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**Question Paper Code: 41052**

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2015.

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.   Write the torque equation of DC motors.

2.   What is the necessity of starters in DC motors?

3.   Why Transformer rating is in kVA?

4.   What are the various common connections for 3 phase transformer?

5.   What is slip?

6.   How can the direction of rotation of 3 phase Induction motor be reversed?

7.   What is a synchronous capacitor?

8.   What could be the reasons if a synchronous motor fails to start?

9.   What is a universal motor?

10. State any two applications of stepper motor.

PART - B (5 x 16 = 80 Marks)

11. (a)  (i)  Explain the working principle of DC generator.                          (8)

        (ii) A 4-pole generator having wave-wound armature winding has 51 slots, each slot
             containing 20 conductors. What will be the voltage generated in the machine
             when driven at 1500 *r.p.m*, assuming the flux per pole to be 7 *mWb*.          (8)

Or

(b) (i) Draw and explain the electrical and mechanical characteristics of DC series motor. (8)

(ii) Determine developed torque and shaft torque of 220 $V$, 4-pole series motor with 800 conductors wave-connected supplying a load of 8.2 $kW$ by taking 45 $A$ from mains. The flux per pole is 25 $mWb$ and its armature circuit resistance is $0.6 Ohm$. (8)

12. (a) (i) Explain in detail the working principle of a transformer. (8)

(ii) A 1Ø transformer has 500 turns in the primary and 1200 turns in the secondary winding. The net cross- sectional area of the core is 80 $cm^2$. If the primary winding is connected to a 50 $Hz$ supply at 500 $V$. Calculate (i) peak-flux density in the core and (ii) voltage induced in the secondary winding. (8)

Or

(b) Explain no-load and impedance tests in transformers with neat diagram. (16)

13. (a) (i) Discuss the construction details and working principle of 3 phase induction motor. (8)

(ii) Explain the Torque and Slip characteristic of 3 phase induction motor. (8)

Or

(b) (i) Draw the equivalent circuit of a 3 phase induction motor. (8)

(ii) Explain the starting of 3 phase induction motor using star-delta starter. (8)

14. (a) Draw and explain the vector diagram of a loaded alternator with different power factor. (16)

Or

(b) (i) Explain V- curves and inverted V- curves for synchronous motor. (8)

(ii) Explain the different torques associated with a synchronous motor. (8)

15. (a) (i) Discuss in detail working principle of Capacitor start- and- run motor. (8)

(ii) Explain in detail working principle of Repulsion type motor. (8)

Or

(b) (i) Discuss in detail the principle operation of Hysteresis motor. (8)

(ii) Discuss the construction detail and working principle of Switched Reluctance Motor. (8)

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