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The series motors will offer maximum speed and torque once started but with increasing speed gradually, its torque will come down due to its current. In practice, this is required for most motors. Due to the high torque provided by the armature, the load on the shaft is initially set to rotate. The low torque will drive the load forward. This further helps to increase the heat dissipation of the motor. But, the amount of torque generated by the motor is directly proportional to the winding current.LThe following are the advantages of a series wound motor:The starting torque of a DC series motor is relatively high compared to other motors, so such motors are widely used for traction applications.It can be used for AC or DC supply; therefore, it is also known as a universal motor.A Shunt motor develops more power for the same construction size than a DC shunt motor.The following are the disadvantages of a series wound motor:The speed control and regulation of the DC series motor are not good enough.DC series motors need to be loaded before starting. Therefore the DC series motors are not good to use, where the load is not applied in the initial stage.Read Also: 9 Different Types of Batteries & Their ApplicationsA compound wound DC motor is a type of self-excited motor and consists of both series of field coils and shunt field coils attached to the armature winding. Both field coils provide for the expected amount of magnetic flux, which links with the armature coil and delivers about the torque required to facilitate rotation at the desired speed.As we know, a compound wound motor is basically formed by the amalgamation of a shunt wound DC motor and a series wound DC motor to obtain better closure properties of both these types.Like a shunt wound, a DC motor is offered with a highly efficient speed regulation characteristic, while a DC series motor has high starting torque. So the compound wound DC motor makes a compromise in terms of both these characteristics and has a good combination of proper speed regulation and high starting torque.However, its initial torque is not as high as in the case of a DC motor, nor is its speed regulation as good as a DC shunt motor. The overall characteristics of a DC shunt motor come in between these two extreme limits.The following are the advantages of a compound wound motor:The motor can quickly start and stop.The reversing and acceleration of the motor can do fast.The following are the disadvantages of a compound wound motor:The operation and maintenance costs of compound wound motors are expensive.DC motors cannot operate in a dangerous situation where there is a spark in the brush of the motor.The compound DC motor can be classified into two types according to the nature of compounding.Read Also: What Are Circuit Breakers? Their Types, Working & ApplicationsIf is shunt field flux assists, the main field flux, which is produced by the main field connected in series to the armature winding, is called a cumulative compound DC motor.If the shunt and series winding are arranged so that the field flux generated by the shunt field winding reduces the effect of flux by the main series field winding, then it is called a differential compound DC motor.Both types of compound DC motors can be of short or long shunt type according to the nature of the arrangement.You may like this: Working Principle of Servo Motor: Diagram, Types, ApplicationsWhen the shunt field winding of the motor is connected in parallel to the armature winding, it is known as a short shunt DC motor. The diagrammatic representation of the short shunt motor is shown in the figure above.When the shunt field winding of the motor is connected parallel to both armature winding and series field winding, then it is known as a long shunt DC motor. The diagrammatic representation of the long shunt motor is shown in the figure above.Read Also: Types of Electric Motors: Their Working and ApplicationsSeries motor: It is used where very high starting torque and variable speed are required, such as electrical fraction work, electric locomotives, trolleys, cranes, hoists, and conveyors. Air compressors, vacuum cleaners, hair dryers, sewing machines, etc.Shunt motors: It is where constant speed is required with low starting torque, such as for lathes, centrifugal pumps, fans, reciprocating pumps, drilling machines, and boring machines. Spinning and weaving machines etc.Compound motor: It is used where sudden loads are applied or removed, such as for shears, punches, coal-cutting machines, elevators, conveyors, heavy planners, rolling mills, ice machines, printing presses, air compressors etc.Thats it; thanks for reading. If you have any questions about types of DC motors ask us in the comments. If you found this article helpful, then please share it with your friends.Subscribe to our newsletter to get notifications of new articles.Download the Pdf of this article from here:Check out the topics listed below as well if you're interested!Capacitors: Types, Definition, Specifications, and Application of CapacitorElectric Circuit: Types of circuits, Kirchhoffs Law and Its ClassificationAC Motors: Types, Working, Construction, Applications, and More16 Different Types of Transformers and Their Working [Explained]What is Resistance Welding? Types, Working, Applications & Advantages Posted: May 20, 2021 What is a DC (Direct Current) Motor? A DC motor is any class of rotary electrical motors that converts direct current electrical energy into mechanical energy. The history of DC motors goes as far back as the 19th century. In 1832, a British scientist, William Sturgeon, created the first DC motor that had the ability to power machinery. Sturgeons initial development was further expanded upon by an American scientist, Thomas Davenport. Davenport is known for creating the first working DC motor, which he patented in 1837. However, Davenport ran into some issues with the cost of battery power while the motors were running. This made the motors ineffective to stand up over time.After the initial invention, created by Davenport, many other inventors began developing concepts. In 1834, Moritz von Jacobi, a Russian engineer, invented the first rotating DC motor. Jacobis motor became well known for its power, which would later set a world record. Jacobi went on to create an even more powerful motor, thus breaking his own record for power in 1838. The invention of this motor, by Jacobi, went on to further inspire others to expand and produce more DC motors of the same power.Antonio Pacinotti made a breakthrough in 1864 with the development of the ring armature. This piece has become crucial in the design of the DC motor; the ring armature carries the current through the grouped coils.Even with all of the developments throughout the 19th century, possibly the most important came in 1886. An inventor named Julian Sprague invented a DC motor that was capable of maintaining a constant speed under variable loads. Spragues invention would lead to the commercial use of the DC motor. This would include early variations of the electric elevator and electric trolleys. These developments led to high demand of the motors, for both commercial & residential usage. Today, DC motors are widely used in many industries, such as healthcare, food service and many industrial settings. The use of DC motors has made industry work far more efficient, with machines able to function with a dependable source of power and speed. DC motors have made many other industries far easier to function in their day to day facilities, by taking a lot of manual power off of humans or animals, and replacing it with motorized equipment. Many of us wouldnt know how to function in our everyday lives without DC motors. From dishwashers, to blenders, to medical equipment at the doctors office, many of us dont know just how ingrained DC motors are in our everyday life. We help provide the motors that you need for the equipment that you use or manufacture.If you are having any issues with your machinery or your current DC motor provider, please contact our experts today at Motor Specialty! In a DC motor, when the armature rotates under the influence of the driving torque, the armature conductors move through the magnetic field, and therefore an EMF is induced in them by the generator action. This induced EMF in the armature conductors acts in opposite direction to the applied voltage \mathcal{E} and is known as the back EMF or counter EMF.The magnitude of the back EMF is given by,
$$\mathcal{E}_b = \frac{d\Phi}{dt} = N \frac{d\Phi}{dt}$$
where \mathcal{E}_b is always less than the applied voltage V . However, this difference is small when the DC motor is running under normal conditions.In DC motors, the back EMF \mathcal{E}_b induced in the armature opposes the applied voltage, thus the applied voltage has to overcome this EMF \mathcal{E}_b to force a current I_a in the armature circuit for motor action. The required power to overcome this opposition is given by,
$$P_{\text{mech}} = \mathcal{E}_b I_a = V I_a - I_a^2 R_a$$
The power P_{mech} is one which actually converted into mechanical power. For this reason, the power P_{mech} is also called as electrical equivalent of mechanical power developed.Consider a shunt DC motor whose electrical equivalent circuit is shown in Figure-1.When a DC voltage V is applied across terminals of the motor, the field electromagnets are excited and armature conductors are supplied with current. Hence, a driving torque acts on the armature which begins to rotate. When the armature rotates, a back EMF is induced in the armature conductors that opposes the applied voltage V . This applied voltage has to force a current through the armature conductors against the back EMF.The voltage equation of the dc motor can be expressed as
$$V = \mathcal{E}_b + I_a R_a$$
where R_a is the resistance of the armature circuit.Then, the armature current of the DC motor is given by,
$$I_a = \frac{V - \mathcal{E}_b}{R_a}$$
and the value of back EMF is large and hence the motor will draw less armature current and vice-versa.Significance of Back EMF in DC MotorThe back EMF in a DC motor makes it a self-regulating machine, which means it takes the motor to draw a sufficient amount of armature current to develop the torque required by the mechanical load.Now, from Equation-4, we may explain the importance of back EMF in the DC motor as Case 1 Motor running on no loadIn this case, the dc motor requires a small torque to overcome the frictional and windage losses. Thus, the armature current I_a drawn by the motor is small and the back EMF is nearly equal to the supply voltage.Case 2 Motor load is changed suddenlyIn this case, when load is suddenly attached to the motor shaft, the armature slows down. Consequently, the speed at which the armature conductors move through the magnetic field is decreased and hence the back EMF decreases. This decreased back EMF allows a larger current to pass through the armature conductors, and larger armature current means high driving torque. Hence, it is clear that the driving torque increases as the motor speed decreases. The reduction in motor speed stops when the armature current is sufficient to produce the increased torque required by the mechanical load.Consider another situation, where the load on the motor is decreased. In this case, the driving torque is momentarily more than the requirement so that the armature is accelerated. The increase in the armature speed increases the back EMF, and causes the armature current to decrease. Once the armature current is just sufficient to produce the reduced driving torque required by the load, the motor will stop accelerating.This discussion clearly states that the back EMF in a dc motor automatically regulates the flow of armature current to meet the load requirements. Today in Linquip, were going to discuss everything about DC motors, their types, and applications. As you may know, a DC motor or a direct connection motor is referred to as any type of rotary electric motors that converts direct electrical energy into mechanical energy. There are four main types of DC motor, all of which are used for different applications. If you want to know everything about a DC motor, DC motor types, and their utilizations.On Linquips website, you can find all the information you need about DC motor equipment and devices. At Linquip, we are happy to assist you with any questions you may have related to DC motors. For more information about DC motors, visit Linquip and explore the article What Is DC Motor?Are you searching for DC motor devices and equipment? Linquip offers a wide range of equipment for your DC motor applications. See lists of DC Motor Products Browse them online free of charge. Do you want to buy DC Motor devices & equipment? Click here to get free access to every DC Motor Devices for Sale you may need. Need an up-to-date price list for DC motors? With Linquip, you can send inquiries to all reputable DC Motor Suppliers and receive quotes for free. View a List of DC Motor for Sale and Their Suppliers What is a DC Motor?Its interesting to know that DC motors are everywhere. Unlike its bizarre name, direct connection motors are everywhere around us, and theyre making our lives much more comfortable. In a nutshell, any device that uses electricity to provide various motions is doing it using DCmotor types.Now that you know what a direct connection motor is lets dive deeper into the concept and discuss the types of direct connection motors and their application in the industrial field.How Many Types of DC Motor Are There?There are four main types of direct connection motors:Permanent Magnet DC MotorSeries DC MotorsShunt DC MotorsCompound DC MotorsIf you want to understand how direct connection motors work and what utilizations they have, you need to get familiar with their different types. 1. Permanent Magnet DC MotorThe permanent magnet motors work by a permanent magnet to make a field flux. A PM direct connection motor does not have a field winding on the motor frame. Instead, it uses permanent magnets to provide a magnetic field against which the rotor field interacts to produce torque.This type of direct connection motor makes excellent starting torque, and it has good speed regulation. 2. Series DC MotorsIn the series DC motors or series wound DC motors, the entire armature current flows through the field winding. Usually, this DC motor type creates a large amount of starting torque, but it cant regulate speed, and even running with no load can damage it. Therefore, these limitations make series DC motors, not a good option for variable speed drive applications. Electric circuit of a series wound DC motor (Reference: Linquip.com)See All Series Wound DC Motors for Sale3. Shunt DC MotorsShunt DC motors are a type of direct connection motors in which the shunt field winding is only parallel to the armature winding and not the series field winding. Shunt DC motors are also known as compound wound DC motors. Shunt DC motors provide excellent speed regulation, as the shunt field can be excited separately from the armature windings. This feature of shunt direct connection motors provides simplified reversing controls.DC shunt motor (Reference: motioncontroltips.com)Read more about Assumotors coreless brushless DC motor.4. Compound DC MotorsCompound DCmotors or compound wound motors have both series and shunt field windings. These types of motors offer good starting torque, but they may have control problems in variable speed drive applications. These motors can be connected to two arrangements: cumulatively and differentially. The cumulative type connects the series field to add the shunt field, providing higher starting torque but less speed regulation. The differential type has good speed regulation and usually operates at a constant speed.Various DC Motor ApplicationsIn general, DC motors are used as variable speed drives and for the applications in which sever, torque variations occur. Now that youre familiar with different DCmotor types lets get through their usages and applications.Series DC motors are generally used where high starting torque is required, and speed variations are possible. These types of direct connection motors are, for instance, used in the traction system, cranes, air compressors, vacuum cleaners, sewing machines, etc.Shunt DC motors are used for applications where you need constant speed, and the starting conditions are not severe. The shunt direct connection motors applications are in lathes machines, centrifugal pumps, fans, blowers, conveyors, lifts, waving machines, spinning machines, etc.Compound wound motors are usually used where you need higher starting torque and relatively constant speed. The compound DC motors applications are in presses, shears, conveyors, elevators, rolling mills, heavy planners, etc.What Are the Main Parts of a DC Motor?DC motors are composed of the following components: a stator, a rotor, a yoke, poles, armature windings, field windings, commutator, and brushes. Many of its parts are similar to those in AC motors, but there are a few differences.What are the Advantages of DC Motors?Comparing with the AC motors that converts alternating current into mechanical power, DC motors have some advantages you might want to consider. Generally, direct connection motors have higher starting torque than alternating current ones. This feature makes it easier to get things moving. The only problem of this feature is that you cant start them unless they are under a load. If a DC motor doesnt have a load to start, it can burn out fast.The other advantage of various DC motor types is that they generate a speed-torque curve thats more linear than the AC motors. This feature is actually due to the curve plotted between the torque and the motors speed, which explains the relationship between how fast the motor spins and how much torque it can generate.The ability to control the speed is the other upper hand of direct connection motors. If youre working with heavy load systems, the ability to control the speed becomes very crucial, and it determines whether youll end up with a successful job or a burned out motor. Therefore, DC motors are ideal for any job needing constant low-speed torque or variable torque.Another important point to consider is that DC motors are easier to install compared to the AC motors. They also need less maintenance and are easier to repair. If your industrial types of equipment are set up to use DC motors, replacing a broken one with a DC motor is quick and easy. While replacing it with an AC motor will force you to redesign the whole motor circuit. What is DC Motor? What is Industrial Motors? DC Motor For Sales The commonly used types of DC Motor are shown in Fig. 5.1. In a separately excited motor, the field and armature voltages can be controlled independent of each other. In a shunt motor, field and armature are connected to a common source. In case of a series motor, field current is same as armature current, and therefore, field flux is a function of armature current. In a cumulatively compound motor, the magneto-motive force of the series field is a function of armature current and is in the same direction as mmf of the shunt field. The steady state equivalent circuit of armature of a dc machine is shown in Fig. 5.2. Resistance Ra is the resistance of the armature circuit. For separately excited and shunt motors, it is equal to the resistance of armature winding and forseries and compound motors it is the sum of armature and field winding resistances. Basic equations applicable to all Types of DC Motor arewhere is the flux per pole, Webers;Ia the armature current, A; V the armature voltage; V;Ra the resistance of the armature circuit, ohms;m the speed of armature, rad/sec;T the torque developed by the motor, N-m; andKe the motor constant.From Eq. (5.1) to (5.3)Shunt and Separately Excited Motors:In the case of shunt and separately excited motors, with a constant field current, the flux can be assumed to be constant. LetThen from Eqs. (5.1), (5.3) and (5.4) to (5.6)The speed-torque and torque-current characteristics of a separately excited motor for rated terminal voltage and full field are shown in Fig. 5.3. The speed-torque curve is a straight line. The no load speed n_0 determined by the values of armature voltage and field excitation. Speed decreases as torque increases and speed regulation depends on the armature circuit resistance (Eq. (5.10)). The usual drop in speed from no load to full load, in case of a medium size motor,is of the order of 5%. Separately excited motors are employed in applications requiring good speed regulation and adjustable speed.Series Motor:In series motors, the flux is a function of armature current. In unsaturated region of magnetization characteristic, can be assumed to be proportional to Ia. Thus,Substituting in Eqs. (5.3), (5.4) and (5.5) giveswhere armature circuit resistance Ra is now the sum of armature and field winding resistances. The speed torque and torque-current characteristics of a series motor at rated terminal voltage and full field are shown in Fig. 5.3. Series motors are suitable for applications requiring high starting torque and heavy torque overloads. Since torque is proportional to the armature current squared, for the same increase in torque, increase in motor current is less compared to that in a separately excited motor where torque is proportional to armature current. Thus, during avary torque overloads and starting, power overload on the source and thermal overloading of the motor are kept limited to reasonable values. According to Eq. (5.14), as speed varies inversely as the square root of torque, machine runs at a large speed at light load. Generally, mechanical strength of a Types of DC Motor permit it to operate upto about twice rated speed. Hence, the series motor should not be used in those drives where there is a possibility of the load torque being dropped to the extent that the speed may exceed twice rated value.Compound Motor:Speed-torque and torque-current characteristics of a cumulative compound motor are also shown in Fig. 5.3. The no load speed depends on the strength of shunt field and slope of the characteristic on the strength of series field. Cumulative compound motors are used in those applications where a drooping characteristic similar to that of a series motor is required and at the same time the no load speed must be limited to a safe value; typical examples are lifts and winches. It is also used in intermittent load applications, where the load varies from almost no load to very heavy loads. In these applications a fly-wheel may be mounted on the motor shaft for load equalisation. This apart from equalising load on the supply, permits the use of a smaller size motor. Pressing machine is a typical example of this type of application.The characteristics of Fig. 5.3, which are obtained at rated terminal voltage and full field are known as natural speed-torque characteristics. Rated (or full load) speed is known as the base speed.Universal Motor:The universal motor can run both on dc and ac supply. It is essentially a dc series motor, with some differences in construction, which are mainly introduced to get satisfactory performance on ac. In series motor, torque depends on the product of armature current and field flux. Reversal of the terminal voltage reverses both the armature current and field flux. Consequently, torque remains in the same direction. Therefore, when fed from an ac source, the series motor produces unidirectional torque. Although the torque fluctuates at a frequency of 100 Hz between zero and its peak value, its fluctuations are smoothed out by the inertia and the motor runs at a uniform speed.A simple dc series motor does not operate well on ac. Hysteresis and eddy current losses that occur in field poles and yoke reduce motor efficiency and increase thermal loading. The alternating flux produces large induced currents in the coils that are short circuited by brushes during commutation. This causes excessive sparking at the commutator. Motor power factor is very poor due to large inductance of field and armature. Universal motor is specially constructed to solve these limitations. In addition to the armature, field poles and yokes are also laminated to reduce eddy current losses. High permeability silicon steel lamination are used to reduce hysteresis loss. A compensating winding is used in series with the armature to reduce armature inductance. The field inductance is lowered by using fewer turns and shallow pole pieces. In spite of these changes, when fed from ac, commutation is worse than when fed from dc. Therefore, their power ratings are seldom higher than 1 kW. No load speed is high, but generally not high enough to damage the motor.Most universal motors are manufactured for use at speeds in excess of 3000 rpm. This is the maximum speed of an induction motor when fed from a 50 Hz supply. Below this speed induction motor is generally preferred. Many universal motors operate at speeds upto 12,000 rpm and can go upto 20,000 rpm. Because of high operating speeds, universal motor is much smaller in size compared to an induction or a low speed dc motor of identical rating. Because of brushes and commutator, it requires frequent maintenance and has a relatively short operating life.Until recently, universal motor was the cheapest motor capable of running at high speeds and having relatively very small weight and size. The brushless Types of DC Motor or a single phase induction motor fed from variable frequency inverter may become its competitor in near future. Some applications of universal motor are fans, electric drills, home appliances etc.Permanent Magnet Motors:In permanent magnet dc motors, field excitation is obtained by suitably mounting permanent magnets on the stator. Ferrites or rare earth (cobalt samarium) magnets are employed. Ferrites are commonly used because of lower cost, but the machine becomes bulky due to low retentivity. Rare earths because of their high retentivity allow a large reduction in weight and size, but they are very expensive. The permanent magnet motors are mainly employed in fractional horsepower range, but they are available upto 5 kW rating.Use of permanent magnets for excitation eliminates field copper loss and need for field supply. Compared to the field wound motors, they are more efficient, reliable, sturdy and compact. The field flux remains constant for all loads giving a more linear speed torque characteristic. In a separately excited motor, failure of field supply can lead to runaway condition. This does not happen in permanent magnet motors. As the flux is constant in these motors, speed cannot be controlled above base speed. Such motors have applications in electric vehicles like mopeds, forklift trucks, wheel chairs etc.DC Servo Motors:There is no sharp dividing line between servo and conventional field wound and permanent magnet dc motors. Servo motors are intended to be used in closed loop speed and positional control systems where performance requirements are such that they cannot be achieved by a normal dc motor. A normal Types of DC Motor is designed to achieve good full load performance with minimum cost. It fails to provide good dynamic response and steady state accuracy when employed in a closed-loop drive. The servo motor on the other hand is designed to achieve good dynamic performance and steady state accuracy. It is designed to achieve the same performance in both directions of rotation, high torque to inertia ratio, low friction and smooth ripple free torque. In a Types of DC Motor, the armature inertia is proportional to length and diameter squared. In some servo motors, inertia is reduced by reducing diameter and increasing length for the same rating. In low power servo drives, where current control is not incorporated, the current during transient operation can be even higher than ten times the rated current. Commutator is designed to obtain spark-free commutation even at such large currents, which will not be possible in a common dc motor. Because of these exacting requirements servo motors are much more expensive than common dc motors. Their ratings can be from few watts (in instrument servos) to megawatts (steel rolling mills). Small servo motors are usually permanent magnet type.Moving Coil Motors:Some applications require acceleration much higher than what can be achieved in a conventional dc servo motor. Armatures of moving coil dc motors have special constructions which allow a substantial reduction in armature inertia and inductance, permitting very high accelerations. Two types of moving coil motors are shell and disc type.Shell Type:In order to maximize acceleration, armature inertia must be minimized. In a conventional dc motor, the armature consists of a winding housed in slots provided on a cylinder of magnetic material, which is provided mainly to give low reluctance path for the stator field, and rotates with armature winding. Consequently, armature has high inertia. In a shell type moving coil motor (Fig. 5.4(a)), the rotor consists of only armature winding. Hence it has very low inertia. Low reluctance path for the stator field is provided by a stationary magnetic material cylinder. Armature winding consists of conductors assembled to form a thin walled cylinder. The commutator may have a cylindrical construction as in conventional dc motors or disc type construction.Tiny motors (with diameters around 1 cm), known as micromotors, have armature winding consisting of simply varnished wires arranged in cylindrical form and a disc type commutator. Such motors are widely used in cameras, card readers, video systems etc. In bigger size motors, the armature winding is made by bonding conductors together using polymer resins and fiberglass to provide adequate mechanical strength.Disc or Pancake Type:The construction details are shown in Fig. 5.4(b). Armature is made in disc or pancake form, and armature conductors resemble spokes on a wheel. Armature winding is formed by stamping conductors from a sheet of copper, welding them together and placing them on a light weight disc. Conductor segments are then joined with a commutator at the centre of the disc. Note that the direction of flux is axial and armature current is radial. This is just opposite to shell type (or conventional) motors where the current is axial and flux is radial. The principle of operation is same as that of a conventional dc motor.Disc type moving coil motors are more robust and available in sized upto few kilowatts. They find applications where axial space is at a premium such as machine tools, disc drives etc.Moving coil motors can be provided with large number of conductors (few hundred). Therefore, torque remains almost constant as the rotor turns. This allows them to produce very smooth rotation at low speeds. The absence of iron in armature of disc type motor eliminates the associated core losses, making it more efficient than conventional dc motors. As already stated, low inertia and low armature inductance gives moving coil motors an excellent dynamic response.Torque Motors:DC motors designed to run for long periods in a stalled or a low speed condition are known as torque motors. A normal Types of DC Motor is designed to optimize full speed performance. In small ratings, the stalled or low speed current in normal dc motors can be 5-10 times the rated current. If these motors are allowed to run at low speed (or standstill), armature winding will get burnt by overheating and the commutator will get damaged due to heavy sparking. In case of torque motors, because of special design, the stalled and low speed current remains below safe value. Some torque motors are designed to operate at low speeds intermittently.Applications of torque motors can be divided into three categories: Where the motor is required to operate in stalled condition. Here, purpose of the motor is to develop required tension or pressure on a material, similar to spring. Machine tools, spooling come under this category.In second category torque motor is required to move through only a few revolutions or degrees of revolution. Opening of valves, switches and clamping devices are some examples. This category of application involves continuous movement of the motor at low speed, e.g. reel drive. Coding Ground For Developers Code, Edit, Run and Share Ignite your coding potential on Coding Ground - an immersive online platform for hands-on learning, collaboration, and skill development. Java Compiler Python Compiler C++ Compiler HTML Editor We know that there are two types of motors, namely AC and DC. The AC motor uses AC current to transform electrical energy into mechanical energy. There are many types of AC motor. The DC motor uses DC current to transform electrical energy into mechanical energy. The main advantage of using this is that we can control the speed, and it occupies less space.There are 4 major types of DC motor. They are:Series DC MotorShunt/Parallel DC MotorCompound DC MotorsPermanent Magnet DC MotorIn the case of a permanent magnet DC motor, permanent magnets are used to create field flux. The other three types are classified based on the electrical connections between the stator and the rotor. Each of them has a unique torque/speed. You may also want to check out these topics given below! Based on the type of construction and electrical connection, DC motors can be categorised into four major types. A brief chart (based on the type of construction and electrical connection) is given below:Types of DC motor when listed sequentially:Permanent Magnet DC MotorShunt MotorSeries MotorCompound Motor is again classified intoShort Shunt MotorLong Shunt MotorDifferentially CompoundCumulative Compound In these types of DC motor, the permanent magnet is used to create a magnetic field. In this, no input current is consumed for excitation. These are used in automobile starters, wipers, air conditioners, etc.Here, the field is connected with the armature windings in parallel or also known as a shunt. The shunt field can be separately excited from the armature windings and that is the reason it can be used for greater speed regulation and can also offer very simplified reverse control. Here, a large wire carrying the full armature current winds the field with few turns. This kind of motor generates a large amount of starting torque but the speed cannot be regulated here. If they are run with no load then it might face damage. These are not the ideal option for variable speed applications. These have a shunt field which is separately excited. They have a good starting torque but might face problems in variable speed applications. Here, the shunt field winding is only connected with the armature winding and that too in parallel. The field coil, which is in series, is entirely exposed to current before being split up into the armature. Here, the shunt field winding is connected in parallel with the both series field coil and armature which are again connected with each other in series. In this type of compound wound DC motor, the flux produced due to the shunt field windings reduces the effect of the main series windings. Here, the flux produced by the shunt field windings enhances the effect of the main field flux which is produced by series winding.A permanent magnet DC motor uses permanent magnets to create field flux.A large wire carrying the full armature current winds the field with few turns. This kind of motor generates a large amount of starting torque but the speed cannot be regulated here. These have a shunt field which is separately excited. They have a good starting torque but might face problems in variable speed applications.The types of compound excited DC motors are short shunt motor, long shunt motor, differential compound, cumulative compound.The types of self-excited DC motors are shunt excited, compound excited and series excited DC motors.When the speed of a DC motor increases, back emf increases but there will be a fall in the line currents. This is because speed is proportional to the back emf. If there is a series motor, the armature current will be equal to the load current.The direction of rotation of the motor is determined by Flemings left-hand rule. The law states that when the current-carrying conductor is placed in the magnetic field, there is a force acting on the conductor, and on the other side of the conductor is forcefully kept under a magnetic field, there will be an induced current in the conductor. Put your understanding of this concept to test by answering a few MCQs. 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What are the 4 types of dc motor. How many types of dc motor. Explain types of dc motor. What are different types of dc motors.

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