Question Bank

UNIT-1: DC Generator:

1. Derive the expression for emf induced in a DC generator with usual notations.

Dec 2013, **Dec 2011**

2. Draw the no load characteristic of a DC shunt generator and comment on its shape. Explain how critical resistance can be found out from the no load characteristics. **Dec 2013, June 2013**

3. A 6 pole, 148 shunt shunt generator has 480 conductors and is wave wound. Its field current is 2A. Find the magnetizing and cross magnetizing amp turns /pole at full load if i) the brushes are at the geometrical neutral axis (GNA) ii) the brushes are shifted from GNA by 5° elec. iii) The brushes are shifted from GNA by 5° mech. **Dec 2013, June2013**

4. What is meant by commutation? Briefly explain the steps involved in commutation process. **June 2013, Dec 2012, June 2012**

5. How would you classifies the types of generators (D.C) and explain them in brief, along with their diagrams. **Dec 2012**

6. Explain what lap and wave windings arc and where they are preferred in DC machines.

June 2012

7. Explain armature reaction with neat figures and derive equations for, i) DC magnetizing ampere tams/pole and ii) Gas magnetizing ampere turns/pole. **Dec 2011**

8. A long shunt compound generator delivers a load current of 50A at 500V, and has armature, series field resistance of 0.05 ohm and 0.03 ohm, 250 ohm respectively. Calculate the generated voltage and the armature current, allow 1 volt per brush for contact drop. **Dec 2012**

UNIT-2: DC Motor:

1. Classify DC motors according to their field winding connections. Draw the circuit diagrams and write the voltage and current relationships in all the types. **Dec 2013**
2. With the help of relevant characteristics explain why a series motor should never be started at no load. **Dec 2013**
3. A 200 V DC shunt motor takes 22 amp at rated voltage and runs at 1000 rpm. Its field resistance is 100 ohm and armature resistance is 0.1 ohm. Compute the value of additional resistance required in the armature circuit to reduce the. Speed to 800 rpm when i) The load torque is proportional to the speed ii) The load torque proportional to the square of the speed. **Dec 2013**
4. What is meant by back emf? Explain its significance. **June 2013, Dec 2011**
5. Derive torque equation of a DC motor. **June 2013**
6. A 440 V, DC shunt motor has a no load speed of 2000 rpm. It is running at 1000 rpm at full load torque, reduced armature voltage and full field. If the load torque is reduced to 50% of rated value, with armature voltage and filed voltage held constant at previous voltages the O speed increases to 1050 rpm. Find the armature voltage drop at full load. Neglect the effect of armature reaction. **June 2013**
7. What are the different methods of speed control of D.C. shunt motor, explain them in brief. **Dec 2012**
8. Explain the torque-Armature Current characteristics of shunt and series motors. **June 2012, Dec 2011**
9. Explain in brief the Ward-Leonard speed control of DC motors. **June 2012**
10. A series motor whit an unsaturated magnetic circuit and 0.5 0hm total resistance when running at a certain speed takes 60 A at 500V. If the load torque varies as the cube of the speed. Calculate the resistance required to reduce the speed by 25%. **June 2012**
11. . Write a short notes on Permanent Magnet DC Motors. **Dec 2011**

UNIT-3&4: Losses, Efficiency and Testing of DC Machines.

1. What are the losses occurring in a DC machine. Explain how do, they vary with the load. Derive the condition for maximum efficiency of a DC generator.

   Dec 2013, June 2013, June 2013, Dec 2012, June 2012

2. Draw the power flow diagram of a DC long shunt compound generator and explain.

   Dec 2013

3. Explain, with the help of necessary circuit diagram, how the efficiency of a DC generator and motor can be predetermined by conducting Swinburne's test. Obtain the efficiency expressions for the motor and generator. **Dec 2013, Dec 2012**

4. Two identical DC shunt machine, when tested by Hopkinson's method, gave the following data: Line voltage = 230 V Line current excluding the field current = 30 A Motor armature current = 230 A Field currents 5 A and 4 amp. The armature resistance of each machine is 0.025 ohm. Calculate the efficiency of both the machines. **Dec 2013**

5. Explain Field's test as applied to two similar DC series motors. **June 2013**

6. Explain the power flow diagram in D. C. machine as generator and as motor. **Dec 2012**

7. The Hopkinson's test on two shunt machine gave the following results for full load. Line If voltage, 250 V, line current excluding field currents, 5A, and 4.2 A, calculate the efficiency of each machine, armature resistance of each machine is 0.02 0hm. **Dec 2012**

8. Explain the retardation test on DC machines. **June 2012**

9. Explain the regenerative test on DC machines. **June 2012, Dec 2011**

10. Briefly explain the brushless DC motors and their applications. **June 2012**

11. Explain commutation with neat figure. **Dec 2011**

12. Discuss the factors that control the speed of DC motors. **Dec 2011**

13. A test in two coupled similar tramway motors, with their fields connected in series gave the following results, when one machine acted as a motor and other as generator motor: Armature current = 56 A Applied voltage across motor terminals = 590 V; Voltage drop across field winding = 40 V Generator: Armature current = 44 A Armature voltage = 400 V Field voltage drop = 40 V Resistance of each armature = 0.3 ohm. Calculate the efficiency of motor and generator at this load. **Dec 2011, (08 Marks)**

UNIT-5: Synchronous Machines

1. Define pitch factor and distribution .factor. Derive-the expressions for these factors. Explain the Effect-of harmonics on them. **Dec 2013, June 2012, Dec 2011**

2. A 3 phase 8 pole 50 Hz star connected alternator has 96 slots with 4 conductors, coil span is 10 slots and the flux per pole is 0.06 wb. Determine the line emf generated. If each phase is capable of carrying 650 amp, what is the KVA rating of the machine? **June 2013, Dec 2012**

3. Derive an expression for EMF equation of a alternator by considering pitch factor and distribution factor. **June 2013, Dec 2012**

4. Calculate the RMS value of line and phase induced emf of a 10 pole, 3-Ph 50 Hz alternator with 2 slots/pole/phase and 4 conductors/slot in two layers. The coil span is 150° electrical. 0. The flux/pole has a fundamental component of 0.15 wb and 20% third harmonic, 6% fifth harmonic component. **June 2013**

5. Briefly explain salient pole and non-salient pole synchronous machines. **June2013**

6. Mention the advantages of revolving field and stationery armature type alternators.

June 2012

7. A 3-phase, 8 pole, star connected alternators has the armature coils short chorded by one slot. The coil span is 165° electrical. The alternator is driven at the speed of 750 rpm. If there are 12 conductors per slot and flux per pole as 50 m.wb, calculate the value of induced emf across the terminals. **Dec 2011**

8. A - 3 phase, 50 Hz, 2 pole, star connected turbo alternator has 54 slots, with 4 conductors per slot. The pitch of the coils is 2 slots less than the pole pitch. If the machine gives 3300 V, between lines on open circuit with sinusoidal flux distribution, determine the useful flux per pole. **Dec 2012**

UNIT- 6 & 7: Voltage Regulation and Synchronization of Alternators

1. With the help of neat sketches, explain how the voltage regulation can be determined using EMF method from the O.C and S.C.test results. **Dec 2013, Dec 2012**

2. A 220 V, 50 Hz 6 pole star connected alternator with armature resistance of 0.06 ohm /phase gave the following data for open circuit and short circuit characteristics. Find the % voltage regulation at full load current of 40 amps at a power factor of 0.8 lag by mmf method. **Dec 2013**

Field Current	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.8	2.2	2.6	3.0	3.4
O.C. Voltage/Ph	16.7	33.5	50.2	67	84.3	99.3	112	134	151	164	173.2	179
S.C.Current.	6.6	13.2	20	26.5	32.4	40	46.3	59.0	--	--	--	--

3. What are the conditions to be satisfied when two alternators are connected in parallel? Derive the expressions for synchronizing power and torque neglecting the effect of Ra.

Dec 2013, June 2013, Dec 2012, Dec2011

4. Define voltage regulation alternator. With necessary diagram, explain zero power factor method to determine the voltage regulation of a alternator. **June 2013, Dec 2011**

5. b. A 3-phase star connected, 1000 KVA, 2000 V, 50 Hz alternator gave the following open circuit and short circuit test readings.

Field current (Amps)	10	20	25	30	40	50
Open circuit voltage (Volts)	800	1500	1760	2000	2350	2600
Short circuit armature current (Amps)		200	250	300		

The armature effective resistance/phase is 0.2 ohm. Draw the characteristics curve and determine the full load percentage regulation at 0.8 p.f. lag using mmf method. **June 2013**

6. With usual notations derive an expression for synchronizing power and torque when two Alternators are connected in parallel. June 2013

7. Explain briefly the capability curves of synchronous generator. **June 2013**

8. Define voltage regulation of an alternator and explain ASA method of findings the voltage regulation. **June 2012**

9. Derive power angle equation for salient pole machine. **Dec 2012, June 2012**

10. Explain the operation of a synchronous generator delivering constant load with variable excitation. **June 2012**

11. A 3 phase, 50 Hz, star-connected, 2000 kVA, 2300 V alternator gives a short circuit current of 600 A for a certain field excitation with the same excitation, the open circuit voltage was 900 V. The resistance between a pair of terminals was 0.12 ohm. Find the full load regulation at i) UPF and ii) 0.8 PF lagging. **Dec 2011**

12. A 1200 KVA, 6600V 3-phase, 8 pole, 750rpm, synchronous generator is operating on 6000 V bus bars. The synchronous reactance is 6 ohm/ phase. Find the synchronizing power and torque per mechanical degree at full load and 0.8 p.f lag. **June 2012**

UNIT-8: Synchronous Motor

1. Explain why a Synchronous motor is not self-starting. Briefly explain the following starting methods In detail. i) Auxiliary motor starting ii) Induction motor starting.

Dec 2013, June 2012, Dec 2011

2. Briefly explain the effect of varying excitation on armature current and power factor.

Dec 2013

3. What are V and inverted V curves. Sketch them and explain their significance.

Dec 2012, Dec 2011

4. What are the methods for starting the synchronous motors? Explain them. **Dec 2012**

5. Define direct axis synchronous reactance and quadrature axis synchronous reactance of a synchronous machine and briefly mention how these are evaluated for a machine.

June 12, June 2013

6. What is hunting what are the factor causes hunting, what are the effects hunting?

Dec 2012, Dec 2011