**Q1)** For 1-Ph commentator d.c repulsion motor , Explain:

1. The different connections for the stator and rotor winding.
2. If the rotor possess a single combined winding (**G**) with angle (**ϴ**)displaced from d-axis , illustrate the following conditions : 1- **ϴ** = 0o  , 2- **ϴ** = 90o.

**Q2)**  A 30 watt , 4 phase stator winding brushless D.C motor:

1. Draw a schematic diagram for this motor and the output voltages wave-form.
2. Name all components of basic construction .
3. Explain the method of operation.

**Q3)** Show the deference in Torque slip characteristic of series D.C universal Motor

 When the source supply is: 1) A.C electrical power. 2) D.C electrical power.

**Q4)** Illustrate operation method, and Rotor position as a function of D.C. Voltage,

 For a Two- phase, Two- pole permanent- magnet Stepper motor.

**Q5)** *According to* construction classify the various types of Hysteresis Motor

**Q6**) Explain what happen to (mutual Inductance, M.M.Fs of Stator and Rotor, E.M.F., current, and Torque), under3 conditions of the below schematic Diagram for the brush axis position

with respect to d-axis.



**Q7)** Sketch to illustrate the torque-speed curve of hysteresis motor.

 **Q8)** For a 2-phase small control (Cervo) motor:

  **1-** Draw the circuit diagram.

 **2-** Describe the method of running

  **3-** Explain the speed-torque characteristic.

**Q9)** Illustrate the construction of permanent magnet electrical machines, what is the main advantage of these machines.

**Q10)** Explain the typical torque speed characteristic for 2-phase control motor, with reference voltage constant , and (0.5 ,0.75, 1.0) p.u. respectively for control voltage (Va).

**Q11)** For a 2-pole single phase synchronous induction motor , Explain :

1. The basic construction , and the method of operation.
2. The modification which can be made to moving rotor , and the Torque-Slip curve .

**Q12)** Explain the speed control method for a series field d.c universal motor.

**Q13)** Construct a repulsion motor from a d.c commutator motor , draw the machine's diagram to explain the method of operation for this motor with changing the angle between winding .

**Q14)** Explain the application of synchro transformers , which are used in feed-back control systems , for maintaining synchronism between two or more shafts.

 **Q15)** With the aid of diagrams, illustrate the salient and non-salient construction of permanent magnet

machines, what is the main risk of these machine types .

**Q16)** Two stepper motors, one with **3-ph**, and the second possess **4-ph**. Construct a table showing the step size and rotor position per each pulse versus phase voltages.

**Q17)** For a single phase synchronous reluctance motor. Explain the method of operation and the torque-

 speed characteristic. Describe all the modification which can be made to this motor to be self-starting

 and also run at synchronous speed.

**Q18)** By changing the input supply voltage, explain how can you control the speed of the universal Motor.

**Q19)** Illustrate the construction of three phase Brushless DC Motor, what is the main advantage of these machines.

**Q20)** Explain the typical torque speed characteristic for 2-phase servo Motor, with reference voltage equal to (1 per unit), and (0.5, 0.75, 1.0) p.u. respectively for control voltage (Va).

 **Q21)** For a 2-pole single phase Reluctance synchronous induction Motor, Explain **:**

 The basic construction, and the method of operation.

**Q22)** Explain the modification which can be made to moving rotor of single phase Reluctance synchronous induction Motor, and illustrate its Torque-Slip curve.

**Q23)** Describe the rotor modification and the method of operation for a single phase synchronous Induction motor.

**Q24)** With the aid of diagrams for a 2-phase servo motor and A.C Tachometers , explain

 The main difference between the two machines.

**Q25)** Illustrate how can you construct a Synchro – drive system from a three phase conventional Wound – Rotor induction motor, all the stators are connected in parallel.

**Q26)** Draw to explain the compensating winding effect on the Torque – Speed curve in a large type of Universal Motor.

**Q27)** With the aid of diagram show the complete arrangements of Drag - Cup Servo Motor which used in control system design for a light load response.

 **Q28)** Illustrate how can you construct a Synchro – drive system from a three phase conventional Wound – Rotor induction motor, all the stators are connected in parallel.

**Q29)** Draw to explain the compensating winding effect on the Torque – Speed curve in a large type of Universal Motor.

**Q30)**  With the aid of diagram show the complete arrangements of Drag - Cup Servo Motor which used in control system design for a light load response.

**Q31)**  For a small A.C Tachometers, draw the machine schematic diagram to describe the method of operation.

**Q32)**   Derive an alternating current Repulsion Motor from a commutator DC Motor

**Q33)**  Explain the equivalent circuit of Saturable – Reactor.

**Q34)** For a series D.C universal motor, Explain : How can you control it’s speed , and in which way the input voltage polarity can by reversed.

 **Q35)** Explain the construction and design of permanent magnet machines.

**Q36)** Explain the effect of the reactance variation on saturable reactor.

 **Q37)** With the aid of diagram , show the operation method of A.C tacho-generator.

 **Q38)** Explain the application of synchro transformers , which are used in feed-back control systems , for maintaining synchronism between two or more shafts.

 **Q39)** Explain the modification to a **3** wound-rotor induction motors, with star connection **(Y)** for **3-ph** stators , illustrate the function of the differential shaft.

**Q40)** A 4-phase stepper motor must be controlling the shaft position of **15o** , find :

1) Number of poles.

2) How many pulses / second must be supplied to the control unit of the motor to achieve rotational speed of 1200 **r.p.m.**

**Q41)** Explain the speed control method for a series field d.c universal motor.

**Q42)** Construct a repulsion motor from a d.c commutator motor , draw the machine's diagram to explain the method of operation for this motor with changing the angle between winding .

 **Q43)** Draw equivalent circuit and the simple construction design of D.C series Universal Motor.

**Q44)** Name the types of Stepper Motor, also show the drawing section of one type only.

**Q45)** Explain the electrical connection of three phase two pole Permanent Magnet Brushless D.C Motor

**Q46)** Sketch to Illustrate the Torque Slip characteristic of2- pole Single phase Hysteresis Motor.

**Q47)** Draw to Explain the Torque speed curves of widely used motors for compare them with universal motor.

 **Q48)** Explain the two schemes for Speed control of Universal Motors typically employs:

 1. Phase angle Control (varying the firing angle).

 2. PWM Chopper control

 **Q49)** Illustrate the two types which classified Universal motors according to the winding.

 **Q50)** What is the main advantage of Compensated Type of Universal Motor

 **Q51)** Sketch to Illustrate the Torque speed curves of Non – Compensated and Compensated type of Universal Motor.

 **Q52)** Explain themain disadvantage of universal motor

 **Q53)** Illustrate andSketch therotor design of (synchronous induction) self starting motor.

**Q54)** Derive the torque equation of Reluctance Motor which can be expressed in terms of **ω** and **ωm** as,

 **Q55)** Name the two main designs of Reluctance Motor and explain one design only.

 **Q56)** Explain theTorque vs. Speed Curve of stepper motor.

 **Q57)** What isThe main limitation of stepper motor**.**

 **Q58)**  Name the three main types of stepper motors.

 **Q59)** With the aid of diagram For Brushless D.C motor Illustrate The principal of operation.

**Q60)** Illustrate andSketch the electrical connection of 3-phase permanent magnet Brushless dc motor.

**Q61)**  With the aid of A schematic diagram of a 2- phase control motor explain method of operation.

 **Q62)** Sketch the construction diagram of the Drag Cup Servo Motor to show the Rotor - cup

  **Q63)** Explain the **motor operation of** Drag Cup Servo Motor .

 **Q64)**  How can you control The Torque Slip Characteristic of a 2- phase Control motor (Servo Motor

 **Q65)**  Draw the cross – section of Hysteresis motor explain a 4- main components of its construction .

 **Q66)** Explain the Method of operationfor the **hysteresis motor .**

 **Q67)** Draw to Illustrate and Explain the **Torque speed characteristic of**  **hysteresis motor .**

 **Q68)** Derive The Hystersis Torque Equation for Hystersis Motor.

 **Q69)** what is the main advantage of the Hystersis Motor.

 **Q70)** According to construction there are various types of hysteresis motor, name all these types.

 **Q71)** for a 2 – phase A.C TACHOMERTER draw the schematic diagram of the machine.

 **Q72)** Draw the construction diagram of the  rotor drag-cup A.C TACHOMERTER .

 **Q73)** Explainthe Method of operation for A.C TACHOMERTER.

 **Q74)**  Show the main parts of DC tachometer generator.

 **Q75)**  Write to explain the emf induces voltage in the dc tachometer generator.

 **Q76)**  Explaintheelectrical connection of a synchro drive system.

 **Q77)**  Illustrate the Construction of Repulsion Motor.

**Q78)**  Draw the cross – section of the magnetic – circuit design for permanent magnet motor (PM) .

 **Q79)**  Draw and explain the Equivalent CCT of saturable reactor.

 **Q80)**  Illustrate the schematic representation of Simple Magnetic Amplifiers .