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PPTXSynchronous machinesMohammed Waris SenanPPTXThree Phase Induction Motor & Its ApplicationImran Hossain ChowdhuryPPTXDc motors and its typesSumeet PatelPPTX04 universal motorRamesh MetiPPTXspeed control of three phase induction motorAshvani ShuklaPPTXFacts devicesVinod SrivastavaPDFTorque - Slip Characteristic of a three phase induction motorAli AltahirPPTXBuck-Boost ConverterSagar PatilPPTXTraction motorRajneesh BudaniaPPTX1 phase induction motorAbhishekLalkiyaPPTXPSOC.pptxSrihari DattaPPTXSeries & shunt compensation and FACTs Deviceskhemraj298PPTXEconomic load dispatchDeepak JohnPPTsingle-phase-induction-motor.pptsivaramanpsrPPTDc motor startersDr SOUNDIRARAJ NPPSXdc Generator Pptkiit universityPPTXElectric drivemishradiyaPDFSynchronous generatorstes4PPTXBldc motors pptClint RobbyPPTXSingle Phase Induction Motor Speed ControlEdgefxkits & SolutionsPDFDC motors characteristics, Torque & Speed Equations, Torque -Armature current...Waqas AfzalPPTXSynchronous motor drivedharmesh nakumPDFMotor Protectionmichaeljmack PPTXPpt on diff. load curveCraZzy ShubhPPTXImpulse testing of transformerPreet_patelPPTELECTRICAL AND ELECTRONICS MEASUREMENT Dinesh SharmaDOCXSYNCHRONOUS MOTOR PROJECT REPORT karmbir sainiPDFEM-2 LAB MANUAL induction motors and alternatorsDr. Roger Rozario A P 67%(3)67% found this document useful (3 votes)12K views3 pagesThe document describes procedures for conducting load tests on a single phase induction motor and a single phase step down transformer. The motor load test involves gradually increasing the …AI-enhanced title and descriptionSaveSave Load Test on Single Phase Induction Motor For Later67%67% found this document useful, undefined67%(3)67% found this document useful (3 votes)12K views3 pagesThe document describes procedures for conducting load tests on a single phase induction motor and a single phase step down transformer. The motor load test involves gradually increasing the load on the motor and recording measurements like current, voltage, speed. Key measurements for the transformer load test are efficiency, regulation, primary and secondary currents and voltages under no load and full load conditions. Open and short circuit tests are also described to determine the transformer's core losses, power factor and eddy current losses.67%(3)67% found this document useful (3 votes)12K views3 pagesThe document describes procedures for conducting load tests on a single phase induction motor and a single phase step down transformer. The motor load test involves gradually increasing the …AI-enhanced title and description Experiment No. : 01 Title of the Experiment: – Load test on Single phase Induction Motor. Objectives: – To be written by student. Apparatus Required: – Sl. No.NameSpecificationsQuantity1Single Phase Induction Motor with spring balance Load.230V, 2.5A, 1440rpm, 50Hz1 No.2Single Phase Auto-Transformer (VARIAC)5KVA, (0-270)V, 10A1 No.3Voltmeter(0-250)V, MI1 No.4Ammeter(0-5)A, MI1 No.5Wattmeter(0-750/1500)W, 5/10A, 150V/300V/600V1 No.6TachometerDigital type1 No.7Connecting WiresPVC Insulated CopperAs per required Circuit Diagram: – : Circuit Diagram for Load Test on single phase IM. Theory: – A single-phase induction motor is an AC motor that operates on a single-phase power supply and is commonly used in household and industrial applications for low-power requirements. A single-phase induction motor consists of two main parts: Stator (Stationary Part) and Rotor (Rotating Part). When a single-phase AC supply is applied to the stator winding, it produces an alternating magnetic field. Unlike a three-phase induction motor, a single-phase induction motor does not generate a rotating magnetic field on its own. Instead, it produces an oscillating field, which cannot start the rotor. To start the motor, an auxiliary winding or starting mechanism is used to create a phase difference. Types of Single-Phase Induction Motors are Split-Phase Induction Motor. Capacitor-Start Induction Motor. Capacitor-Start, Capacitor-Run Induction Motor. Shaded-Pole Induction Motor. The load test on a single-phase induction motor is conducted to determine its performance characteristics such as efficiency, power factor, torque, slip, and output power under different loading conditions. Precautions: – The auto transformer is kept at minimum voltage position. The motor is started at no load condition. Procedure: – Connect all apparatus as per the circuit diagram. By adjusting the Single phase auto transformer (VARIAC) the rated voltage is applied and the corresponding no load values of speed, spring balance and meter readings are noted down. The procedure is repeated till rated current of the machine. The motor is unloaded, the auto transformer is brought to the minimum voltageposition. The radius of the brake drum is measured. Observation Table: – Sl. No.V (in Volts.)I (in Amps.)Pi (in Watts)S1 (in Kg)S1 (in Kg)W=(S1-S2)(in Kg)SpeedN(in rpm)Cos Φ=(Pi/V*I)Torque (T) in N-mP0 (in Watts)% efficiencyη= (P0/Pi)*1001234567 Calculation: – \[\color\red{1. }\color\green{\;Input \;power\; (P_i)\;=\;}\color\red{Wattmeter\;reading}\;\color\magenta{\;\;in\;Watt.}\] \[\color\red{2.}\color\green{\;Torque \;(T)\;=\;}\color\red{9.81*r*W}\color\magenta{\;\;in\;N-m}\] \[\color\green{Where,}\color\red{\;r}\color\green{\;is\;radius\;of \;pully\; (brake\; drum)}\color\magenta{\;\;in\;meter}\] \[\color\red{3.\;}\color\green{Output \;power\; (P_0)\;=\;}\color\red{\dfrac{2*\pi*N*T}{60}}\color\magenta{in \;Watt.}\] \[\color\green{Where,}\color\red{\;N}\color\green{\;is\;Speed\;of \;the\;motor}\color\magenta{\;\;in\;rpm}\] \[\color\red{4.\;}\color\green{Power\; factor,\; Cos\;Φ\;=}\color\red{\dfrac{P_i}{V*I}}\] \[\color\red{5.\;}\color\green{\%\; Efficiency\; (η)\; =}\;\color\red{\dfrac{P_0}{P_i}*100}\] \[\color\red{6.\;}\color\green{\%\; Slip\; (S)\; =\;}\color\red{\dfrac{N_s-N}{N_s}*100}\] \[\color\green{Where,}\color\red{N_S}\; =\; \color\green{synchronous\; speed\; =}\color\red{\dfrac{120*f}{P}}\] \[\color\green{Where,}\;\color\red{P\; =\;}\color\green{ no. \;of \;poles}\] \[\color\red{f\;=\;}\color\green{frequency \;of \;supply \;(Hz)}\] Plot graph: Efficiency vs Load Power factor vs Load Speed vs Load Slip vs Load Torque vs Load Conclusion: – To be written by student. For Viva Question: What is the purpose of this experiment ? Answer: A Load Test on a Single-Phase Induction Motor (IM) is conducted to evaluate its performance, efficiency, and torque characteristics under actual working conditions. The primary objectives of this test are: Determine Efficiency, Measure Power Consumption, Torque vs Speed Characteristics Determine Slip of the Motor Analyze Power Factor Performance Determine Temperature Rise Identify Mechanical Losses Check Motor Performance under Different Loads 2. Whether single phase induction motor self starting motor ? Answer: No, a single-phase induction motor is not a self-starting motor. Single-Phase Supply Produces an Alternating Magnetic Field When a single-phase AC supply is given to the stator winding, it creates a pulsating (alternating) magnetic field, not a rotating magnetic field (like in a three-phase motor). This pulsating field induces equal forward and backward torques in the rotor, making the net torque zero at standstill. As a result, the rotor does not start rotating on its own. Lack of Rotating Magnetic Field Unlike a three-phase induction motor, which inherently produces a rotating magnetic field, a single-phase induction motor lacks this mechanism. The motor requires an auxiliary starting method to initiate rotation. To overcome this problem, auxiliary starting methods are used to create a phase shift, generating an initial rotating magnetic field. The commonly used methods are: Split-Phase Induction Motor Uses an auxiliary winding (starting winding) placed at 90° to the main winding. A centrifugal switch disconnects the auxiliary winding once the motor reaches about 75-80% of its rated speed. Capacitor-Start Induction Motor Uses a capacitor in series with the starting winding to provide better phase shift and higher starting torque. Capacitor-Start Capacitor-Run Induction Motor Uses two capacitors: Start capacitor for high starting torque. Run capacitor for smooth operation after starting. Shaded-Pole Induction Motor Uses shaded poles (copper rings) on a portion of the stator poles to create a weak rotating magnetic field. Suitable for low-power applications like fans and clocks. 3. What are the starting methods of single phase induction motor ? Answer: Since a single-phase induction motor is not self-starting, various methods are used to initiate its rotation. These methods create a phase shift between stator windings to produce a rotating magnetic field, allowing the motor to start. 6. What are the inherent characteristics of plain 1-phase Induction motor ? Answer: A plain single-phase induction motor (without any starting mechanism) exhibits the following inherent characteristics: Not Self-Starting, Double Revolving Field Theory, Low Starting Torque, Slip (S) and Speed Characteristics, Poor Power Factor, Efficiency is Lower Compared to Three-Phase Motors, Noisy Operation and Vibrations, Torque-Speed Characteristics, Overheating Issues, Application Suitability. 7. Why single phase induction motor has low power factor ? Answer: A single-phase induction motor typically operates at a low power factor (0.6 to 0.8 lagging) due to the following reasons: High Inductive Reactance in the Stator Winding, No Rotating Magnetic Field in Standalone Operation, High Magnetizing Current Requirement, Presence of Auxiliary Windings in Some Designs, Higher Copper Losses and Core Losses. 8. State double field revolving theory. Answer: The Double Field Revolving Theory explains the principle of operation of a single-phase induction motor. It states that an alternating (single-phase) magnetic field can be resolved into two rotating magnetic fields of equal magnitude but opposite directions. Since an induction motor requires a rotating field to generate torque, this theory helps understand why a single-phase induction motor is not self-starting and how it can be made to rotate. 9. How the direction of a capacitor start Induction motor is reversed ? Answer: A capacitor-start induction motor has a main winding and an auxiliary (starting) winding with a capacitor to create a phase shift and generate starting torque. The direction of rotation depends on the relative phase difference between these two windings. 10. Why is the starting torque of a capacitor start induction motor high, when compared to that of a split phase induction motor ? Answer: A capacitor-start induction motor produces a higher starting torque than a split-phase induction motor due to the following reasons: Greater Phase Angle Between Main and Auxiliary Winding Currents, Higher Starting Current in Auxiliary Winding, Improved Power Factor at Start, Larger Auxiliary Winding Size in Capacitor-Start Motors, Higher Torque Multiplication.