Important Instruction to examiners:

1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
3) The language errors such as grammatical, spelling errors should not be given more importance.(Not applicable for subject English and Communication Skills)
4) While assessing figures, examiner may give credit for principle components indicated in a figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
6) In case some questions credit may be given by judgment on part of examiner of relevant answer based on candidate understands.
7) For programming language papers, credit may be given to any other program based on equivalent concept.

Q.1 Attempt any Ten of the following **20 Marks**

a) Define electrical supply system and state is types. **(Definition: 1 Mark & Types: 1 Mark)**

Electrical Supply System:

It is a system in which electrical energy is generated, transmitted and distributed for various applications

Types of electrical Supply:

1. AC Supply: a) 1-ph AC Supply b) Three phase AC supply

2. DC Supply

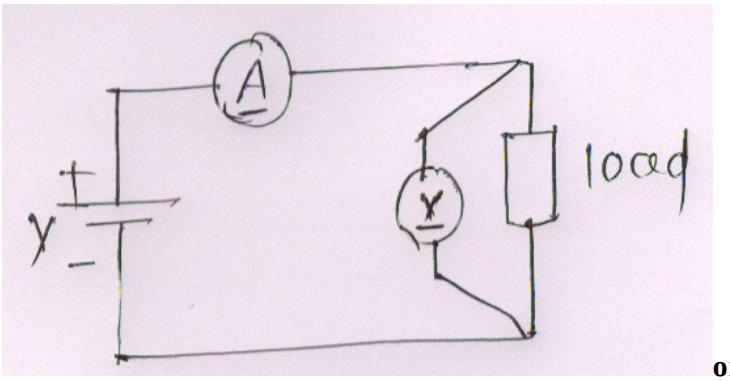
b) State the principle of PMMC type instrument. **(2 Mark)**

Principle of PMMC type instruments:

When a current carrying conductor is placed in a magnetic field it experiences a force which is given by F = B. I. L newtons

The deflection of the coil is directly proportional to the current flowing through it

c) How should an ammeter and voltmeter be connected in an electric circuit to measure current and voltage? **(2 Mark)**



or equivalent diagram

OR

- In an electric circuit ammeter is always connected in series with load while voltmeter is connected in parallel with the load (across the load)

d) State any two applications of D.C series motor.

Following are the application of Dc series motor: **(Any Two expected: 1 Mark each)**

1. Crane
2. Hoist
3. Elevator
4. Lift
5. Traction application

e) State the types of transformer based on construction. **(2 Mark)**

Following are the types of transformer based on construction

1. Core type transformer
2. Shell type transformer
3. Berry type transformer

Output power of transformer is given by P= VICosØ, for different types of load i.e (resistive, capacitive, inductive) cosØ changes so, for same voltage and current output power will different, so transformer is designed to operate at particular voltage and current levels and it not designed to deliver particular output power that is why rating of transformer is in KVA.

OR

As copper loss of a transformer depends on current and iron loss on voltage, Hence total transformer loss depends on volt-ampere and not on phase angle between voltage and current ie. It is independent of load power factor. That is why rating of transformer is in KVA.

g) State factors that determine the direction of rotation of three phase induction motor.

Answer: **(Each factor: 1 Mark)**

Following factors that determine the direction of rotation of three phase induction motor

1. Phase sequence of supply
2. Direction of rotating magnetic field

h) State the necessity of earthing.

Necessity Earthing: **(Any two points: 1 Mark each)**

- Earthing provides protection to the electrical machinery due to leakage current.
- Earthing provides protection to Tall Building & structure against lightening stroke
- Earthing is protects human from shocks.

i) State any four types of tariff.

- **Types of Tariff:-** **(Any four types are expected- 1/2 Mark each type)**

i) Flat-demands Tariff

ii) Simple-demand Tariff or Uniform Tariff

iii) Flat-rate Tariff

iv) Step-rate Tariff

v) Block-rate Tariff

vi) Maximum demand Tariff

viii) Three-part Tariff

ix) Power factor Tariff

j) State how the slip of three phase induction motor varies with load. **(2 Mark)**

- **We know, Slip =** $\frac{N_S - N}{N_S}$ *Where NS = Syncronous speed & N = Speed of rotor*
- The slip of three phase induction motor depends upon the rotor speed.
- As the load on the motor increases the speed of the rotor decreases and hence the slip increases.

k) State any two application of universal motor.

- **Applications of Universal Motor:** **(Any two application expected -1 Mark each)**

i) Washing machine

ii) Mixers and grinders

iii) Food processors

iv) Small drilling machines

l) List the different types of enclosure for electric motors (any four)

Enclosures :- **(Any four types are expected-1/2 Mark each)**

1. Open type enclosure
2. Screen protected enclosure
3. Drip (moisture) proof enclosure
4. Flame (fire) proof enclosure
5. Totally enclosed type enclosure
6. Pipe ventilation totally enclosed type enclosure

Q.2 Attempt any Four of the following **16 Marks**

a) Define inductive reactance and capacitive reactance with respect to A.C. circuit.

i) Inductive Reactance: **(2 Mark)**

The opposition offered by inductance to the flow of current is called as inductive reactance.

$$X_L = 2\pi f L \quad \text{ohm}$$

ii) Capacitive reactance: **(2 Mark)**

The opposition offered by capacitor to the flow of current is called as capacitive reactance.

$$X_C = \frac{1}{2\pi f C} \quad ohm$$

b) Describe the concept of current and voltage and give units for them.

1) Current: **(Explanation: 1 Mark & Unit: 1 Mark)**

It is defined as the movement of free electrons or flow of electrons inside a conducting material. It is denoted by I and measured in ampere.

OR $I = Q/t$

$$Units: - coulomb / \text{sec}. or\ Amperes.$$

2) Voltage: - **(Explanation: 1 Mark & Unit: 1 Mark)**

Work done per unit charge is called voltage.

OR

The electrical potential or voltage at a point is the work done in moving unit charge form infinity to that point.

OR

$$V = W/Q$$

Unit for voltage = Volt

c) State any four advantages of three phase system single phase system.

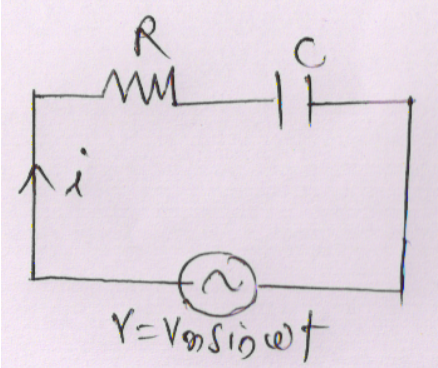
(Explanation is not necessary)

Advantages of 3-phase system over 1-phase system: - (Any Four points each point 1 Mark)

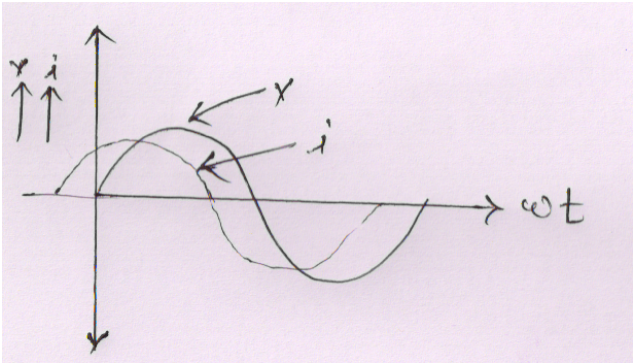
1. **More output:-** for the same size output of poly-phase machines is always higher than single phase machines.
2. **Smaller size:-**for producing same output the size of three phase machines is always smaller than that of single phase machines.
3. **More power is transmitted-** it is possible to transmit more power using a three phase system than single system.
4. **Smaller cross-sectional area of conductors-** if the same amount of power is transmitted then the cross-sectional area of the conductors used for three phase system is small as compared to that of single phase system.
5. **Better power factor**-power factor of three phase machines is better than that of single phase machines.
6. **Three phase motors are self starting**-three phase ac supply is capable of producing a rotating magnetic field when applied to stationary windings, the three phase ac motors are self starting. While single phase induction motor needs to use additional starter windings
7. **Horse power rating**- Horse power rating of three phase motors is greater than that of single phase motor.
8. Power delivered by a single phase system fluctuates whereas for three phase system power delivered to the load is the same at any instant.

d) Draw circuit diagram wave form, phasor diagram and comment on the phase relationship between voltage and current in RC series circuit.

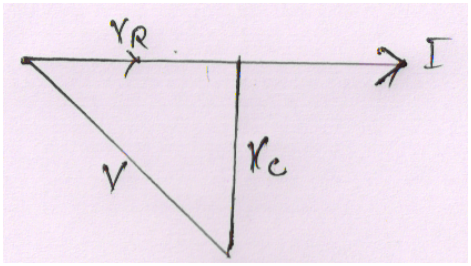
1. Circuit Diagram: - ---------- **(1 Mark)**



2. Waveform: ---------- **(1 Marks)**



3. Draw The vector Diagram: ---------- **(1 Marks)**



4) Comment: Voltage Equation: - $V = V_m \sin wt$ ---------- **(1 Marks)**

Current Equation:- $i = I_m \sin(wt + \phi)$

From equations it is clear that the current leads to the voltage by an angle 'ϕ'

e) If V_L = 400 V and I_L = 10A. Calculate the receptive phase values for a i) Delta connection ii) Star connection

Line Voltage (V_L) = 440V

i) Delta connection:

Phase Voltage (V_{ph}):

∴ Line voltage V_L= Phase Voltage V_{ph} ---------- **(1/2 Marks)**

$400 = V_{ph}$

V_{ph} = 400 Volt---------- **(1/2 Marks)**

Phase current = $I_{ph} = \frac{I_L}{\sqrt{3}}$ ---------- **(1/2 Marks)**

$$I_{ph} = \frac{10}{\sqrt{3}}$$

$I_{ph} = 5.77\ Amp$ ---------- **(1/2 Marks)**

ii) Star connection:

∴ Line voltage $V_L = \sqrt{3}$ Phase Voltage V_{ph}

$400 = \sqrt{3}\, V_{ph}$ ---------- **(1/2 Marks)**

$$V_{ph} = \frac{400}{\sqrt{3}}$$

V_{ph} = 230.94 volt ---------- **(1/2 Marks)**

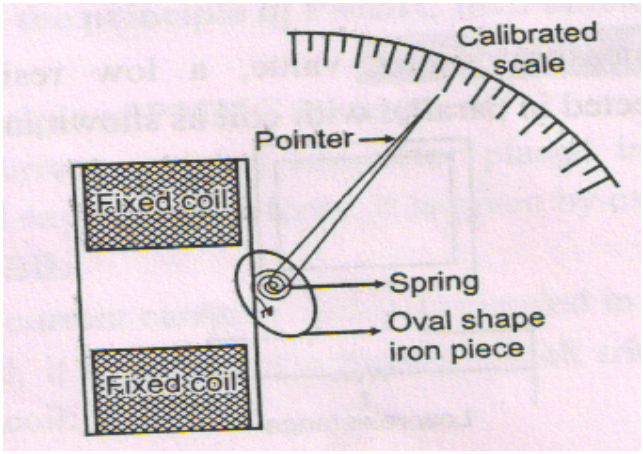
Phase Current (I_{ph})

Line current I_L= Phase Current I_{ph} ---------- **(1/2 Marks)**

Phase current I_{ph}= 10 Amp ---------- **(1/2 Marks)**

f) Draw a neat labeled diagram of attraction type moving iron instrument and state its principle of operation. **(Diagram: 2 Marks & Operation: 2 Marks)**

Neat labeled diagram of attraction type moving iron instrument:



or equivalent diagram

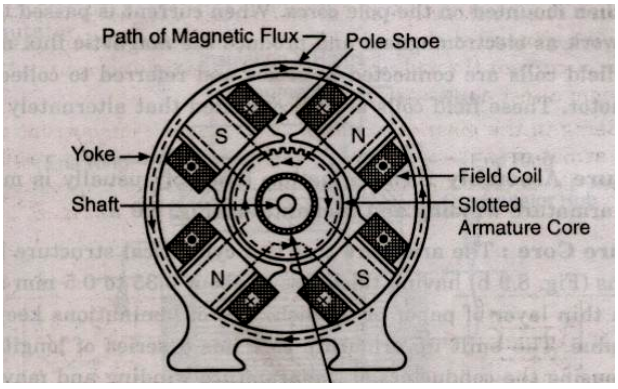
Principle of operation:

- When current passes through the fixed coil, the coil gets magnetized so it attracts the iron piece towards itself which makes the pointer to mover over calibrated scale.
- The force of attraction between coil and iron piece deflects the pointer, the deflection of pointer will proportional to the coil.

Q.3 Attempt any Four of the following **16 Marks**

a) List the main parts of DC motor write the function of any four parts.

(Figure is not necessary) **(Function of any four parts -1 Mark each part)**



- **Function : (Any four part expected)**

1) Yoke: The main frame of machine is called the yoke. The yoke serves the following two purposes.

i) It supports the other components such as poles and provides mechanical protection for whole machine.

ii) It forms a part of the magnetic circuit & provides the path of low reluctance for the magnetic flux.

2) Pole Cores & Pole shoe:

The pole core and pole shoe from an important part of the field system. The pole shoe serves two purposes

i) They spread out flux in the air gap & their large cross section reduces the reluctance of the magnetic path

ii) They support the exciting coils or field coils.

3) Armature core:

The armature core, which is cylindrical or drum and built up of circular sheet discs or laminations is keyed to the shaft. It serves two purposes

i) Houses the armature conductors or coils and causes them to rotate, hence cut the magnetic flux

ii) Provides a low reluctance path to the flux through armature

4) Armature winding:

The armature winding consists of a large number of coils suitably connected together

5) Commutator:

The function of the commutator is to reverse the current in each conductor of the armature as it passes from one pole to another and thus to help the motor to develop a continuous and unidirectional torque

7) Brush:

Brushes are used to conduct the current to the commutator from the external circuit.

8) Cooling Fan:

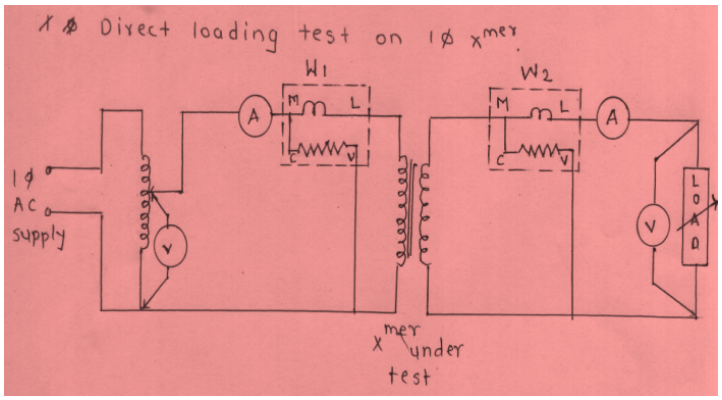
In some machine, A fan is fitted to the shaft on the side opposite to that of the commutator for cooling purposes.

9) End covers:

These are attached to the ends of the main frame and contain bearings for the armature. The end cover on the commutator side also supports the brush assemblies

b) Draw a labeled circuit diagram to determine percentage efficiency and regulation of a 1-ph transformer by direct loading test and write the rating of meter for 220/110V, 1 KVA transformer.

Figure:- :- **(Figure-2 Mark & rating of meter-2 Mark)**



or equivalent fig.

Ratings of Meter:

1. Primary voltmeter: 0 to 300 V AC
2. Secondary voltmeter: 0 to 150/300 volt AC
3. Primary Ammeter: 0 to 5/10 Amps
4. Secondary Ammeter: 0 to 10 Amps
5. Primary side wattmeter: 1500 watt, 5A
6. Secondary side wattmeter: 1500 watt, 10A

c) Compare auto transformer with two winding transformer on the basis of construction, efficiency, size and application. **(Each point 1 Mark)**

Sr no.	Points	Autotransformer	Two winding transformer
1	**Construction**	It has one winding	It has two windings
2	**Efficiency**	Efficiency is high	Efficiency is low
3	**Size**	Size is small	Size is large
4	**Application**	Variac, starting of ac motors, dimmerstat.	Mains transformer, power supply, welding, isolation transformer

d) A voltage equation is expressed as V= 70.7 sin 314 t. Determine: i) Maximum value of voltage ii) RMS value of voltage iii) Frequency & Time period of waveform

V = 70.7 sin 314t ----------i

Step-I:- To find max. Value of voltage & current; comparing equation I & ii with following equation iii & iv respectively

$\therefore v = V_m \sin wt$ .....*ii* ---------- **(1/2 Marks)**

We get $V_m = 70.7$ *volt* ---------- **(1/2 Marks)**

Step-II:- To find RMS value of voltage:

$\therefore V_{rms} = 0.707 \times V_m$ ---------- **(1/2 Marks)**

$\therefore V_{rms} = 0.707 \times 70.7$

$\therefore V_{rms} = 50$ *volt* ---------- **(1/2 Marks)**

Step-III:- To find frequency:

$\therefore f = \frac{\omega}{2 \times \pi} = \frac{314}{2 \times \pi}$ ---------- **(1/2 Marks)**

$\therefore f = 50$ *Hz* ---------- **(1/2 Marks)**

Step-IV:- To find Time period:

$\therefore T = \frac{1}{f} = \frac{1}{50}$ ---------- **(1/2 Marks)**

$\therefore T = 0.02$ sec ---------- **(1/2 Marks)**

e) A coil consists of 20 ohm resistance and 0.2H inductance is connected across 230V 50 Hz supply. Calculate i) Impedance of coil ii) Power factor iii) Current iv) Active power

Given Data;

R = 20 ohm and inductance L = 0.2 H V= 230V, f= 50Hz

1) Reactance of the coil :- $X_L = 2\pi f L$

$X_L = 2\pi \times 50 \times 0.2$

$X_L = 62.84\ \Omega$ ---------- **(1/2 Marks)**

2) Impedance of the coil :- $Z = \sqrt{R^2 + X_L^2}$

$Z = \sqrt{20^2 + 62.84^2}$

$Z = 65.94\ \Omega$ ---------- **(1/2 Marks)**

3) Power Factor:- $Cos\ \phi = \frac{R}{Z}$ ---------- **(1/2 Marks)**

$Cos\ \phi = \frac{20}{65.94}$

$Cos\ \phi = 0.30\ (lagging)$ ---------- **(1/2 Marks)**

4) Current Taken: - $I = \frac{V}{Z}$ ---------- **(1/2 Marks)**

$I = \frac{230}{65.94}$

$I = 3.49$ Amp---------- **(1/2 Marks)**

5) Active Power: - $P = V\ I\ Cos\phi$ ---------- **(1/2 Marks)**

$P = 230 \times 3.49 \times 0.30$

$P = 240.67$ watt---------- **(1/2 Marks)**

f) A 20 KVA, 3000/300V, 50 Hz, 1-ph transformer has 800 turns on the primary. Determine
i) No. of turns on secondary ii) Maximum flux in the core

Given Data:–

f=50 *Hz*, 20 *KVA* , $N_1 = 800$, $N_2 = ?$, $V_1 = 3000\,V$ $V2 = 300\,V$ $\phi_{max} = ?$

i) Number of turns on secondary $N_2 = N_1 \times \frac{V_2}{V_1}$ ---------- **(1Mark)**

$$N_2 = 800 \times \frac{300}{3000}$$

$N_2 = 80\ turns$ ---------- **(1Mark)**

ii) Maximum flux in the core:

E.m.f. equation for primary side is given by : –

$E_1 = 4.44 \times f \times \phi_{max} \times N_1$ ---------- **(1Mark)**

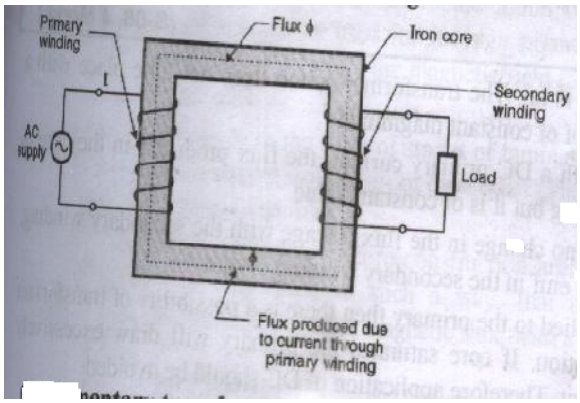
$3000 = 4.44 \times 50 \times \phi_{max} \times 800$

$\phi_{max} = 0.016\ wb$ ---------- **(1Mark)**

Q.4 Attempt any Four of the following **16 Marks**

a) Describe with neat sketch the working principle of a transformer. ---------- **(2 Marks)**

Neat sketch of Transformer:



or equivalent diagram

Working Principle: - ---------- (2 Marks)

- The primary winding is connected to single phase AC supply. an ac current starts flowing through it.
- The AC primary current produces an alternating flux in the core.
- This Changes flux gets linked with the secondary winding through the core
- The varying flux will induce voltage into the secondary winding according to the faraday's laws of electromagnetic induction. **OR**

A Transformer works on the principle of Faradays law of electromagnetic induction. When their primary winding is connected to a.c supply, applied alternating voltage circulates an alternating current through it.

This current flowing through the primary winding produces an alternating magenetic flux ( ).This flux links with secondary winding through the magenetic core & induces an emf in it according to the faraday's laws of electromagnetic induction.

b) Suggest suitable 1-ph motors for the following application i) Washing machine ii) Water pump iii) Electric Clock iv) Grinder (Each application: 1 Mark)

Answer:

i) Washing machine: a) Universal Motor b) Shaded pole motor

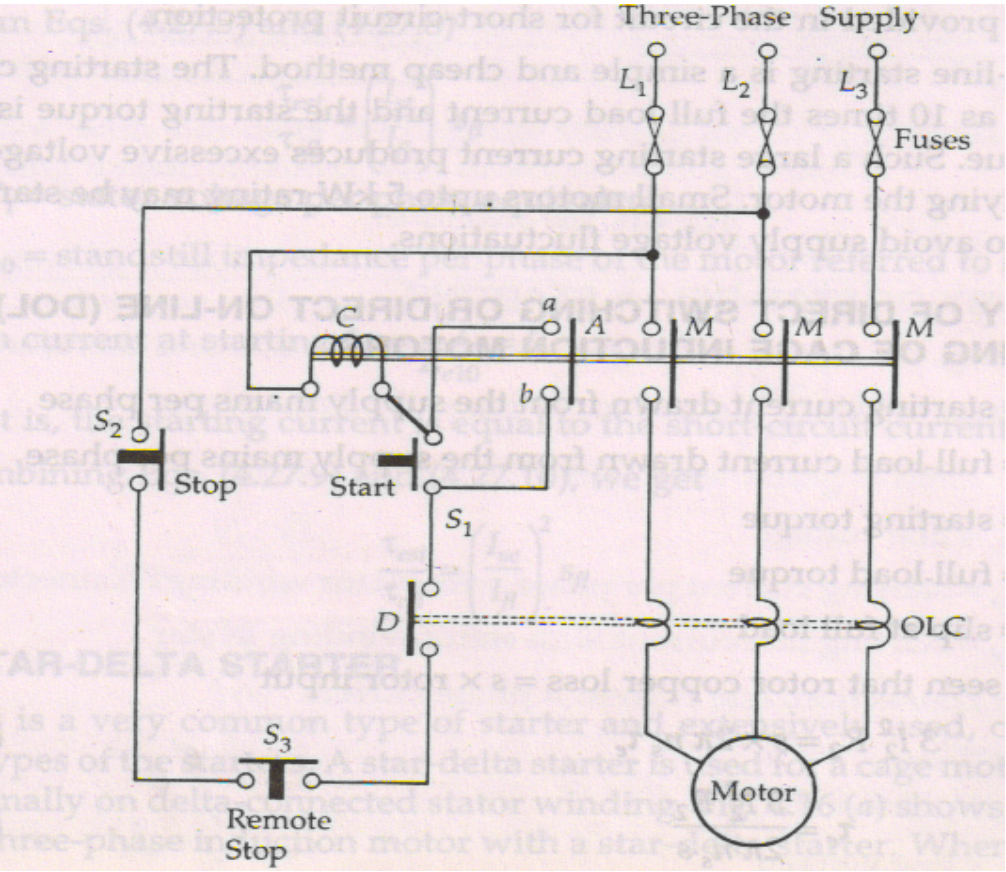
ii) Water pump: Induction motor

iii) Electric Clock: Stepper Motor

iv) Grinder: Universal Motor

c) Draw a neat labeled diagram of direct on line starter used for 3-ph induction motor.

Diagram of direct on line starter used for 3-ph induction motor: **(4 Marks)**



or equivalent figure

d) State the factors to be considered while selecting the motors for different drive

(Any four point expected- 1 Mark each point)

- **Factors to be considered for selection of Electrical Drives: (Any 4 Point expected)**

1) Nature of Supply:- Whether supply available is AC, pure DC or rectified DC

2) Nature of Drive :-Whether motor is used to drive individual machines or group of M/c

3) Nature of Load :- Whether load required light or heavy starting torque or load having high inertia require high starting torque for long duration.

4) Electric Characteristics of drive: - Starting, Running, Speed control and braking characteristics of electric drive should be studied and it should be match with load.

5) Size and rating of motor: - Whether motor is continuously running, intermittently running or used for variable load cycle.

6) Mechanical Consideration: - Types of enclosure, Types of bearings, Transmission of power, Noise level, load equalization

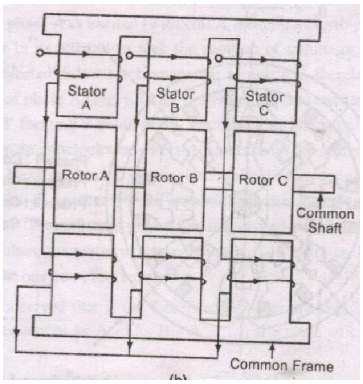
7) Cost: - Capital, Running and maintenance cost should be less

e) Describe the construction of Stepper motor (Any type) with neat sketch state two applications of it.

Types of Stepper Motor:-

1) Variable Reluctance Motor
2) Permanent Magnet Motor

1) Variable Reluctance Motors:- **(Explanation of anyone Type expected- 3 Mark)**



or equivalent dia.

Working:-

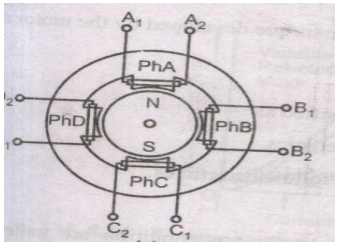
When phase A is excited rotor attempts minimum reluctance between stator and rotor and is subjected to an electromagnetic torque and there by rotor rotates until its axis coincides with the axis of phase A.

Then phase 'B' is excited disconnecting supply of phase 'A' then rotor will move 30 anticlockwise directions. The Same process is repeated for phase 'C'

In this way chain of signals can be passed to get one revolution and direction can be also changed.

OR

2) Permanent Magnet Motor:-



or equivalent dia.

Working :-

If the phase is excited in ABCD, due to electromagnetic torque is developed by interaction between the magnetic field set up by exciting winding and permanent magnet.

Rotor will be driven in clockwise direction.

Applications of stepper motor- **(Two application expected-1/2 Mark each)**

1. In Floppy disc drives.
2. In Computer printers.
3. In image scanners.
4. In compact Disc drives, etc.

f) List any four advantages of having stationary armature winding in case of three phase alternator. **(Each advantages: 1 Mark)**

Following advantages of having stationary armature winding in case of three phase alternator:

i) It is easier to insulate stationary winding for high voltage for which the alternators are usually designed.

ii) The stationary armature can be directly connected to load without going through large unreliable slip rings & brushes.

iii) Slip rings & brush gear required are of light construction.

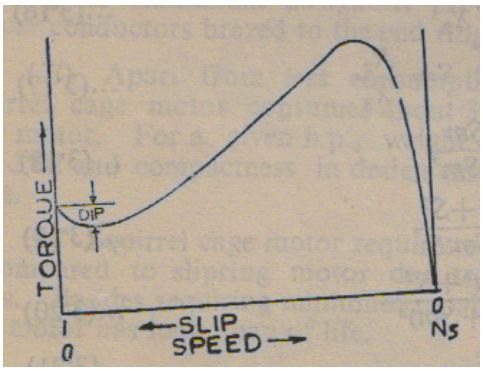
iv) Due to simple & robust construction of rotor higher speed of rotating dc field is possible.

Q.5 Attempt any Four of the following **16 Marks**

a) Draw a typical torque-speed characteristics of an induction motor describe its nature.

(Characteristics: 2 Marks & Explanation: 2 Marks)

Speed torque characteristics of 3-phase induction motor:



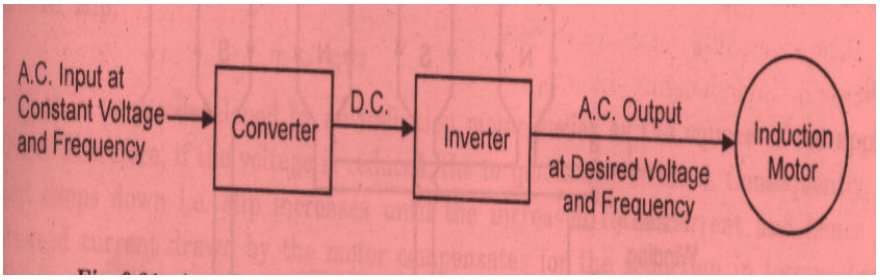
or equivalent figure

$$T \alpha \frac{S\, R_2 (E_2)^2}{(R_2)^2 + (SX_2)^2}$$

- When slip is equal to zero torque will also zero hence the curve starts from origin.
- At normal speed SX2 is small hence it is neglected. hence torque is directly proportional to slip if R_2 is constant, Hence for low values of slip the torque –slip characteristics is approximately straight line.
- At slip increases torque also increases and becomes maximum when $SX_2 = R_2$. After these slip-increases therefore $(SX_2)^2$ also increases and becomes more than R_2. Hence R2 is neglected, thus for large value of slip torque is inversely proportional to slip if X_2 is constant, Thus after maximum torque, curve drops down and finally comes to rest.

b) Explain the method of speed control of I.M by VFD using block schematic.

(Diagram-2 Mark & Explanation-2 Mark)



or equivalent fig

Explanation of speed control of induction motor by VFD (Variable frequency Drive):

- The synchronous speed of the induction motor can be varied smoothly over a wide range by changing the supply frequency.
- In order to maintain the air gap flux at its normal value under varying frequency conditions, it is necessary to keep V/f ratio constant.
- Therefore if speed controls to be achieved by changing frequency, the supply voltage is also to be changed simultaneously.
- Since the commercial power systems operate at constant frequency, variation of frequency for speed control purpose is necessarily achieved by using rotary (e.g. motor-generator sets) or solid state frequency conversion equipments.

c) State the meaning of electric drive? Give classification of electric drive.

Meaning of electric drive: **(Meaning: 2 Mark & Classification: 2 Marks)**

- Drive means a machine which can be used for a certain operation like crushing, drilling, grinding, transportation etc.

Classification of drive:

i) Individual Drive ii) Group drive iii) Multimotor Drive

d) A three phase,4-pole, 50 Hz, squirrel cage I.M. runs at 1450 rpm, Determine percentage slip and frequency of rotor emf.

Given Data:

P= 4, F= 50 Hz, N= 1450 rpm

$$N_s = \frac{120\ f}{P}$$ ---------- **(1/2 Mark)**

$$Synchronous\ \ speed\ N_S = \frac{120 \times 50}{4} = 1500\ rpm$$ ---------- **(1/2 Mark)**

i) % Slip: $$\%\ Slip = \frac{N_S - N}{N_S} \times 100$$ ---------- **(1/2 Mark)**

$$\% \, Slip = \frac{1500 - 1450}{1500} \times 100$$

$$\% \, Slip = 3.33 \, \%$$

---------- **(1 Mark)**

ii) Rotor frequency:

$$F_2 = S \times f_1$$

---------- **(1/2 Mark)**

$$F_2 = 3.33 \times 50 \quad = 1.665 \, Hz$$

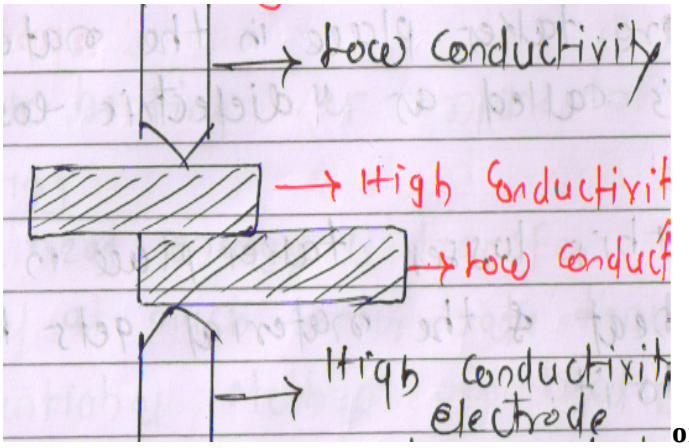
---------- **(1 Mark)**

e) Describe with a neat diagram the process of any one type of electric welding.

(Figure: 2 Mark & explanation: 2 Mark)

1**. Resistance Welding**:

(Following any one method of welding expected or any equivalent method expected)

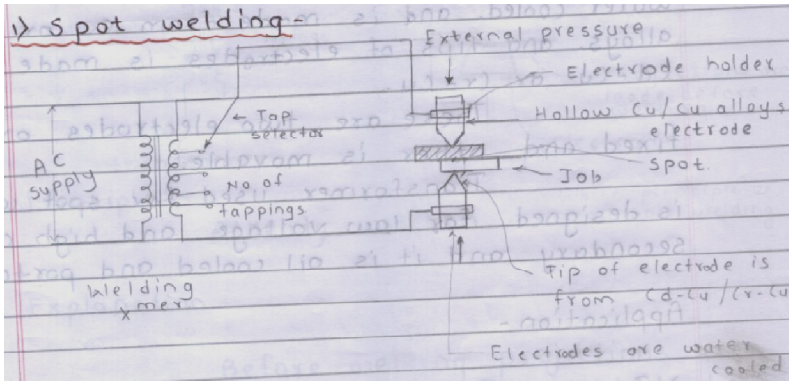


or equivalent diagram

Explanation:

- In resistance welding strong electric current is passed through the metal contact.
- These current heats the metal to plastic state ($H = I^2R_t$) and the joint is formed by applying pressure in order to join two dissimilar metals having different conductivity.
- The voltage requirement is near about 2-8 V and current range will near about 100A

2. Spot Welding:



or Equivalent fig.

Spot welding means the joining of two metal sheets at suitable spaced interval. As shown in fig.Job to be welded is placed one over the other between two electrodes under pressure.

When heavy current passed through the job through electrode. Current varies from 1000A to 10000A.and the voltage between electrodes is usually less than 2V.

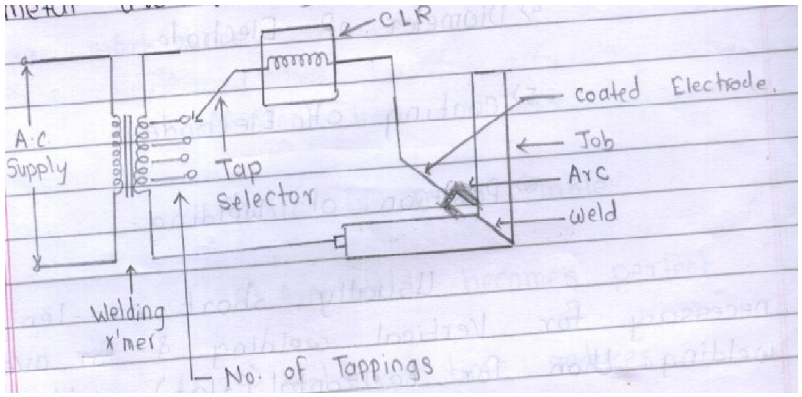
The period of flow of current and magnitude of current depends upon thickness of sheet (job) to be welded. The electrodes are hallow and water cooled. And is made from copper or copper alloys and tips of electrodes is made from Cd-Cu or Cr-Cu.

There are two electrodes one is fixed and other is movable. and transformer used for spot welding.

3. Metal Arc welding:

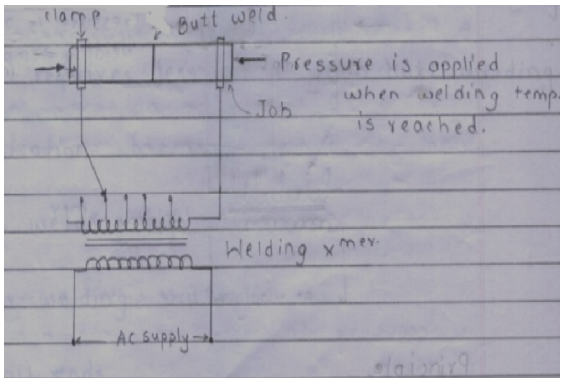
The process in which two metal parts to be welded are brought to a molten state and then allowed to solidify using an arc between them is called as arc welding.

Melting of metal is obtained due to heat developed by an arc struck between an electrode (of same metal as to be welded forming filler material) and metal to be welded (job)



or Equivalent fig.

4. Upset Butt welding:-



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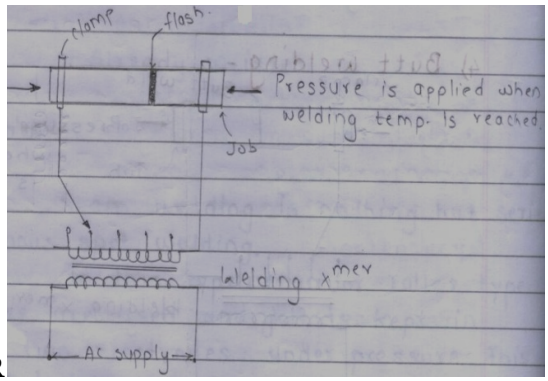


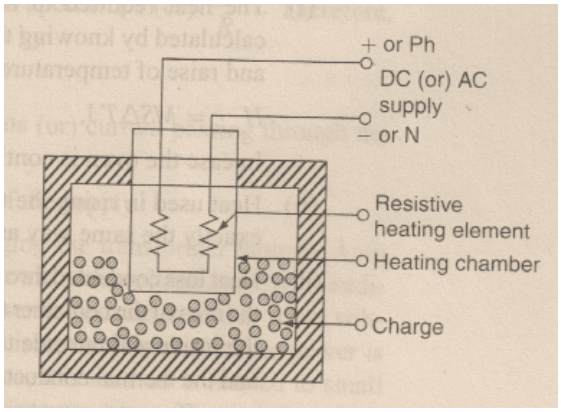
The job is clamped as shown in fig. two parts which are to be welded are brought together and heavy current is passed through joints by welding transformer, which creates necessary heat at joints due to I^2R loss.

When welding temperature is reached, supply is cut down and at the same time mechanical pressure is applied.

f) Describe indirect resistance heating method with suitable example.

Diagram of Indirect resistance heating:

(Figure: 1 Mark, Explanation: 2 Mark, Example: 1 Mark)



or equivalent figure

Explanation of indirect resistance heating:

- In indirect resistance heating method, high current is passed through the heating element.

- In case of industrial heating, sometimes the heating element is placed in a cylinder which is surrounded by the charge placed in a jacket is known heating chamber as shown in above figure.
- The heat is proportional to the power loss produced in the heating element is delivered to the charge by one or more of the modes of the transfer of heat viz. conduction, convection and radiation.
- This arrangement provides uniform temperature and automatic temperature control.

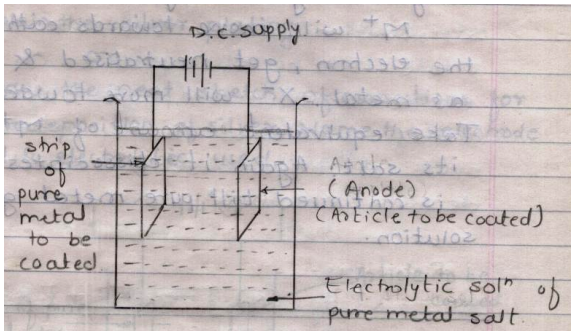
Example of Indirect heating element:

1. Immersion water heaters
2. Room heaters
3. Resistance ovens
4. Domestic and commercial cooling
5. Salt bath furnace

Q.6 Attempt any Four of the following **16 Marks**

a) Give the meaning of electroplating; Give any two applications of it.

(Figure is not necessary meaning: 2 Mark)



or equivalent fig

Meaning of Electroplating:

Electroplating is a process of depositing a layer of some material for protective purposes on the **articles of other metals** **OR**

Electroplating is carried out with a desire to coat particular metal on the surface of other metal.

Applications of electroplating: **(Two expected: 1 Mark each)**

i) Gold or silver plating for ornaments.

ii) Zinc nickel plating on cost iron or steel parts to prevent corrosion.

iii) Surface plating for giving extra shining

b) State the importance of energy conservation and audit.

The importance of energy conservation and audit: **(4 Mark)**

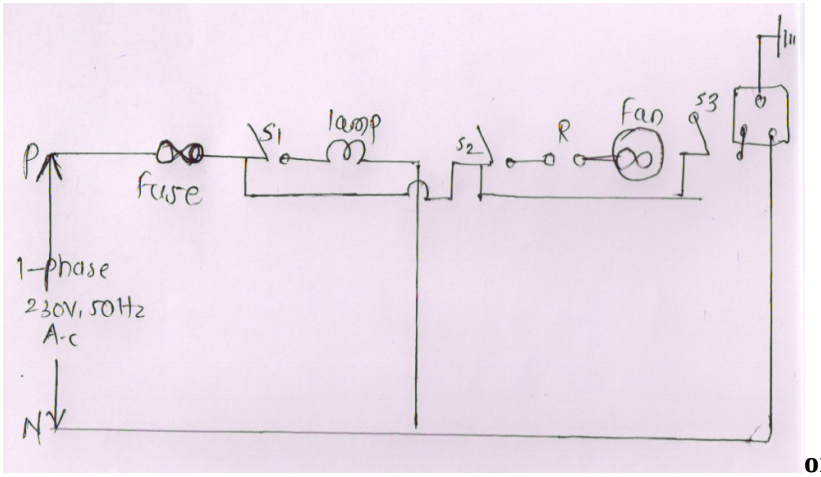
85% of Primary Energy Sources comes from fossil fuel and non-renewable energy sources. In last 200 years we have consumed 60% of all resources. Fossil fuels like coal, oil takes number of years to form through natural cycle. Because of rise in population, industrialization, change in life style, there is steep rise in energy demand. To meet these demands we have consumed maximum fossil fuel. Hence these fuels are on the verge of depleting soon. Up-till now more than 60% of all sources have been consumed. Rate of consumption of energy sources is more than that of formation. If rate consumption of energy increase similarly then no sources will be left over for next generation.

Hence energy conservation is needed as it,

1) Reduces energy demand.
2) Reduces rise in energy cost.
3) Provides economical solution to energy shortages.
4) Increases financial capital.
5) Increases environmental value.

c) Draw a simple electrical wiring diagram for the control of one lamp, one socket, one fan with regulator and fuse.

Simple schematic diagram: **(4 Marks)**



or equivalent diagram

d) State the applications of following i) CFL Lamp ii) Fluorescent Lamp iii) MCB iv) ELCB

(Each Application: 1 Mark)

i) CFL Lamp: for residential application

ii) Fluorescent Lamp: for residential application and commercial appl**ication**

iii) MCB: for residential, commercial, Industrial application

iv) ELCB: commercial application and Industrial application

e) List the applications of electrical machine in electro agro system.

(Any four application expected: 1 Mark each)

Following are the applications of electrical machine in electro agro system:

1. For water pumps
2. Cutting machines for crops
3. As a diesel generator
4. Thrushes for thrusting the crops
5. For various agricultural process

f) State any four fire extinguishing method adopted in electrical engineering.

(Any four fire extinguishing method expected: 1 Mark each)

Following are the fire extinguishing method adopted in electrical engineering:

1. Fire suppression with steam
2. Fire suppression with foam
3. Fire suppression with carbon dioxide gas
4. Fire suppression with fire sand bucket
5. Fire suppression with dry chemical