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**Question Paper Code: 31437**

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

Fourth Semester

Electronics and Instrumentation Engineering

01UEE426 - PRINCIPLES OF ELECTRICAL MACHINES

(Regulation 2013)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. State the condition under which a DC shunt generator fails to excite.
2. Write down the applications of DC series motor.
3. What are the losses in a transformer? And how those losses are minimized?
4. The emf per turn for a single phase 2200 / 220 V, 50 Hz transformer is 11 V. Calculate the number of primary and secondary turns?
5. Define slip of three phase Induction motor.
6. A 50 Hz, 6 pole, 3 $\phi$  induction motor runs at 970 rpm. Find slip.
7. Why is the field system of an alternator made as a rotor?
8. What are the various function of damper winding provided with alternator?
9. Why single phase induction motor is not self starting?
10. Name the motor being used in ceiling fans.

PART - B (5 x 16 = 80 Marks)

11. (a) Explain the methods of excitation and characteristics of a DC generators with suitable diagrams. (16)

Or

- (b) (i) Derive an expression for torque developed in DC motor. (8)

(ii) Why starting current is high at the moment of starting a DC motor? Draw a neat sketch of 3-point starter and explain its working. (8)

12. (a) The following data were obtained on a 20 kVA, 50 Hz, 2000 / 200 V distribution transformer:

	Voltage (V)	Current(A)	Power(W)
OC test with HV open-circuited	200	4	120
SC test with LV short-circuited	60	10	300

Draw the approximate equivalent circuit of the transformer referred to the HV and LV sides respectively. (16)

Or

(b) (i) Explain the principle of operation of a transformer. Derive its emf equation. (8)

(ii) Explain in detail the tests required to obtain the equivalent circuit parameters of transformer. (8)

13. (a) (i) Describe the construction and principle of operation of a 3 $\phi$  induction motor with neat sketch. (8)

(ii) With neat diagram, explain the working of any two types of starter used for 3-phase squirrel cage induction motor. (8)

Or

(b) Sketch and explain the torque – slip characteristics of the 3 $\phi$  cage and slip ring induction motors. Show the stable region in the graph. (16)

14. (a) (i) Derive an expression for emf induced in an alternator. (8)

(ii) Describe the salient constructional features of AC generators driven by Diesel engines and Steam engines. (8)

Or

(b) Explain the different methods of starting a synchronous motor. (16)

15. (a) Explain the construction and working principle of single phase induction motors. (16)

Or

(b) Discuss briefly the operation and characteristics of

(i) Hysteresis motor (8)

(ii) Switched reluctance motor (8)