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Question Paper Code: 43302

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

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. The principle of dynamically induced emf is utilized in

(a) transformer (b) choke	(c) generator	(d) thermocouple
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2. If *B* is flux density, *l* the length of the conductor and *v* the velocity of the conductor, then emf is given by

$(a) Biv sin \theta (b) Biv cos \theta (c) Bi v sin \theta (d) Bi v cos \theta$	(a) Blv $\sin\theta$	(b) <i>Blv² cos θ</i>	(c) $Bl^2v \sin\theta$	(d) $Bl^2v^2 \cos\theta$
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- 3. Brushes of DC machines are made of
 - (a) Aluminium (b) Soft copper (c) Hard copper (d) Carbon

4. In 8 - pole wave connected motor armature, the number of parallel paths are

- (a) 8 (b) 4 (c) 2 (d)1
- 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.	Which of the following does not change in a transformer?					
	(a) Current	(b) Voltage	(c) Frequency	(d) All the above		
8.	Transformer cores a	nsformer cores are laminated in order to				
	 (a) Simply its construction (b) Minimize eddy current loss (c) Reduce cost (d) Reduce hysteresis loss 		rent loss loss			
9.	The open circuit test	is carried out in a tra	in a transformer to find the			
	(a) Cu loss		(b) Core loss			
	(c) Total loss		(d) Insulation resistance	e		
10.	The main purpose of	f performing open-ci	rcuit test on a transformer is	s measure its		
	(a) cu loss		(b) core loss			
	(c) total loss		(d) insulation	resistance		
PART - B (5 x $2 = 10$ Marks)						
11.	Define pitch factor?					
12.	Define critical resist	ance.				
13.	Mention the speed c	ontrol of DC shunt m	notor?			
14.	Define all-day effici	ency.				
15.	What are the losses	in a DC machines?				
PART - C (5 x 16 = 80 Marks)						
16.	(a) Briefly explain	the multiply-excited	magnetic systems?	(16)		
			Or			
	(b) Derive an expre	ssion for mechanical	force developed by magnet	tic field. (16)		
17.	(a) (i) Derive the H	EMF equation of DC	generator.	(8)		
	(ii) A 4 pole lap runs at 700	connected DC arma or connected DC arma	ture has 100 slots and 8 co is 310 V. Find the useful fl	nductors per slot and ux per pole. (8)		
		Or				

(b) Explain with a neat sketch, the construction of a dc machine. (16)

- 18. (a) (i) Calculate the torque developed by 440 V DC motor having an armature resistance of 0.25 Ω and running at 750 *rpm*, when taking a current of 60 A. (8)
 - (ii) Discuss in detail about the speed control of DC shunt motor. (8)

Or

(b) Explain the different methods used for the speed control of dc shunt motor. (16)

19. (a) (i) Draw the equivalent circuit of a transformer and derive the components with respect to primary side. (8)

(ii) Explain the working and construction of auto transformer. (8)

Or

- (b) The primary and secondary windings of a 30KVA, 6.6 KV/230V transformer have resistance of 10Ω and 0.013Ω respectively. The leakage reactance of the windings are 17Ω and 0.022Ω . 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) With the help of neat circuit diagram explain the following test of a DC machine.
 - (i) Hopkinson's test (8)
 - (ii) Swinburne's test (8)

Or

- (b) The corrected instrument reading obtained from O.C and S.C test on 20 kVA, 450 / 120 V, 50 Hz transformer are:
 O.C Test : 120 V, 4.2 A, 80 Watts on L.V side
 S.C Test : 9.65 V, 22.2 A, 120 Watts on H.V side
 Find
 - (i) approximate equivalent circuit
 - (ii) efficiency at 0.8 lagging power factor
 - (iii) efficiency at half load for 0.8 lagging power factor. (16)

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