



SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
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(AUTONOMOUS)

QUESTION BANK (DESCRIPTIVE)

Subject with Code : EM-I(16EE211)

Course & Branch: B.Tech - EEE

Year & Sem: II-B.Tech & I-Sem

Regulation: R16

UNIT – I

ELECTROMECHANICAL ENERGY CONVERSION

1. Derive the expression for Torque in a multi excited field system? [L4] 10M
2. Explain field energy and co-energy in a magnetic field system? [L2] 10M
3. Explain the principle of energy conversion of an electromechanical system? [L2] 10M
4. Explain energy and co-energy densities? [L1] 10M
5. Derive the expression for force of a singly excited toroid in a magnetic field system? [L4] 10M
6. Write energy balancing Equation? [L1] 10M
7. Draw the concept map of electro mechanical system? [L1] 10M
8. Derive the dynamic equations of an electromechanical system? [L4] 10M
9. Explain forces and torques in a magnetic field system? [L2] 10M
10.
 - a) Write energy balancing Equation. [L1] 2M
 - b) What is excitation? [L1] 2M
 - c) Write the formula for energy stored in electro mechanical system? [L1] 2M
 - d) Define M.M.F? [L1] 2M
 - e) Define reluctance? [L1] 2M

UNIT -II
D.C GENERATORS

- 1 (a). Explain the basic principle of operation of a DC Generator with a simple loop generator? [L2] 10M
- 2 (a). Explain different types of armature windings [L2] 5M
 (b) Calculate the e.m.f. of a 4- pole wave wound generator having 45 slots with 18 conductors per slot at 1200 r.p.m. The flux per pole is 0.016 Wb. [L4] 5M
3. (a) How demagnetizing and cross magnetizing ampere turns per pole are calculated in a DC Machine?[L2] 5M
 (b) The brushes of a certain lap connected 400kw, 6-pole generator are given a lead of 18° electrical. From the data given, calculate (i) the demagnetizing ampere-turns (ii) the cross-magnetizing ampere-turns (iii) series turns required to balance the demagnetizing component. [L4] 5M
4. (a) Deduce an expression for e.m.f equation of DC Generator?[L4] 5M
 (b) An 8-pole lap connected armature has 960 conductors, a flux of 40 m Wb per pole and a speed of 400 r.p.m. Calculate the emf generated on open circuit. If the armature were wave connected, at what speed it must be driven to generate 400 V. [L4] 5M
5. (a) Explain the effects of armature reaction in a DC Generator?[L2] 5M
 (b) Distinguish between Lap and Wave windings? 5M
6. Draw the developed winding diagram of progressive lap winding for 4 poles, 24 slots with one coil side per Slot, single layer showing there in position of the poles, direction of motion;direction of induced e.m.fs. And position of brushes.[L5] 10M
7. Enumerate all the parts of a DC machine and indicate their function? [L1] 10M
8. (a)what is the purpose of compensating winding? Explain in details'?[L2] 5M
 (b) A 50 kW, 500 V, 4-pole generator has a 2 layer simplex lap winding in 36 slots with 10 conductors in each layer. If the brushes are given an actual lead of 10 degrees, calculate (i) the cross magnetizing AT per pole, and (ii) the demagnetizing AT per pole. Assuming the brush's to be placed on GNA, calculate the number of turns on the compensating winding if the ratio of pole arc to pole pitch is 0.8 .[L4] 5M
9. (a).Derive the expression for reactance voltage? [L2] 5M
 (b) A 4 pole wave wound d.c machine has an armature of 25 cm diameters and runs at 1200 rpm .If the armature current is 160A,thickness of brush 12mm and self inductance of each armature coil is 0.14 mh,cal the average e.m.f induced in each coil during commutation?[L4] 5M
10. a) what is the purpose of equalizer ring?.[L1] 2M
 b) Write the purpose of the commutator?[L1] 2M
 c) what is meant by armature reaction? [L1] 2M
 d) what is the purpose of interpoles. [L1] 2M
 e) What is the purpose of pole shoe. [L1] 2M

UNIT –III**CHARACTERISTICS OF D.C GENERATORS**

1. What are the various characteristics of compound generators? [L1] 10M
2. How do you determine the magnetization characteristics of D.C. Shunt generator? [L2] 10M
3. Explain in detail about the parallel operation of DC Series generators? [L2] 10M
- 4) (a) What is the experimental procedure to obtain the load characteristic of dc series generator?
Explain. [L1] 5M
- (b) Explain the parallel operation of two DC series generators with equalizer bar connection. [L1] 5M
- 5). A DC Compound Generator has 110V as terminal voltage. The armature resistance, shunt field Resistance and series field resistance are 0.06Ω , 25Ω and 0.04Ω respectively. The load consists of 200A which rated at 55W. Find the total emf generated and armature current when the machine is connected as (i) Long Shunt (ii) Short Shunt. [L4] 10M
- 6) Explain about self excited and separately excited D.C generators? [L1] 10M
- 7). (a) what are the causes for the failure of self-excitation. [L2] 5M
- (b) Write the remedial measures for the failure of self-excitation. [L2] 5M
- 8). Draw and explain the characteristics of DC series and DC Shunt Generators. [L2] 10M
- 9) (a) Write all the required conditions for self-excitation. [L5] 5M
- (b) A 20KW, 200V DC Shunt Generator has an armature resistance of 0.05Ω and shunt field resistance of 200Ω . Calculate the power developed in the armature when it delivers rated output. [L4] 5M
10. a) Enlist types of dc generators? [L1] 2M
- b) Draw the circuit diagram of Long Shunt Compound Generator. [L2] 2M
- c) Draw the internal and external characteristics of DC Series Generator? [L2] 2M
- d) Define critical field resistance? [L1] 2M
- e) Draw the internal and external characteristics of DC Shunt Generator? [L2] 2M

UNIT –IV**D.C MOTORS**

1. A 25HP, 250V DC Series motor has armature resistance 0.1Ω and field resistance 0.05Ω and brush Contact drop 3V. When the line current is 80A, the speed is 600rpm. Find the speed when the line Current is 100A. [L4] 10M
2. Draw and explain the characteristics of DC series and DC Shunt Motors. [L2] 10M
3. Explain the principle of operation of a D.C motor. Derive the equation for the torque Developed by a D.C. motor? [L2] 10M
4. a) Distinguish between generator and motor action. Derive the equation for the back e.m.f of DC motor? [L4] 5M
b) Find the torque exerted by a 4-pole series motor whose armature has 1200 conductors Connected up in wave winding. The motor current is 10A and the flux per pole is 0.02Wb . [L4] 5M
5. Explain in detail about the types of D.C motors. Also mention their applications? [L1] 10M
6. Explain the operation of four point starter for a DC motor with neat diagram? [L2]10M
7. Explain the armature voltage and field flux control methods for the Speed control of a DC Motor. [L2] 10M
8. Why is a starter necessary for a DC motor? Explain the working of a three-point starter with the help of a neat diagram? [L1] 10M
9. Draw and explain the various characteristics of a DC Motor? [L1] 10M
10. a) Define torque ? [L1] 2M
b) If the applied voltage of a DC motor is 230 V, then back emf, for maximum power developed is? [L4] 2M
c) What is the emf generated by a 4 pole Lap connected DC Motor rotating at 1500 rpm having 200 conductors and useful flux per pole is 0.4 mwb . [L4] 2M
d) The speed of a motor falls from 1100 r.p.m at no-load to 1050 r.p.m at rated load. The speed regulation of motor is. [L4] 2M
e) Write the working principle of a DC motor. [L1] 2M

UNIT –V**TESTING OF D.C MACHINES**

- 1) What do you mean by power stages in a D.C machine? Also explain (i) Electrical efficiency
ii) Mechanical efficiency (iii) commercial efficiency? [L2] 10M
- 2) Explain Swinburne's test on DC machines? What are its advantages and disadvantages? [L2] 10M
- 3) Explain the procedure for obtaining the efficiency by using brake test on DC shunt machine. [L2] 10M
- 4) Describe Hopkinson test in detail. What are its advantages and disadvantages? [L2] 10M
- 5) A Shunt generator delivers 195A at terminal Voltage of 250V. The armature resistance and shunt Field resistances are 0.02Ω and 50Ω respectively. The iron and friction losses equal 950W. Find (a)

- EMF generated (b) Copper losses (c) output of the prime mover (d) commercial, mechanical and electrical efficiencies. [L4] 10M
- 6) Describe Field's test in detail. What are its advantages and disadvantages? [L2] 10M
- 7) Describe Retardation test in detail. What are its advantages and disadvantages? [L2] 10M
8. (a) Enumerate the losses in DC machine. [L1] 5M
- (b) Derive the condition for maximum efficiency [L1] 5M
9. Describe separation of stray losses in a DC motor test in detail. [L2] 10M
10. a) Write the condition for maximum efficiency? [L1] 2M
- b) Which losses are called variable losses? [L1] 2M
- c) Which losses are called constant losses? [L1] 2M
- d) Define efficiency and write the equation for efficiency? [L1] 2M
- e) Name the methods of direct and indirect testing? [L1] 2M

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