QUESTION BANK

DECEMBER 2017 - JUNE 2018 / EVEN SEMESTER

EE8301 ELECTRICAL MACHINES – I

BRANCH: EEE **YR/SEM:** II/IV **BATCH**: 2016 - 2020

SUB CODE/NAME: EE6401 ELECTRICAL MACHINES – I

UNIT I

MAGNETIC CIRCUITS AND MAGNETIC MATERIALS

PART - A

1. What are quasi-static fields? May/June-2014
2. Define magnetic reluctance. May/June-2014
3. What is meant by statically induced EMF? April/ May-2015
4. Mention the materials suitable for fabrication of Permanent Magnets. April/ May-2015
5. Define Stacking factor. Nov/Dec-2015
6. What are quasi static fields? Nov/Dec-2015
7. What is Hysteresis Losses? Nov/Dec-2016
8. Define Flux Linkage. Nov/Dec-2016
9. State Amperes law May/June- 2016
10. Define leakage flux May/June- 2016
11. Define relative permeability. Apr/May- 2017
12. Define magnetic flux density. Nov/ Dec- 2017
13. Define self-inductance. Nov/ Dec- 2017
14. Give the expression for hysteresis losses and eddy current losses. Apr/May- 2017
15. Define 'statically induced emf'. Nov/Dec-2017
16. Define reluctance. Nov/Dec-2017
17. Define EMF and MMF. (.)
18. Name the main magnetic quantities with their symbols having the following units: Webers, Telsa , AT/Wb , H/m(.)
19. Define statically and dynamically induced EMF. (.)
20. Explain flux fringing at air gap. (.)
21. Define magnetic field intensity, flux and flux density. (.)
22. Define reluctance and permeance. (.)
23. What is leakage flux and fringing? (.)
24. Define inductance. (.)
25. What is leakage flux and mutual flux? (.)
26. Define magnetic reluctance. (.)
27. What are quasi static fields? (.)
28. How will you minimize hysteresis and eddy current losses? (.)
29. What are the core losses and how can this loss be minimized? (.)
30. Define Torque. (.)
31. How is emf induced dynamically? (.)
32. What is fringing effect? (.)
33. Define stacking factor. (.)
34. Draw the magnetization curve of ferromagnetic material. (.)
35. Compare electric and magnetic circuits. (.)

36. What is transformer and its basic principle? (.)

PART – B

MAGNETIC CIRCUITS

1. Explain the AC operation of magnetic circuits. (8) May/June-2014, Explain the AC operation of Magnetic circuit.(10) Nov/Dec-2016, Explain AC operation of magnetic circuits and derive the energy stored in magnetic field .(8) .
2. What is the principle of a typical magnetic circuit with air-gap and explain. Also prove that the core reluctance may be neglected in practice. (8) May/June-2014
3. Define the following: (a) magnetic flux and flux density (b) reluctance (c) permeance (d) mmf (e)magnetic field intensity (f) permeability of free space.
4. The core of an electromagnet is made of an iron rod of 1cm diameter, bent in to a circle of mean diameter 10cm, a radial airgap of 1mm being left between the ends of the rod. Calculate the direct current needed in coil of 2000 turns uniformly spaced around the core to produce a magnetic flux of 0.2 mwb in the airgap. Assume that the relative permeability of the iron is 150, that the magnetic leakage factor is 1.2 and that the airgap is parallel. Apr/May- 2017
5. Draw and explain the typical magnetic circuit with airgap and its equivalent electric circuit. Hence derive the expression for airgap flux. Nov/ Dec- 2017.
37. A steel ring has mean diameter of 20cm, cross section of $25cm^2$ and a radial airgap of 0.8mm cut across it. When excited by a current of 1A through a coil of 1000 turns wound on the ring core, it produces an airgap flux of 1mwb. Neglecting leakage and fringing, calculate a. relative permeability of steel and b. total reluctance of the magnetic circuit. Nov/Dec-2017

LAWS GOVERNING MAGNETIC CIRCUITS

6. Define the following terms. (i) MMF and Lenz's Law. (ii) Faraday's Law of Electro Magnetic Induction. (iii) Parallel and series magnetic circuits (iv) Torque and Permeability.

INDUCTANCE AND ENERGY

7. Derive an expression for an energy density in a magnetic circuits.(6) Nov/Dec-2015
8. Derive the expression for self- inductance and mutual inductance and also define coefficient of coupling. Apr/May- 2017

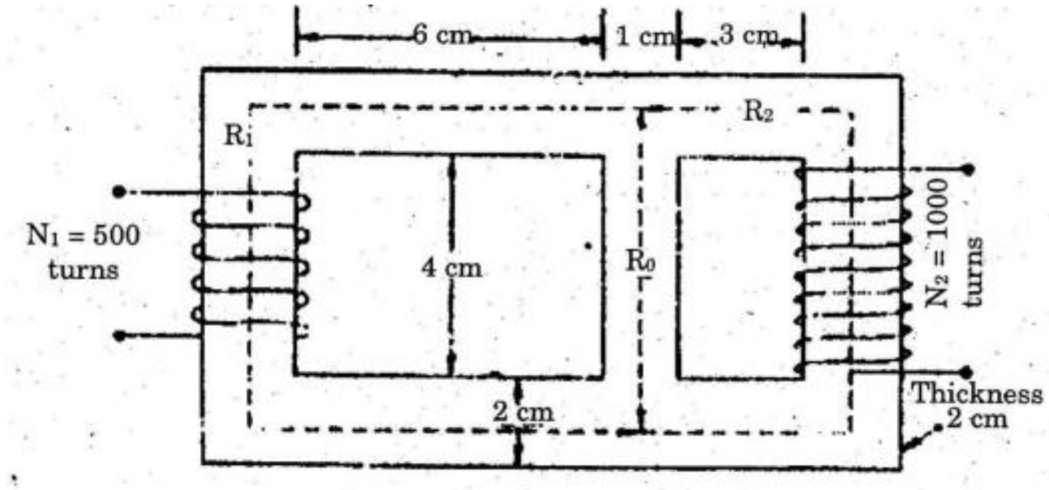
PROPERTIES OF MAGNETIC MATERIALS

9. Summarize the properties of magnetic materials (16) May/June- 2016

   Explain the two different types of magnetic circuits with neat diagram. (8) .

HYSTERISIS AND EDDY CURRENT LOSSES

10. Specify the causes for Hysteresis and eddy current losses in electrical machines. Also suggest the methods in construction to minimize the above the losses. (8) April/ May-2015, Explain the core losses that occurs in magnetic circuits in detail. (8) www.Vidyarthiplus.com, Explain in detail "Eddy current loss". (4) Nov/Dec-2015
11. The total core loss of a specimen of Silicon Steel is found to be 1500W at 50HZ keeping the flux density constant the loss become 3000W when the frequency is raised to 75HZ. Calculate separately the hysteresis and eddy current losses for each of these frequencies. (6) Nov/Dec-2015
12. Explain the hysteresis and eddy current losses and obtain its expression. (16) May/June- 2016
38. Derive the expression for hysteresis and eddy current loss when a magnetic core carries a time varying flux. Nov/Dec-2017
13. Explain in detail, the magnetic circuits and the electrical analog of magnetic circuit. .



14. Compare magnetic and electric circuit. (8) ., www.Vidyarthiplus.com, Explain the similarities and dissimilarities between electric and magnetic circuits.
15. Explain in detail, the power losses that occur in a magnetic material. .

INTRODUCTION TO PERMANENT MAGNETS

16. State properties of magnetic material suitable for fabrication permanent magnet and Electromagnet.(8) April/ May-2015

PART – C

INDUCTANCE AND ENERGY

1. For the magnetic circuit as -shown below, find the self and mutual inductance 'between the two coils. Assume core permeability = 1600. (15) May/June-2014

STATICALLY AND DYNAMICALLY INDUCED EMF.

2. Explain clearly the statically and dynamically induced EMF. (15) Nov/Dec-2015, Explain in detail how the emf is induced. (15) www.Vidyarthiplus.com, Obtain the expression for dynamically induced EMF and force. (15) Nov/Dec-2016
3. Explain in detail how the emf is induced and explain its types. (15) (vidyarthiplus)

HYSTERISIS AND EDDY CURRENT LOSSES

4. The total core loss of a specimen of silicon steel is found to be 1500W at 50 Hz. Keeping the flux density constant the loss becomes 3000 W when the frequency is raised to75 Hz. Calculate separately the hysteresis and eddy current loss at each of their frequencies.

UNIT II

TRANSFORMERS

PART - A

1. Differentiate between a core and shell type transformer. May/ June- 2014
2. What is the basic purpose of tertiary winding? May/ June- 2014
3. Specify the applications of auto transformer? April/May- 2015
4. Mention the role of tertiary winding in Transformer. April/May- 2015
5. Why transformer rating is in "KVA? Nov/Dec-2015
6. What happen when a DC supply is applied to a Transformer? Nov/Dec-2015
7. Define Voltage Regulation of a transformer. Nov/Dec-2016
8. Draw Scott connection of a transformer. Nov/Dec-2016

9. Define all day efficiency of a transformer. May/June- 2016
10. What is Inrush current in a transformer? May/June- 2016
11. Why transformer rating is expressed in kVA? Apr/ May- 2017
12. Why wattmeter in OC test on transformer reads core loss and that in SC test reads copper loss at full load. Apr/ May- 2017
13. List out merits and demerits of core and shell type transformer. Nov/ Dec- 2017
14. How do you reduce leakage flux in a transformer? Nov/ Dec- 2017
39. Mention the different types of transformers. Nov/Dec-2017
40. Why the transformer is having more efficiency than AC motors. Nov/Dec-2017
15. Differentiate between a core and shell type transformer.
16. What is the basic purpose of tertiary winding?
17. Define regulation of a transformer.
18. State the advantages and applications of auto transformer.
19. What happens if DC supply is applied to the transformer?
20. Why all day efficiency is lower than commercial efficiency?
21. Give the principle of transformers.
22. What are the condition for parallel operation of a transformer?
23. Why is transformer rated in KVA?
24. Compare two winding transformer and auto transformer.
25. What is an auto transformer?
26. Mention the different types of three phase transformer connection.
27. What are the causes of stray losses?
28. What is the purpose of conducting open circuit test?
29. What is an ideal transformer?
30. Draw the no load phasor diagram of a transformer.
31. The emf per turn for a single-phase 2200/220 V, 50 Hz transformer is 11 V.
32. Calculate the number of primary and secondary turns.
33. What is transformer and its basic principle?
34. Draw the phasor diagram of an ideal transformer.
35. Why the transformer rating is in KVA?

PART – B

CONSTRUCTION& PRINCIPLE OF OPERATION

1. Explain the principle of operation of a transformer. Derive its emf equation. (8) May/ June- 2014
2. Explain the construction and working principle of a transformer.
3. Explain the principle of operation of a transformer. Draw the vector diagram to represent a load at UPF, lagging and leading power factor. .
4. Derive the emf equation of a transformer. (10) .
5. Develop an equation for induced emf in a transformer winding in terms of flux and frequency. .
6. Explain the principle of operation of a transformer. Derive its EMF equation. Nov/ Dec- 2017

EQUIVALENT CIRCUIT PARAMETERS

7. Draw the approximate equivalent circuit of the transformer referred to the HV and LV sides respectively. (16) Nov/Dec-2016
8. Draw the equivalent circuit of a single phase 1100/220V transformer on which the following results were obtained.
   i. 1100V, 0.5A, 55W on primary side, secondary being open circuited

ii. 10V, 80A, 400W on LV side, high voltage side being short circuited

Calculate the voltage regulation and efficiency for the above transformer when supplying 100A at 0.8 pf lagging. Apr/ May- 2017

9. Obtain the equivalent circuit of a single phase transformer referred to primary and secondary. .

PHASOR DIAGRAMS

10. Draw the phasor diagram of transformer when it is operating under load and explain. (8) May/ June- 2014
11. Draw and explain the phasor diagram of transformer when it is operating under load. Nov/ Dec-2017
12. With neat sketch explain the working of transformer under no load and lagging power factor load. (10). .

LOSSES

13. A 500 KVA transformer has a core loss of 2200 watts and a full load copper loss of 7500 watts. If the power factor of the load is 0.90 lagging, calculate the full load efficiency and the KVA load at which maximum efficiency occurs. (6) April/May- 2015
14. Calculate the efficiency for half, full load of a 100 KVA transformer for the P.F of unity and 0.8 the copper loss at full load is 1000 W and iron loss is 1000 W. (10) Nov/Dec-2015
41. The efficiency of a 1000 kVA, 110V/220V, 50Hz, single phase transformer is 98.5% at half full load at 0.8 pf lagging and 98.8% at full load unity p.f. Determine the iron loss, full load copper loss and maximum efficiency. Nov/Dec-2017

TESTING

15. With a circuit explain how to obtain equivalent circuit by conducting OC & SC test in a single phase transformer. (16) May/June- 2016, Explain in detail, the step by step procedure to draw the equivalent circuit of transformer. www. Rejinpaul.com.
16. A 100 KVA, 3300 V/240V, 50 Hz, 1 phase transformer has 990 turns on the primary. Calculate the number of turns on secondary and the approximate value of primary and secondary full load currents. (10) April/May- 2015
17. A parameters of approximate equivalent circuit of a 4KV, 200/400V. 50 Hz, 1 phase transformer are: R_p'= 0.15Ω, Xp'=0.37 Ω, Ro=600 Ω, Xm=300 Ω. When rated voltage of 200 is applied to the primary, a current of 10A at lagging power factor of 0.8 flows in the secondary winding. Calculate i)The current in the primary, Ip ii) The terminal voltage at the secondary side (8) May/ June- 2014
18. Explain the back to back method of testing for two identical single phase transformers. Apr/ May- 2017

EFFICIENCY

19. Derive an expression for maximum efficiency of a transformer. .

SUMPNER'S TEST

20. With circuit explain Sumpner's test and how to obtain efficiency of a transformer. (16) Nov/Dec- 2016

INRUSH CURRENT

21. What is meant by Inrush Current in transformer? Specify the nature of Inrush currents and its problem during transformer charging. (6) April/May- 2015

PARALLEL OPERATION OF THREE PHASE TRANSFORMERS

22. Specify the conditions for parallel operation of transformer. Also explain the effect of load sharing due to impedance variation between transformers during parallel operation. (6) April/May- 2015

PART – C

PARALLEL OPERATION OF THREE PHASE TRANSFORMERS

1. Explain the various three phase transformer connection and parallel operation of three phase transformer. (16) May/June- 2016

TESTING

2. 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	Nov/Dec-2016

3. The primary of the transformer is rated at 10 A and 1000 V. The open circuit reading are V_I = 1000V, V_2 = 500V, I = 0.42A, Pac= 100W. The short circuit readings are I_1=10A, V_1=125V and P_{ac} = 400 W. Draw the equivalent circuit for the Transformer. Predict the output voltage for the load impedance Z_L = 19 + j 12 ohms and draw the phasor diagram. (16) Nov/Dec-2015
4. A 1-phase transformer, has 180 turns respectively in its secondary and primary windings. The respective resistances are 0.233 and 0.067. Calculate the equivalent resistance of
   i. The primary in terms of the Secondary winding.
   ii. The secondary in terms of the primary winding, and
   iii. The total resistance of the transformer in terms of the primary. (8) May/ June- 2014

UNIT – III
ELECTROMECHANICAL ENERGY CONVERSION AND CONCEPTS IN ROTATING MACHINES

PART - A

1. Define co-energy. May/June- 2014, May/June- 2016
2. What do all practical energy conversion devices make use of the magnetic fields as a coupling medium rather than electric fields? May/June- 2014
3. Why do all practical energy conversion devices make use of the magnetic field as a coupling medium rather than an electric field? April/May- 2015
4. Write the equation, which relates rotor speed in electrical and mechanical radian/second. April/May- 2015
5. What are the requirements of Excitation system? Nov/Dec-2015
6. What do you meant by SPP? What is its significant? Nov/Dec-2015
7. What is Magnetic saturation? Nov/Dec- 2016
8. What is meant by distributed winding? Nov/Dec- 2016
9. What is meant by winding inductance? May/June- 2016
10. What is magnetic saturation? Nov/Dec- 2016
11. What is meant by distributed winding? Nov/Dec- 2016
12. Define the synchronous speed. Write the expression also. April/ May- 2017
13. Define the term pole pitch and coil pitch. April/ May- 2017

14. Define field energy. Nov/Dec-2017
15. What is meant by multiple excited system? Nov/Dec-2017
16. State the principle of electromechanical energy conversion. Nov/Dec-2017 (2013 reg)
17. Predominant energy storage occurs in the airgap of an electromechanical energy conversion device. Is this statement correct? Nov/Dec-2017 (2013 reg)
18. What are the advantages of analyzing energy conversion devices by field energy concept?
19. Draw the general block diagram of electromechanical energy conversion device.
20. In a linear system prove that field energy and co-energy are equal.
21. Write an expression for stored energy in the magnetic field.
22. What are the basic magnetic field effects that result in the production of mechanical forces?
23. What are the assumptions made to determine the distribution of coil mmf?
24. Define winding factor.
25. What do you mean by co-energy?
26. What are the requirements of the excitation systems?
27. What is meant by reactance voltage?
28. Why fractional pitched winding is preferred over full pitched winding?
29. Why do all practical energy conversion devices make use of the magnetic field as a coupling medium rather than an electric field?
30. What is meant by SPP? What is its significance?
31. Enumerate the advantages of using short pitched winding in a synchronous machine.
32. Why synchronous machine does not produce torque at any other speed?
33. Give example for singly and multiply excitation systems.
34. State the principle of electromechanical energy conversion.
35. Define pitch factor and distribution?
36. Write down the expression for torque in round rotor machine.
37. State the assumptions made while obtaining m.m.f space wave.

PART – B

ENERGY IN MAGNETIC SYSTEMS

1. Obtain the expression for energy in an attracted armature relay magnetic system. (16) May/June-2016
2. (i) For a certain relay, the magnetization curves for open and closed positions of the armature are linear. If the armature of the relay moves from open to closed position at constant current (i.e. very slowly), show that the electrical energy input is shared equally between field energy and the mechanical work done.

FIELD ENERGY & CO ENERGY

3. Derive an expression for co-energy density of an electromechanical energy conversion device.
4. (i) Describe the flow of energy in electromechanical devices.
   (ii) Discuss about the 'field energy' and 'coenergy' in magnetic system.
   (iii)The magnetic flux density on the surface of an iron face is 1.6 T which is a typical saturation level value for ferromagnetic material. Find the force density on the iron face.
5. (i) In an electromagnetic relay, functional relation between the current i in the excitation coil, the position of armature is x and the flux linkage ψ is given by $i = 2\psi^3 + 3\psi(1 - x + x^2)$, $x > 0.5$. Find force on the armature as a function of ψ. (8) Nov/Dec-2015
   (ii) Show that the torque developed in a doubly excited magnetic system is equal to the rate of increase of field energy with respect to displacement at constant current. (8) Nov/Dec-2015
6. Explain the concept of electromechanical energy conversion with neat diagram. April/ May- 2017
7. Derive the expression for field energy and co- energy of a attracted magnetic relay. Nov/Dec-2017

MECHANICAL FORCE

8. Obtain an expression for the mechanical force of field origin in a typical attracted armature relay.
9. Find an expression for the magnetic force developed in a doubly excited magnetic systems.
10. Derive the expression for mechanical force developed in a attracted magnetic relay. Nov/Dec-2017
11. Explain in detail the production of mechanical force for an attracted armature relay excited by an electric source.

SINGLY AND MULTIPLY EXCITED SYSTEMS

12. Show that the torque developed in doubly excited magnetic system is equal to the rate of increase of field energy with respect to displacement at constant current. (8) May/June- 2014

MMF OF DISTRIBUTED WINDINGS

13. Draw and explain the m.m.f space wave of one phase of distributed AC. winding.
14. Explain in detail, MMF distribution in AC synchronous machine and derive the expression for fundamental MMF. April/ May- 2017

MAGNETIC FIELDS IN ROTATING MACHINES

15. i) Explain the concept of rotating magnetic field. ii) Derive the torque equation in round rotor machines.
16. Discuss how the rotating magnetic field is produced in a 3 phase winding fed by a 3 phase supply. Nov/ Dec- 2017 (2008)

TORQUE IN ROUND ROTOR MACHINE

17. Derive the torque equation of a round rotor machine. Also clearly state the assumptions made. (16) April/May- 2015
18. Derive the expression for torque developed in a round rotor machine. (2008), Nov/ Dec- 2017

PART – C

FIELD ENERGY & CO ENERGY

1. Obtain the expression for field energy and mechanical force. (16) Nov/Dec- 2016

SINGLY AND MULTIPLY EXCITED SYSTEMS

2. With an example explain the multiple- excited magnetic field system. (16) May/June- 2016
3. With neat sketch explain the multiple excited magnetic field system in electromechanical energy conversion systems. Also obtain the expression for field energy in the system. (16) April/May- 2015

MECHANICAL FORCE

4. Discuss in detail the production of mechanical force for an attracted armature relay excited by an electric source. (16) May/June- 2014

MAGNETIC FIELDS IN ROTATING MACHINES

5. Explain about the magnetic field in rotating machines. (16) Nov/Dec- 2016

UNIT-4

DC GENERATORS

PART-A

1. What is the difference between lap winding and wave winding of a DC machine armature? May/ June- 2014
2. Why synchronous machine does not produce torque at any other speed? May/ June- 2014
3. Specify the role of interpoles in DC Machine? April/May- 2015
4. What is meant by residual emf in DC generator? April/May- 2015
5. Why fractional Pitched Winding is required than full pitched winding? Nov/Dec- 2015
6. Define Winding factor? Nov/Dec- 2015
7. Write EMF equation of D.C generator. Nov/Dec- 2016
8. What is the use of interpole in D.C machine? Nov/Dec- 2016
9. Compare Lap and Wave windings. May/June- 2016
10. Draw various characteristics of DC shunt generator. May/June- 2016
11. What is meant by armature reaction? April/ May- 2017
12. State the conditions under which a DC shunt generator fails to excite. April/ May- 2017
13. What is the purpose of yoke in a DC machine? Nov/ Dec- 2017
14. What is critical resistance of a DC shunt generator? Nov/ Dec- 2017
15. Define mmf. Nov/ Dec- 2017 (2008 reg)
16. How torque is developed in DC motor. Nov/ Dec- 2017
17. What is the difference between Lap winding and Wave Winding of a DC Machine armature.
18. List the factors involved in the voltage buildup of a shunt generator.
19. Why the external characteristics of a DC shunt generator is more drooping than that of a separately excited generator?
20. What are the requirements of the excitation systems?
21. Why fractional pitched winding is preferred over full pitched winding?
22. Define Commutation and Commutation period.
23. Define Winding factor.
24. Draw a schematic diagram indicating flow of energy in the conversion of Mechanical Energy to Electrical form.
25. What is armature reaction in DC generators? What are its effects?
26. Write the EMF equation of DC generator explaining all terms.
27. Mention the uses of DC generators.
28. Give few applications of Ward-Leonard systems.
29. Draw the External Characteristics of a |Shunt generator.
30. What are the Characteristics of DC generators?
31. What are the different types of DC generators?
32. How the generators are classified based on method of excitation?
33. State the application of various types of generators.
34. Define back pitch and front pitch.
35. Define winding pitch and commutator pitch.
36. Why the air gap between the pole pieces and the armature is kept very small?

PART-B

CONSTRUCTION AND COMPONENTS OF DC MACHINE

1. Explain the construction and operation of D.C generator. (16) Nov/Dec- 2016

LAP AND WAVE WINDINGS

2. A 6-pole DC generator has 150 slots. Each slots has 8 conductors and each conductor has resistance of 0.01Ω.The armature terminal current is 15 A. Calculate the current per conductor and the drop in armature for Lap and Wave winding connections.
3. A four pole lap wound shunt generator supplies 60 lamps of 100W, 240V each; the field and armature resistances are 55Ω and 0.18Ω respectively. If the brush drop is 1V for each brush find i. Armature current ii. Current per path iii. Generated emf iv. Power output of DC machine. April/ May- 2017

EMF EQUATIONS

4. Derive the EMF equation of DC generator. (6) April/May- 2015
5. Obtain EMF equation of DC generator. (8) May/June- 2016

CHARACTERISTICS OF DC GENERATORS

6. (ii) Draw the OCC Characteristics and External Characteristics of DC generator.
7. Draw and explain the load characteristics of differentially and cumulatively compound DC generator. (6) April/May- 2015, Draw and explain the load characteristics of DC Compound generators in detail. (8) Nov/Dec- 2015
8. A 4-pole, lap wound DC machine has 728 armature conductors. Its field winding is excited from a DC source to create an airgap flux of 32 rnWb/pole. The machine is run from a prime mover at 1600rpm. It supplies a current of 100A to an electric load.
    a. Calculate the electromagnetic power developed.
    b. What is the mechanical power that is fed from the prime mover to the generator?
    c. What is the torque provided by the prime mover? (8) May/ June- 2014
9. A 4 pole DC motor is lap wound with 400 conductors. The pole shoe is 20cm long and the average flux density over one pole pitch is 0.4T, the armature diameter being 30 cm. Find the torque and gross mechanical power developed when the motor is drawing 25A and running at 1500 rpm. May/June-2016
10. A 4 pole DC shunt generator with lap connected armature supplies 5 kilowatt at 230 volts. The armature and field copper losses 360 watts and 220 watts respectively. Calculate the armature current and generated EMF? (10) April/May- 2015
11. A separately excited generator when running at 1000 rpm supplied 200A at125V. What will be the load current when the speed drops to 800rpm supplied if I_f is unchanged? Given that armature resistance= 0.04 Ω and brush drop= 2V. Derive the necessary equations. Nov/ Dec- 2017

PARALLEL OPERATION

12. Two shunt generators are connected in parallel to supply a load of 5000A each machine has a armature resistance of 0.03Ω and field resistance of 60 Ω. EMF on one machine is 600Vand in other machine is 640V.What power does each machine supply? (6) Nov/Dec- 2015
13. Two DC shunt generators are connected in parallel to supply a load of 5000 A. Each machine has an armature resistance of 0.03 Ω and field resistance of 60 Ω but the emf of one machine is 600V and that of the other machine is 640 V. What power does each machine supply?

PART – C

ARMATURE REACTION & COMMUTATION

1. Explain the armature reaction and commutation in detail for a DC machine. (10) Nov/Dec- 2015, Describe the process of commutation in D.C machine. (16) Nov/Dec- 2016, Explain the Armature reaction in DC machine. (16) May/June- 2016 Explain armature reaction and commutation in detail. (16) (Vidyarthiplus) Explain the process of commutation and the methods to improve the commutations .(16) (Vidyarthiplus)
2. Write notes on the following:
   (i) Self and separately excited DC generators
   (ii) Commutation.
3. Explain the effect of armature reaction in a DC generator. How are its demagnetizing and cross magnetizing ampere turns calculated? April/ May- 2017
4. Explain in detail about commutation and list out the various methods of improving commutation in detail with a neat sketch.

METHODS OF EXCITATION

5. Explain the different methods of excitation and characteristics of a DC generators with suitable diagrams. (Vidyarthiplus)
6. A 400V DC shunt generator has a full load current of 200 A. The resistance of the armature and field windings are 0.06 Ω and 100 Ω respectively. The stray losses are 2000 Wind the Kw output of prime mover when it is delivering full load and find the load for which the efficiency of the generator is maximum.
7. In a 400 volts, DC compound generator, the resistance of the armature, series and shunt windings are 0.10 ohm, 0.05 ohm and 100 ohms respectively. The machine supplies power to 20 Nos. resistive heaters, each rated 500 watts, 400 volts. Calculate the induced emf and armature currents when the generator is connected in 1. Short shunt 2. Long shunt. Allow brush contact drop of 2 volts per brush. (10) April/May- 2015
8. A long shunt Compound generator has a shunt field winding of 1,000 turns per pole and series field winding of 4 turns per pole and a resistance of 0.050. In order to obtain the speed voltage both at load and full load for operating as shunt generator. It is necessary to increase the field current by O.2A. The full load armature current of the compound generator is 8OA. Calculate the diverter resistance connected in parallel of series field to obtain flat compound operation? (8) Nov/Dec- 2015

UNIT-V

DC MOTORS

PART-A

1. List the factors involved in the voltage buildup of a shunt generator. May/ June- 2014
2. Why the external characteristics of a DC shunt generator is more drooping than that of a separately excited generator? May/ June- 2014
3. Specify the techniques used to control the speed of DC shunt motor for below and above the rated speed? April/May- 2015
4. Why DC series motor is suited for traction applications? April/May- 2015
5. State Fleming's Left hand rule? Nov/Dec-2015
6. Why DC Series motor is called as Variable speed motor? Nov/Dec-2015
7. List various method of starting D.C motor. Nov/Dec-2016
8. What is meant by dynamic braking in D.C motor? Nov/Dec-2016
9. Draw the speed- torque characteristics of DC series motor. May/June-2016
10. What is meant by plugging? May/June-2016
11. Why a starter is necessary for a DC motor? April/ May- 2017
12. What are the applications of DC motor? April/ May- 2017
13. What will happen to the speed of a DC motor when its flux approaches zero? Nov/ Dec- 2017
14. Mention the effects of differential compounding and cumulatively compound on the performance of DC compound motor. Nov/ Dec- 2017
15. Draw the speed torque characteristics of DC series motor. Nov/ Dec- 2017
16. Define commutation in DC motor. Nov/ Dec- 2017
17. Why the Starters necessary for starting DC motors?
18. Why is belt drive not suitable for DC series motor?
19. What is the significance of back emf in a DC motor?
20. Why DC series motor called variable speed motor?
21. List the merits and demerits of Swinburne’s test.
22. What are the methods of speed control in DC motor?
23. Mention the application of various DC motor.
24. Give few applications of Ward-Leonard systems.
25. Draw the characteristics of DC compound motor.

26. State the voltage equation of DC motor.
27. State Fleming's left hand rule?
28. How to reverse the direction of rotation of dc motor?
29. What is Back emf?
30. Draw the circuit model of various types of motors.
31. Define Speed regulation of dc motor.
32. Write the torque equation of a DC motor.
33. Draw the Speed-Current and torque-current Characteristics of a DC series motor.
34. State the function of NO Volt coil of the starter.
35. When you will say the motor is running at base speed?
36. State the advantages and disadvantages of Flux control method?

PART-B

SPEED TORQUE CHARACTERISTICS

1. Derive from the fundamental, emf and torque equations and explain the characteristics of DC shunt motor. (12) May/ June- 2014
2. (i)Draw and explain the characteristics of compound motor
   (ii)Explain the factor affecting the speed of a DC motor.
3. Explain the different methods of excitation and characteristics of a DC motors with suitable diagrams.
4. Draw the speed Torque characteristics of DC shunt and series motor. Also from the characteristics specify the applications for each motor. (6) April/May- 2015
5. Derive from the fundamental, emf and torque equations.
6. Explain the characteristics of Dc shunt motor.

STARTING AND SPEED CONTROL OF DC MOTORS

7. Discuss in detail about shunt armature speed control of DC shunt motor. (8) May/ June-2014
8. A 500V DC shunt motor running at 700 rpm takes an armature current of 50A. Its effective armature resistance is 0.4Ω. What resistance must be placed in series with the armature to reduce the speed to 600 rpm, the torque remaining constant? (8) May/ June- 2014
9. Why starting current is high at the moment of starting a DC motor? Explain the method of limiting the starting current in DC motors. (6) April/May- 2015
10. A 400V DC shunt motor has a no load speed of 1450 RPM, the line current being 9 Amperes. At full loaded condition, the line current is 75 Amperes. If the shunt field resistance is 200 ohms and armature resistance is 0.5 ohm. Calculate the full load speed. (10) April/May- 2015
11. A 230 volts DC shunt motor on no load runs at a speed of 1200 RPM and draws a current of 4.5 Amperes. The armature and shunt field resistances are 0.3 ohm and 230 ohms respectively. Calculate the back EMF induced and speed, when loaded and drawing a current of 36 Amperes. (10) April/May- 2015
12. Explain the 3 point starter with neat sketch. Nov/ Dec- 2017
13. Explain the different methods of speed control techniques of DC motors. April/ May- 2017
14. Explain the methods speed control of DC shunt motor. (8) (Vidyarthiplus)
15. Explain the methods speed control of DC series motor.(8) (Vidyarthiplus)
16. Explain the various methods of controlling the speed of a DC shunt motor and bring out their merits and demerits. Also, state the situations where each method is suitable.

PLUGGING, DYNAMIC AND REGENERATIVE BRAKING

17. Explain about any one of the braking.

TESTING AND EFFICIENCY

18. Derive in detail the condition for maximum efficiency of DC machine. (6) Nov/Dec-2015
19. Calculate the efficiency of the machine acting as a generator. (16) Nov/Dec-2016
20. Explain any 2 methods of testing of DC machines .(8) (Vidyarthiplus)
21. With neat circuit diagram explain the conduction of Swinburne's test.

RETARDATION TEST

22. Explain in detail the construction and working operation of retardation test on DC Motor. (10) Nov/Dec-2015

HOPKINSON'S TEST

1. What are the merits, and demerits of Hopkinson's test? (4) May/ June- 2014
2. (i) Explain the important ratings of a DC motor.

PART – C

STARTING AND SPEED CONTROL OF DC MOTORS

1. Why starters are necessary? Explain in detail the construction and working operation of 4 point starter. (16) Nov/Dec-2015
2. Draw the neat sketch of 3 point starter and explain its working. Nov/ Dec- 2017
3. Explain the different methods of speed control of DC shunt motor with neat circuit diagrams. Nov/ Dec- 2017
4. (i) What are the various starting methods of DC motor? Explain any one method. (ii) Explain in detail the various method of speed control in DC motor?
5. (i) Discuss in detail about shunt armature speed control of dc shunt motor.
   (ii) A 500V dc shunt motor running at 700 rpm takes an armature current of 50A.Its effective armature resistance is 0.4Ω. What resistance must be placed in series with the armature to reduce the speed to 600 rpm, the torque remaining constant?

TESTING AND EFFICIENCY

6. Input current=13.25A, field current=2.55A, Resistance of the armature at 75°C=0.032 and brush drop= 2V. Estimate the full load current and efficiency. (16) May/June-2016
7. Explain the method to obtain efficiency at full load by conducting Hopkinson's test. (16) May/June-2016

SWINBURNE'S TEST

8. With a circuit, explain how to obtain efficiency of D.C Generator by conducting Swinburne's test. (16) Nov/Dec-2016
9. With the help of neat circuit diagram, explain Swinburne's test and derive the relations for efficiency (Both for generator and motor) April/ May- 2017

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