional to current 3. Damping is provided by eddy current damping / 3. Damping is provided by air 4. Spring controlled instrument / 4. Gravity controlled instruments. 5. Controlling torque is proportional to angle of defection / 5. Controlling torque is proportional to Sin θ 6. Scale is uniform / 6. Non uniform scale. 7. Delicate, sensitive and accurate. / 7. Robust, reliable accurate. -2M	12	2	3	1,2	

Question Paper Setter

Approved by Audit Professor/ Course Coordinator