Important suggestions 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.

SECTION — I

Q.1	**Attempt any NINE of the following:**	**18 Marks**
a)	**Define the term (1) Amplitude (ii) Frequency**	
Ans	**i) Amplitude-** **(1 Mark)** The maximum or peak value of ac quantity is called as amplitude. **ii) Frequency :** **(1 Mark)** The total number of cycles per second. (Hertz)	
b)	**State principle of Electromagnetic induction.**	
Ans	**i) First Law: -** Whenever change in the magnetic flux linked with a coil or conductor , an emf is induced in it. **OR** Whenever a conductor cuts magnetic flux, an emf is induced in conductor. ----------**(1 Marks)** **ii) Second Law :-** The Magnitude of induced emf is directly proportional to (equal to) the rate of change of flux linkages. $e = \frac{-Ndt}{dt} d\phi$ Where, N= Number of turn $d\emptyset$ = Rate of Change of flux ----------**(1 Marks)**	

c)	**State ohm's law**
Ans	**Ohms Law: ----------** **(State-1 Mark & Equation-1 Mark)** The current flowing through a solid conductor is directly proportional to the difference of potential across the conductor. & inversely proportional to its resistance provided the temperature remains constant. **Equation:-** **i.e** $I \propto V \quad \therefore \frac{V}{I} = cons\tan t \ \therefore I = \frac{V}{R}$ $or \ \therefore V = I.R. \quad or \quad R = \frac{V}{I}$ **Where** R is constant called as resistance, V=voltage and I = Current
d)	**Give any two chemical plant application of DC shunt motor.**
Ans	**Applications of DC shunt motor used in chemical plant:** **(Any Two applications expected: 1 Mark each)** 1. Inorganic chemical industry 2. Organic chemical industry 3. Petrochemicals industry 4. Antibiotics chemical industry to run the machines 5. Fertilizer Industries 6. Refineries and Petroleum Industry 7. Hydro-Generated Oil and Soap Industries
e)	**Give classification of DC motor.**
Ans	**Types of DC Motor :-** **(2 Mark)** i) DC Shunt Motor ii) DC Series Motor iii) DC Compound Motor: a) Short Shunt compound motor b) Long short compound motor
f)	**A 6 pole three phase induction motor operates on 50 Hz frequency. Calculate its synchronous speed.**
Ans	**Given Data:** **P=6, F=50Hz** **Find Ns** $N_s = \frac{120 \times f}{P}$ ---------- **(1 Mark)** $N_s = \frac{120 \times 50}{6}$ $N_s = 1000 rpm$ ---------- **(1 Mark)**

g) Why single phase induction motor are not self starting?

Ans: Reason: **(2 Marks)**

The single phase induction motors are not self starting because single phase supply is alternating but not produces rotating magnatic field which is the necessity for self starting of IM.

Torque obtain by single phase supply is pulsating i.e. at positive half cycle rotor rotates in clockwise direction and at negative half cycle rotor rotates in anticlockwise direction so net torque is zero and due to inertia of rotor remains standstill.

h) What is ideal transformer? How it differs from practical transformer.

Ans: **(Each point carrying 1/2 mark)**

Ideal Transformer:-

An ideal transformer is an imaginary transformer which has. - no copper losses (no winding resistance) - no iron loss in core. - no leakage flux. In other words, an ideal transformer gives output power exactly equal to the input power.

Difference:-

Ideal Transformer	Practical Transformer
It has 100% efficiency.	It has 100% below efficiency.
It has no losses.	It has no losses.
Purely inductive material is used.	It is two purely inductive material used.
It has no I^2R losses.	It has I^2R losses.
It has no iron loss.	It has iron loss.
There is no ohmic resistance drop.	There is ohmic resistance drop.
It has no leakage drop.	It has leakage drop.
In it ideal condition.	In it practical condition.

i) Give classification of transformer.

Ans: **The types of transformer on basis of voltage: (Any two types expected 1 Mark each)**

i) Step-up transformer

ii) Step down transformer

	The types of transformer on basis of Supply : i) 1-ph transformer ii) 3-ph transformer **Types of transformer according to their construction:** 1. Core type 2. Shell type 3. Berry type **Types of transformer :-** 1. Oil filled transformer 2. Dry type transformer
j)	**A single phase transformer has voltage ratio 230V/115V. It has 100 turns on primary. Find secondary turns.**
Ans:	$V_I = 230\,V \quad V_2 = 115\,V \quad N_I = 10 \quad N_2 = ?$ **the secondary Turns :** $\frac{V_1}{V_2} = \frac{N_1}{N_2}$ ---------- **(2 Mark)** $\frac{230}{115} = \frac{100}{N_2}$ $N_2 = \frac{115 \times 100}{230}$ ---------- **(2 Marks)** $N_2 = 50$
k)	**State types of wires.**
Ans:	**Types of wire used in electrical wiring:** **(Any four Types Expected: 1/2 mark each: Total 2 marks)** i) VIR (Vulcanized Indian Rubber) ii) PVC (Polyvinyl Chloride) wires iii) T.R.S. Wire iv) Flexible wire v) Lead sheathed wires vi) CTS (Cab Tyre sheathed wires) vii) MICC (Mineral insulated copper covered) wire. **OR** Following various types of wires and cables are used in domestic and industrial wiring:

1) V.I.R. (Vulcanized India Rubber) wire.
2) C.T.S. or T.R.S. (Cab Tyre Sheathed or Tough Rubber Sheathed) wire.
3) Weather proof wire.
4) L.C.(Lead Covered) wire.
5) MICC (Mineral insulated copper covered) wire.
6) PVC (Poly Vinyl Chloride) wire.
7) Flexible wire.

l) Name any two material used for fuse.

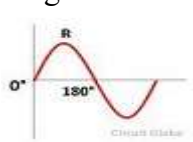
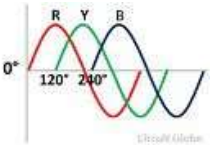
Ans: **Name the material used for fuse wire:** **(2 Marks)**

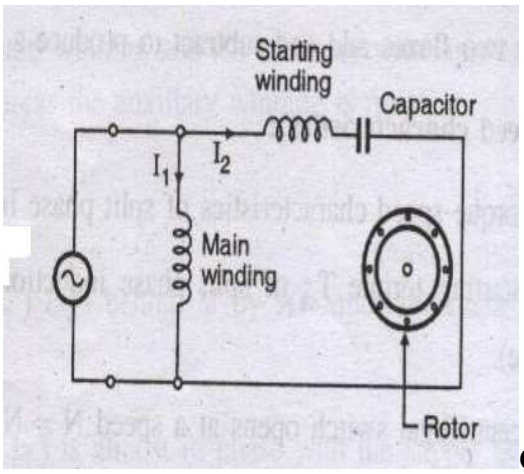
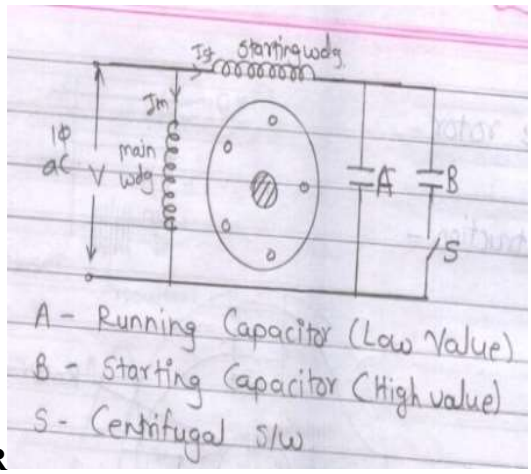
S.No	Material used for fuse wire
1	Tin
2	Lead
3	Zinc
4	Silver
5	Copper
6	Aluminum

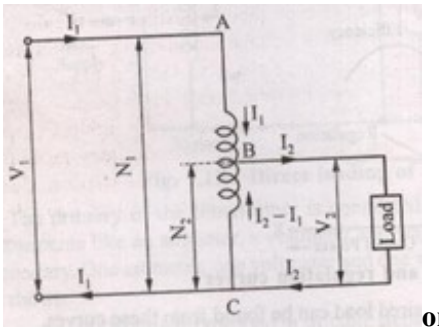
Q.2 Attempt any FOUR of the following: 16 Marks

a) Compare single phase and three phase AC supply.

Ans: **(Any Four Point expected: 1 each , Total 4 marks)**

Parameter	Single Phase	Three Phase
Number of wires.	Single Phase Require two wires for completing the circuit.	Three Phase Requires three/four wires for completing the circuit.
Voltage	Single Phase normally operate at 230V	Three Phase operate at 415V
Naming	Single phase supply wires are indicated as L and N	Three phase supply wires are indicated as R-Y-B-N
Power	Single phase supply delivers oscillating power	Three phase supply delivers constant power
Use	It is preferred for distribution purpose and domestic supply	It is always preferred for transmission
Copper	It requires thick copper for transmitting same power	It requires smaller copper diameter to transmit same power
Wave Shape	Single Phase 	Three Phase 

b)	**State different methods of controlling speed of (i) DC Series Motor. (ii) DC Shunt Motor.**
Ans:	**i) Speed Control of D.C. Series motor :** **(Any one method expected-2 Mark)** 1. Field diverter method: 2. Tapped Field control **ii) Speed Control of D.C. Shunt motor :** **(Any one method expected-2 Mark)** **1) Armature Voltage Control Method for DC Shunt Motor:** i. Armature resistance control ii. Armature voltage control **2) Flux (field) Control Method for DC Shunt Motor:-** i. Field rheostat control
c)	**Draw 'C' split type induction motor describe its working.**
Ans:	**Capacitor Split Induction Motor:-** **(Figure: 2 Mark & Working:2 Mark)**  **OR**  **or Equivalent fig** **Working Principle:** In these motors one capacitor is connected in series with the auxiliary winding. There is no centrifugal switch. Thus this winding along with the capacitor remains energized for both starting and running conditions. Capacitor used serves the purpose of obtaining necessary phase displacement at the time of starting and also improves the power factor of the motor.

d)	**State function of "No Volt Coil" and "Overload Coil". in case of DC shunt motor starter.**
Ans:	**i) Function of no volt coil in case of DC shunt motor starter:** **(2 Mark)** When the supply fails / gets disconnected or break in the field winding, the holding coil is de – energized and so releases the starting arm which go back to OFF position (or first stud) due to spring tension. **OR** No Volt Release Coli ensures that whenever supply resumes after switching off or supply failure, the motor does not start on it's own, but starts only after the user starts it and that too through current limiting resistors. Read more on Brainly.in - https://brainly.in/question/3007659#readmore **ii) Function of overload coil in case of DC shunt motor starter:** **(2 Mark)** It is connected in series with the supply line to protect the motor against overload. When the motor is overload, overload release coil is magnetize and it lifts the armature to the upward and short circuit the No volt release coil. As soon as the no volt coil is short circuited, it demagnetized and releases the starting arm from 'ON' position. Therefore the motor is disconnected from the supply and protected against overload.
e)	**Describe working principle of autotransformer with neat diagram.**
Ans:	**Diagram:** **(Figure: 2 Mark & Working: 2 Mark)**  **or equivalent figure** **working principle:-** Principle of operation of the transformer is the same as the one of the common transformer, then the relation between input and output voltages and input and output currents and the ratio of number of turns between the primary and the secondary winding is the same. The currents of the primary and secondary windings are flowing on the opposite directions, so the total current flowing through the common part of the winding is equal to the difference between the current on the low-voltage winding and the current on the high-voltage winding. In order for an autotransformer to work properly, the two windings should have the same winding sense.

f)	**Suggest various safety precautions which should be taken while working with electricity.**
Ans:	**The Following are the precautions should be taken while working electricity:-** **(Any Four point expected : 1 Mark each, Total 4 marks)** 1. Avoid working on live parts. 2. Switch off the supply before starting the work. 3. Never touch a wire till you are sure that no currents are flowing. 4. Do not guess, whether electric current is flowing through a circuit by touching. 5. Insulate yourself on the insulating material like wood, plastic etc. before starting the work on live main. 6. Your hand & feet must be dry (not wet) while working on live main. 7. Rubber mats must be placed in front of electrical switch board/ panel. 8. Use hand gloves, Safety devices & proper insulated tools. 9. Ground all machine tools, body, and structure of equipments. 10. Earthing should be checked frequently. 11. Do not use aluminum ladders but use wooden ladders. 12. Do not operate the switches without knowledge. 13. Use proper insulated tools & safety devices. 14. When working on live equipment obey proper instruction. 15. Do not work on defective equipment. 16. Use safe clothing. 17. Use shoes with rubber soles to avoid shock. 18. Do not wear suspected Necklace, arm bands, finger ring, key chain, and watch with metal parts while working. 19. Do not use defective material. Do not work if there is improper illumination such as in sufficient light or unsuitable location producing glare or shadows. 20. Do not work if there is an unfavorable condition such as rain fall, fog or high wind. 21. Do not sacrifice safety rules for speed. 22. Do not allotted work to untrained person (worker) to handle electrical equipment. 23. Make habit to look out for danger notice, caution board, flags, and tags. 24. Warn others when they seen to be in danger near live conductors or apparatus. 25. Inspect all electrical equipment & devices to ensure there is no damage or exposed wires that may causes a fire or shock. 26. Avoid using electrical equipment near wet, damp areas. 27. Use approved discharge earth rod for before working. 28. Never speak to any person working upon live mains. 29. Do not Do the work if you are not sure or knowledge of the condition of equipment/ machine. 30. Safety book/ Training should be given to all persons working in plants.

Q.3	Attempt any FOUR of the following: 16 Marks
a)	List different part of DC machine. State function of any two parts.

Ans:

(Any Four parts of name expected -1/2 Mark each , & Function of any Two part -1 Mark each part, Total 4 marks)

Parts of DC Machine:----------(Any four parts expected: 1/2 Marks each)

1) Yoke:
2) Pole Cores & Pole shoe:
3) Armature core:
4) Armature winding:
5) Commentator:
6) Brush:
7) Cooling Fan:
8) End covers
9) Field winding

Function : (Any Two part expected)

1) 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 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:

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 coil suitably connected together to form rotor winding.

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

6) Brush:

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

7) Cooling Fan:

A fan is fitted to the shaft for cooling purposes.

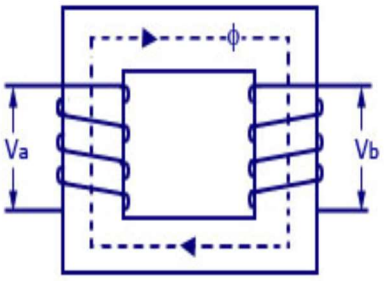
8) End covers:

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 and describe core type and shell type transformer.

Ans:

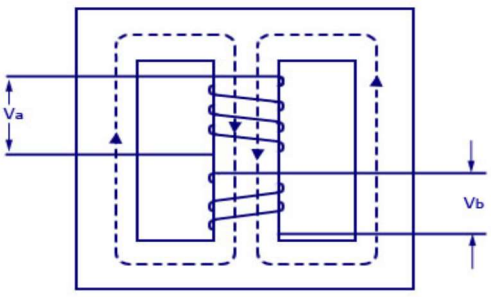
i) Core Type Transformer: **(2 marks)**



The Winding surround the core, Average length of the core is more; Magnetic Flux has only one continuous path and less in weight.

It is Suitable for high voltage & less output of the transformer.

ii) Shell Type Transformer: **(2 marks)**



The core surrounds the windings, Average length of the core is less, and Magnetic Flux is distributed into 2 paths and more in weight

It is Suitable for less voltage & high output of the transformer.

c) State need of earthing. List different types of earthing.

Ans: **Necessity of Earthing: (Any Two point are expected)** **(2 Mark)**

1. To provide an alternative path for the leakage current to flow towards earth.
2. To save human life from danger of electrical shock due to leakage current.
3. To protect high rise buildings structure against lightening stroke.
4. To provide safe path to dissipate lightning and short circuit currents.
5. To provide stable platform for operation of sensitive electronic equipment's.

Types of Earthing: **(Any Two types Expected : 1 Mark each,Total 2 marks)**

1. Pipe type earthing
2. Plate earthing
3. Rod earthing or Driven Rod earthing
4. Strip earthing or Wire earthing

d) Compare squirrel cage and slip ring type 3 phase induction motor.

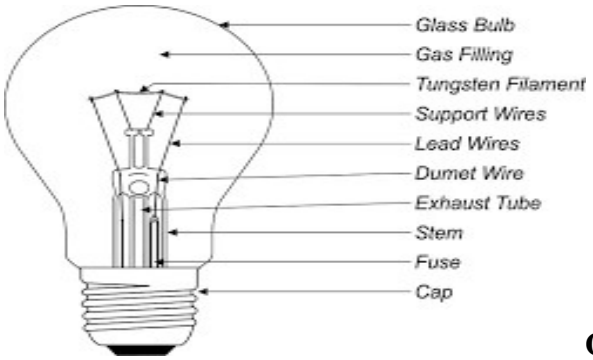
Ans: **(Any four point expected: 1 Mark each, Total 4 marks)**

S.No	3-phase squirrel cage I.M	Slip ring 3-Ph I.M
1	Rotor is in the form of bars	Rotor is in the form of 3-ph winding
2	No slip-ring and brushes	Slip-ring and brushes are present
3	External resistance cannot be connected in the rotor circuit	External resistance can be connected in the rotor circuit
4	Small or moderate starting torque	High Starting torque
5	Starting torque is of fixed	Starting torque can be adjust
6	Simple construction	Completed construction
7	High efficiency	Low efficiency
8	Less cost	More cost
9	Less maintenance	Frequent maintenance due to slip-ring and brushes.
10	Starting power factor is poor	Starting power factor is adjustable & large
11	Size is compact for same HP	Relatively size is larger
12	Speed control by stator control method only	Speed can be control by stator & rotor control method

e) Describe operation of incandescent lamp with neat diagram.

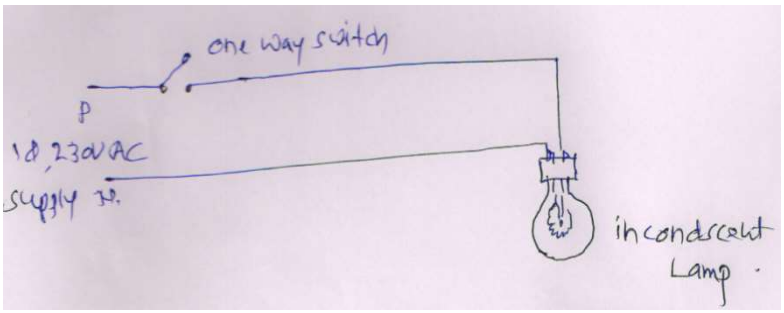
Ans: **(Neat diagram: 2 Mark & Operation: 2 Mark)**

Construction Figure og incandescent lamp



Or

OR



or equivalent figure

Operation of incandescent lamp

When the current is passed through the tungsten filament, it is heated to incandescence (while hot conditions) which then starts emitting energy in the form of light

f) A coil connected in parallel across 150V dc supply, takes current of 3A. Find i) Resistance of coil (ii) Power dessipated in coil (iii) Total energy consumed in 2 Hrs

Ans:

$$I = \frac{V}{R}$$

i) Resistance of the coil:

$$R = \frac{V}{I} = \frac{150}{3}$$ ---------- **(1/2 Mark)**

$$R = 50\ \Omega$$

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

ii) Power dissipated in coil.

$$P = I^2 R = (3)^2 \times 50$$

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

$$P = 450 \ watts$$

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

iii) Total energy consumed in 2 hours.

$$E = P \times t = 450 \times 2$$

$$E = 900 \ w-h$$

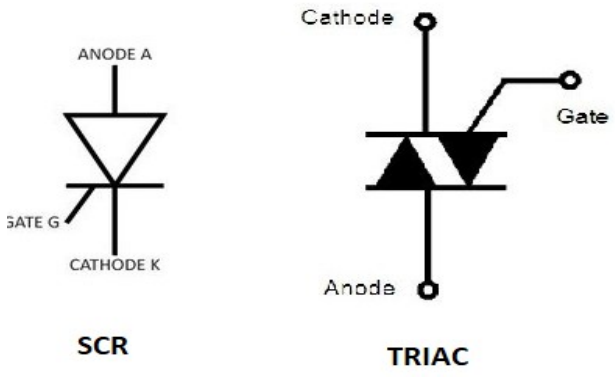
$$E = 0.900 \ kwh$$

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

---------- **(END PART-I)** ----------

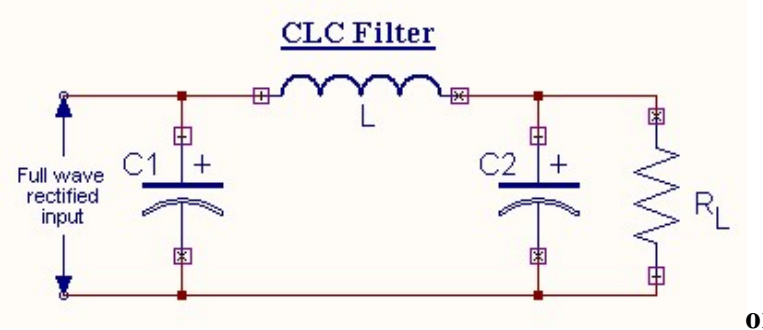
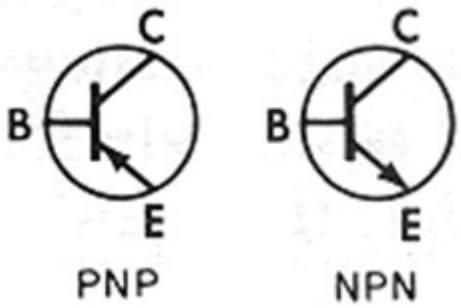
SECTION — II

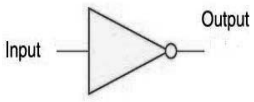
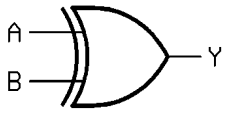
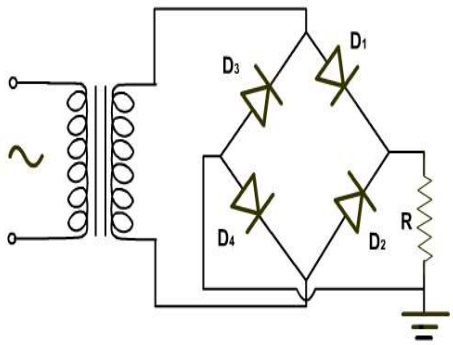
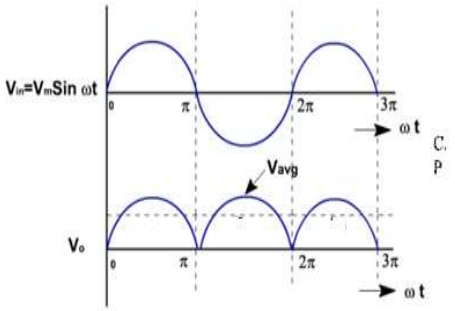
Q.4	Attempt any NINE of the following:	18 Marks
a)	**Give example of (i) Trivalent impurity (ii) Pentavalent impurity**	
Ans:	**i)Trivalent impurity :** Boron (B) , Aluminium (Al)	**(1 Mark)**
	ii) Pentavalent impurity : Phosphorus (P) , Arsenic(As), Antimony (Sb)	**(1 Mark)**
b)	**Give classification of semiconductor**	
Ans:	**Classification of semiconductor**	**(2 Marks)**
	(i) Intrinsic Semiconductor	
	(ii) Extrinsic Semiconductor – N type, P type	
c)	**List application of transistor.**	
Ans:	**Application of transistor**	**(Two applications – 2 Marks)**
	1) Transistor used as a voltage amplifier.	
	2) Transistor used as a power amplifier.	
	3) Used as Switch.	
	4) Used in digital circuits as – memory, gates.	
	5) Used in Oscillators & Multivibrators	
	6) Used in Time base generators.	
d)	**Draw Symbol of (i) SCR (ii) TRIAC**	
Ans:	**Symbol of (i) SCR (ii) TRIAC**	**(Each symbol 1 Mark)**



SCR **TRIAC**

or equivalent Figure

e)	**Draw circuit diagram of CLC filter**
Ans:	**Circuit diagram of CLC filter** **(2 Marks)**  **or equivalent Figure**
f)	**List application of SCR.**
Ans:	**Applications of S.C.R.: -** **(Any two for 2 Marks)** 1. Phase controlled Rectifiers 2 . DC to DC converters (Choppers). 3. DC to AC converters (Inverter) 4. Industrial Drives & Control, etc. 5. Control circuits & Any other applications
g)	**Give need of Regulated power supply.**
Ans:	**Need of Regulated power supply** **(2 Marks)** The regulated power supply provides constant DC output voltage irrespective of changes in input voltage or load current. The rectified voltage follows the AC input and will vary as the mains vary. The variations may affect the circuit performance and is undesirable in sensitive equipment such as computers, sensor and precision circuits. In addition, components and circuits will only operate or perform efficiently when the power supply is within a certain limit..
h)	**Draw symbol of (i) NPN (ii) PNP transistor**
Ans:	**symbol of PNP and NPN transistor:** **(Each symbol 1-Mark)**  **or equivalent Figure**

i)	**List Different types of filter.**
Ans:	**Different types of filter :** **(2 Marks)** i) Capacitor (C) filter ii) Inductor (L) filter iii) LC filter iv) CLC filter or π filter
j)	**What is negative and positive logic.**
Ans:	**Negative logic :** **(1 Mark)** In Negative logic representation Bit 1 represents logic low and Bit 0 represents logic high. **Positive logic :** **(1 Mark)** In Positive logic representation Bit 1 represents logic high and Bit 0 represents logic low.
k)	**Why NAND and NOR gates are called as universal gates.**
Ans:	**Reason for NAND and NOR gates are called as universal gates**: **(2 Marks)** All other gates (AND, OR, NOT) can be formed using the combination of NAND & NOR gates therefore NAND & NOR gates are called as universal gates
l)	**Draw symbol of ..(i) NOT gate (ii) Ex-OR gate**
Ans:	**(i) NOT gate** **(ii) Ex-OR gate** **(2 Marks)**  
Q.5	**Attempt any FOUR of the following:** **16 Marks**
a)	**Draw and describe Bridge Rectifier with neat diagram.**
Ans:	**Diagram of Bridge rectifier:** **(2 Marks)**  

or equivalent Figure

Operation : **(2 Marks)**

During positive half cycle of an AC supply, D1 & D4 will forward biased and current starts flowing through load. The output voltage is equal to +Vs.

During negative half cycle of an AC supply, D2& D3 will forward biased and current starts flowing through load. The output voltage is equal to +Vs.

In this pulsating DC waveform will be obtained at the load.

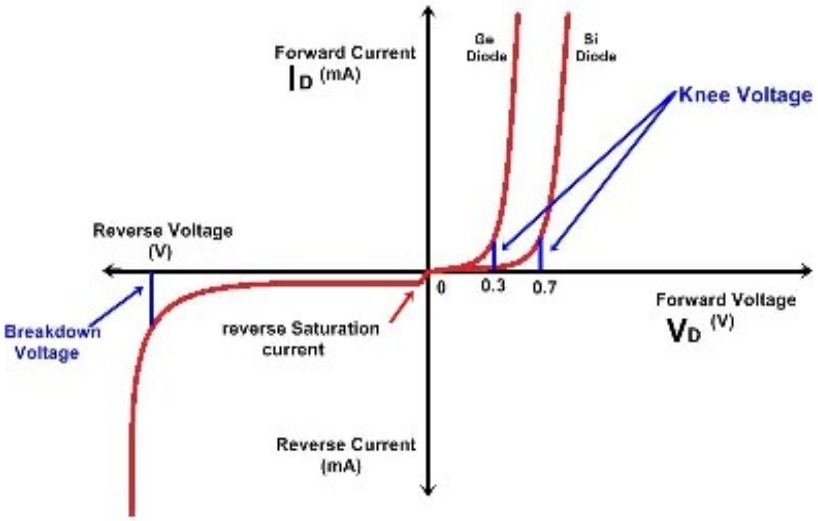
b) Compare 'P' type semiconductor and 'N' type semiconductor.

Ans: **(4 Marks)**

S.No	P type Semiconductor	N type Semiconductor
1	Trivalent impurities are added	Pentavalent impurities are added
2	Majority charge carriers are holes	Majority charge carriers are electrons
3	Minority charge carriers are electrons	Minority charge carriers are holes
4	Fermi level lies near valence band	Fermi level lies near conduction band

c) Draw V-I characteristics of (i) P-N Junction Diode (ii) Zener Diode

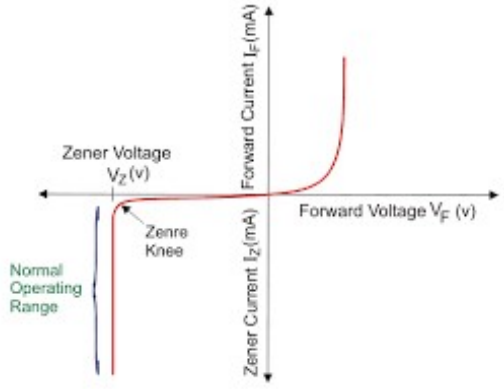
Ans: **(i) P-N Junction Diode** **(2 Marks)**



P-N Junction Diode V-I Characteristics

or equivalent Figure

(ii) Zener Diode : **(2 Marks)**

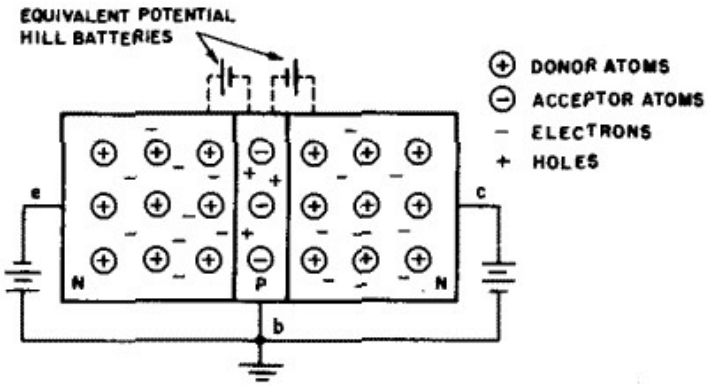


or equivalent Figure

d) Describe working of NPN transistor with neat diagram.

Ans: **(Diagram 2-Marks, Explanation 2-Marks)**

Operation of NPN transistor-



or equivalent Figure

N-p-n transistor is made by sandwiching thin layer of p-type semiconductor between two layers of n-type semiconductor. It has three terminals - Emitter, Base and collector. The npn transistor has two supplies, one is connected through the emitter base and one through the collector base. The supply is connected such that emitter-base are forward biased and collector base are reverse biased. It means, Base has to be more positive than the emitter and in turn, the collector must be more positive than the base. The current flow in this type of transistor is carried through movement of electrons. Emitter emits electrons which are pulled by the base as it is more positive. This end up in the collector as it is more positive. In this way, current flows in the transistor.

e) Define Filter. Give its need and classification.

Ans:

Definition **(1 Mark)**

Filters are circuits which are used to remove unwanted AC components from the output of rectifier.

Need of filter **(1 Mark)**

To remove unwanted frequency components from the signal using different components such as Inductor, Capacitor etc.

Classification **(2 Marks)**

1) Capacitor (C) filter
2) Inductor (L) filter
3) LC filter
4) CLC filter or π filter

f) Describe De-morgan's theorem.

Ans:

DeMorgan's Theorem is a simplification technique that can be used to simplify Boolean expressions. **(2 Marks)**

$$\overline{A+B} = \bar{A}.\bar{B}$$

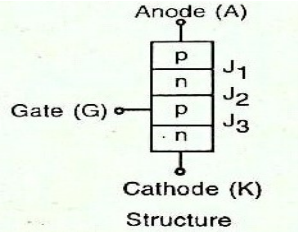
$$\overline{A.B} = \bar{A}+\bar{B}$$

This can be proved by using truth tables as follows: **(2 Marks)**

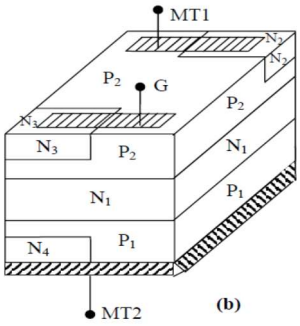
A	B	$\overline{A+B}$	$\bar{A}.\bar{B}$
0	0	1	1
0	1	0	0
1	0	0	0
	1	0	0

A	B	$\overline{A.B}$	$\bar{A}+\bar{B}$
0	0	1	1
0	1	1	1
1	0	1	1
1	1	0	0

Q.6	**Attempt any FOUR of the following:**	**16 Marks**
a)	**Draw construction of (i) SCR (ii)TRIAC**	
Ans:	**i) Construction of SCR**	**(2 Marks)**



ii) Construction of TRIAC **(2 Marks)**

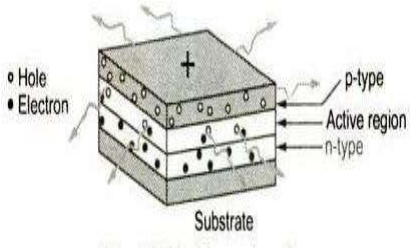


or equivalent Figure

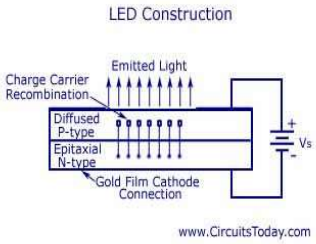
b)	**Describe working principle of light emitting diode (LED)**

Ans: **(Diagram - 2 Marks, working principle- 2 Marks)**

Diagram light emitting diode :



or



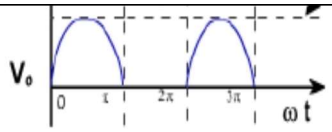
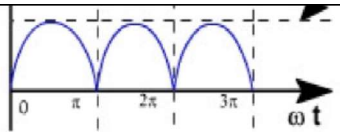
or equivalent Figure

Working of LED (LED- Light Emitting Diode) :

- When it is forward bias, it emits visible light. The electrons are in the higher conduction band on the N-side, where holes are are in the lower valence band on p- side.
- When forward biased electrons recombine with the holes. During recombination energy is emitted in form of light.
- G_aA_s, G_aP, G_aA_sP are used to get visible light.(G_aA_S- Infrared radiation, G_aP- Red or green, G_aA_sP- Red or yellow
- Colors of the emitted light depend on the type of material used.
-

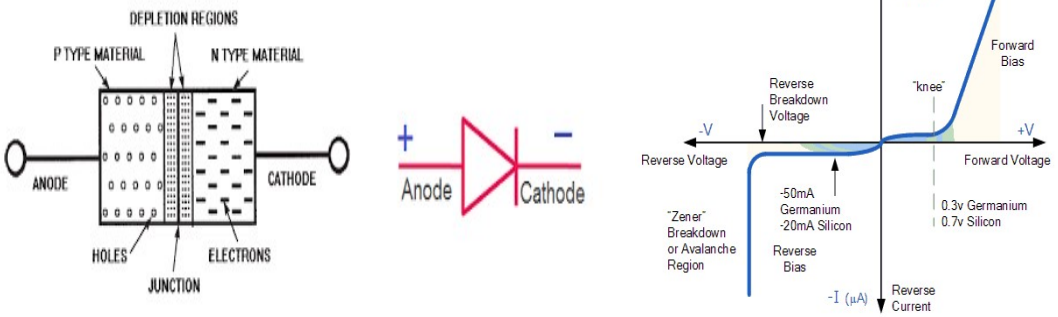
c) Compare Half wave Rectifier and Full wave Rectifier.

Ans:

S.No.	Parameter	Half wave	Full wave
1	**Definition**	The Rectifier that converts only one half Cycle of the input AC supply to DC is called Half Wave Rectifier.	The Rectifier that converts both Halves of the AC input supply Cycle into DC is Called Full Wave Rectifier.
2	**number of diodes used**	1	2 or 4
3	**efficiency**	40.6 %	81.2 %
4	**ripple factor**	1.21	0.48
5	**output waveform**		
6	**Peak Inverse Voltage (PIV)**	Vm	2Vm for center tap Vm for bridge
7	**DC Output Voltage**	V_m/π	$2V_m/\pi$
8	**Ripple frequency**	50 Hz	100 Hz

d) Describe working of diode in forward biased mode with neat diagram.

Ans: Construction & characteristics: **(2 Marks)**



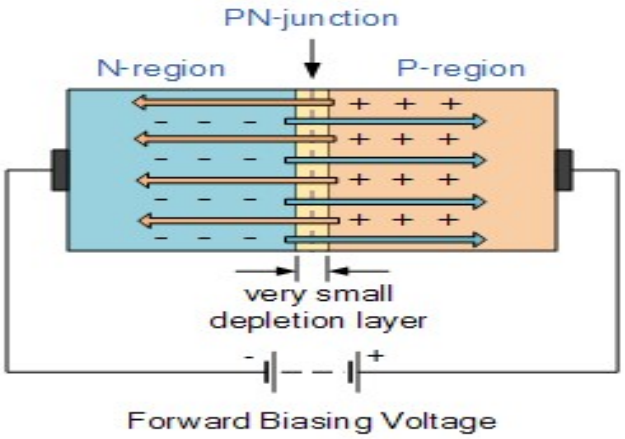
or Eqivalent Figure

Forward Bias condition : **(2 Marks)**

When a diode is connected in a **Forward Bias** condition, a negative voltage is applied to the N-type material and a positive voltage is applied to the P-type material. If

this external voltage becomes greater than the value of the potential barrier, approx. 0.7 volts for silicon and 0.3 volts for germanium, the potential barriers opposition will be overcome and current will start to flow.

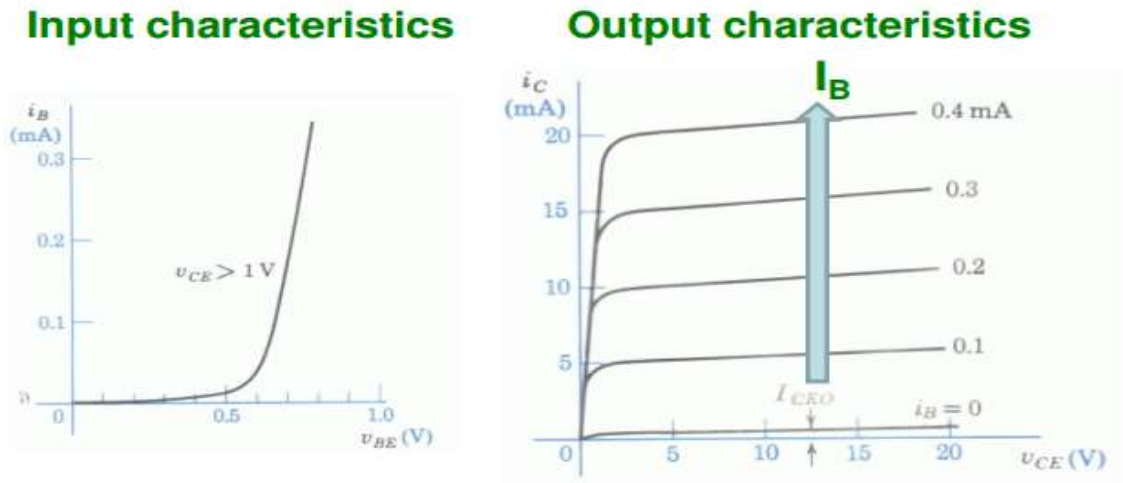
This is because the negative voltage pushes or repels electrons towards the junction giving them the energy to cross over and combine with the holes being pushed in the opposite direction towards the junction by the positive voltage. This results in a characteristics curve of zero current flowing up to this voltage point, called the "knee" on the static curves and then a high current flow through the diode with little increase in the external voltage as shown below.



or Eqivalent Figure

e) Draw V-I characteristic of transistor in CE mode. Show different region.

Ans: **Characteristics of transistor in CE mode:** **(4 Marks)**

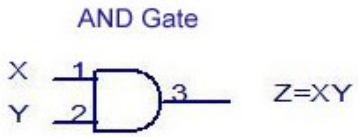


or Eqivalent Figure

f) Draw symbol and Truthtable of (i) AND gate (ii) OR gate

Ans:

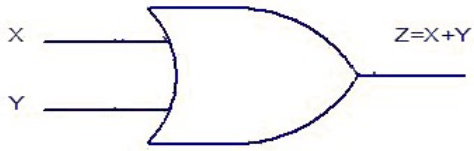
i) Symbol and Truthtable of AND gate **(2 Marks)**



TRUTH TABLE

INPUTS		OUTPUT
X	Y	Z
0	0	0
0	1	0
1	0	0
1	1	1

ii) Symbol and Truthtable of OR gate **(2 Marks)**



TRUTH TABLE

INPUTS		OUTPUT
X	Y	Z
0	0	0
0	1	1
1	0	1
1	1	1

---------- END----------