Reg. No. :

# **Question Paper Code: 41332**

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2016

## Third Semester

Electrical and Electronics Engineering

## 14UEE302 - DC MACHINES AND TRANSFORMERS

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Which of the following law states that "any induced emf will circulate a current in such a direction so as to oppose the cause producing it"

(a) Lenz's law	(b) Faradays law	
(c) krichoff's law	(d) Ampere circuital law	

2. Relay coil is an example of

(a) Multiple Excited system	(b) Static excited system
(c) Dynamic excited system	(d) Single excited system

## 3. The sole purpose of a commutator in a dc generator is to

- (a) Increase output voltage (b) reduce sparking at brushes
- (c) Provide smoother output (d) convert the induced AC into DC
- 4. The critical resistance of the dc generator is

(a) Armature (b) Field (c) Load (d) Brushes

5. The speed of the dc motor can be controlled by varying

(a) Its flux per pole	(b) Resistance of armature circuit		
(c) Applied voltage	(d) all of the above		

6. The normal value of the armature resistance of a dc motor is

	(a) 0.005	(b) 0.5	(c) 10	(d) 100	
7.	The all-day efficienc	y of a transformer de	pends primarily on		
	(a) its copper loss		(b) the amount of load		
	(c) the duration o	f load	(d) both (b) and (c)		
8.	Transformer cores are	e laminated in order t	0		
	(a) simply its con	struction	(b) minimiz	e eddy current loss	
	(c) reduce cost	(c) reduce cost (d) reduce hysteresis			
9.	One of the main adva	ntages of Swinburne	's test is that it		
	(a) its applicable	for shunt motors			
	(b) needs one run	ning cost			
	(c) Its very econo	mical and convenien	t		

(d) Ignore any charge in iron loss

10. The main purpose of performing open-circuit test on a transformer is measure its

(a) copper losses	(b) core loss		
(c) total loss	(d) insulation resistance		

PART - B (5 x 
$$2 = 10$$
 Marks)

- 11. Define pitch factor?
- 12. State the advantages of parallel operation of D.C shunt generators?
- 13. Mention the speed control of DC shunt motor?
- 14. Draw the typical equivalent circuit of a single phase transformer?
- 15. Why the open circuit test on a transformer is conducted on a transformer is conducted at rated voltage?

PART - C (5 x 
$$16 = 80$$
 Marks)

16. (a) Briefly explain the multiply-excited magnetic systems? (16)

#### Or

(b) Derive the torque equation of round rotor machine clearly starting all the assumption made? (16)

#### Or

- (b) (i) An 8 pole lap connected DC shunt generator delivers an output of 240A at 500V. The armature has 1408 conductors and a 60 commutator segments. If the brushes are given a lead of 4 segments from no- load neutral axis estimate the demagnetizing and cross magnetizing AT/pole.
  - (ii) Estimate the reactance voltage for a DC shunt machines having 55 commutator segments brush width in commutator segments of 4*cm*, self-inductance of 0.153*mh* and current per coil of 27*A*. The speed of the machine is 700 *rpm*.
- 18. (a) The back emf of a shunt motor is 230V, the field resistance is 16 *ohm*'s and field current is 1.5A. If the line current is 37A. Find the armature resistance also find the armature current when the motor is stationary. (16)

#### Or

(b)	Derive an expres	sion for the t	orque develope	d in the armature of	f a DC motor?	(16)
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19. (a) (i) What are the classifications of transformer?(8)(ii) Derive the E.M.F equation of a transformer?(8)

### Or

- (b) The primary and secondary windings of a 30KVA, 6.6 KV/230V transformer have resistance of  $10\Omega$  and  $0.013\Omega$  respectively. The leakage reactance of the windings are  $17\Omega$  and  $0.022\Omega$ . Estimate the percentage voltage regulation of the transformer when it is delivering full-load at 0.8 power factor lagging at the rated voltage. (16)
- 20. (a) A 60*KW*, 400V DC shunt motor has 4 poles and a wave connected armature of 450 conductors. The flux per pole is 45*mwb*, *Ra*=0.1Ω and *Rsh* =200Ω. If the full load efficiency is 90.5%. Find the (i) speed (ii) Armature torque (iii) Useful torque. (16)

#### Or

(b) (i) What are the losses occurring in transformer?(8)(ii) Derive the condition for maximum efficiency in a transformer?(8)