



**Scheme**

**of Valuation/Answer Key**

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**THIRD SEMESTER B.TECH DEGREE EXAMINATION, MAY 2019**

**Course Code: EE205**

**Course Name: DC MACHINES AND TRANSFORMERS**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions, each carries 5 marks.*

		Marks
1	parts of dc machine - 3 marks functions of any two parts – 2 marks	(5)
2	Expression for emf equation of dc generator – 1 mark Derivation – 3 marks For lap, A=P, for wave A=2 - 1 mark	(5)
3	speed-armature current characteristics – 3 marks Equations – 1 mark Explanation – 2 marks	(5)
4	Reason (rating of transformer in kVA) - 5 marks	(5)
5	Necessary conditions - 3 marks Desirable conditions – 2 marks	(5)
6	Definition of all day efficiency - 2 marks Variation of efficiency with load – 3 marks	(5)
7	$r_{e1} = \frac{10000}{1500} \left[ \frac{4.2 + 10^2 \times 0.05}{1500} \right] = 0.041 pu \dots 1 \frac{1}{2} \text{ marks}$ $x_{e1} = \frac{10000}{1500} \left[ \frac{5.1 + 10^2 \times 0.062}{1500} \right] = 0.05 pu \dots 1 \frac{1}{2} \text{ marks}$ $r_{e2} = \frac{10000}{150} \left[ \frac{0.05 + 4.2/10^2}{150} \right] = 0.041 pu \dots 1 \text{ mark}$ $x_{e2} = \frac{10000}{150} \left[ \frac{0.062 + 5.1/10^2}{150} \right] = 0.05 pu \dots 1 \text{ mark}$	(5)
8	purpose of tertiary winding - 5 marks	(5)

**PART B**

<i>Answer any twofull questions, each carries10 marks.</i>			
9	a)	Back pitch and front pitch - 2 marks Winding diagram - 5 marks	(7)
	b)	Different losses – 1 mark Methods for minimization of magnetic losses – 2 marks	(3)
10	a)	Emf = 72 V - 5 marks Use lap winding - 2 marks	(7)
	b)	Explanation – self excitation – 1 marks Conditions for building up of voltage build up – 2 marks	(3)
11	a)	$I_L = \frac{10000}{230} = 43.48A$ ..... 1 mark $I_f = \frac{230}{100} = 2.3A$ ..... 1 mark $I_a = 45.78A$ ..... 1 mark $Input = 10000 + 45.78^2 \times 1 + 230 \times 2.3 + 500 = 13125W$ ..... 2 marks $\eta = \frac{10000}{13125} = 76.19\%$ ..... 2 marks	(7)
	b)	3 differences between wave & lap windings ..... 3 marks	(3)
<b>PART C</b>			
<i>Answer any twofull questions, each carries10 marks.</i>			
12		Necessity of starter – 3 marks Diagram - 3 marks, working of 3 point starter – 4 marks	(10)
13	a)	Diagram – 2 marks Working - 2 marks Determination of efficiency of generator – 2 marks	(6)
	b)	3 differences of core type & shell type ..... 4 marks	(4)
14		Working of a transformer no-load - 5 marks On load condition – 5 marks	(10)
<b>PART D</b>			
<i>Answer any twofull questions, each carries 10 marks.</i>			
15	a)	Condition for maximum efficiency .... 1 mark Derivation - 2 marks Explanation (efficiency of a transformer depends on load) – 2 marks	(5)
	b)	Reason (star-delta transformer is used to step-down voltage) .... 5 marks	(5)
16		$0.95 = \frac{600}{600+x+y}$ ....(1) – 2 marks $0.95 = \frac{300}{300+x+(\frac{y}{4})}$ ....(2) – 2 marks $x = 10.52, y = 21.05$ – 3 marks $\eta_{(0.7)} = 95.27\%$ - 3 marks	(10)
17		circuit diagram – 2 marks Explanation – 3 marks Proof – 4 marks	(10)
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