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SFI GEC PALAKKAD

Course Code: EST120
Course Name: BASICS OF CIVIL AND MECHANICAL ENGINEERING
PART I: BASIC CIVIL ENGINEERING
(2019 Scheme)

Max. Marks:50 Duration: 90 min

PART A
Answer all questions, each carries 4 marks.

1 Discuss the difference between floor area and carpet area.

2 List the properties of good building bricks. Explain any five.

3 Explain sieve analysis.

4 Differentiate Ramps and escalators.

5 Draw neat sketch of the following foundations: (i) Isolated stepped footing; (ii) Cantilever footing; and (iii) Continuous footing (iv) Combined footing. (5x4=20)

PART B
Answer one full question from each module, each question carries 10 marks

Module-I

6 Explain the components of a residential building with a neat diagram. (10)

OR

7 Explain the role of NBC, KBR & CRZ norms in building rules and regulations prevailing in our country. (10)

Module-II

8 What are the different kinds of cement available and what are their uses? (10)

OR

9 a) What are the objectives of surveying? (3)

b) Explain the types of steel sections and steel reinforcement that are available. (7)

Module-III

10 a) Explain the different types of foundation. (5)

b) Differentiate English bond and Flemish bond with neat sketch. (5)

OR

11 a) Explain the commonly used roof covering materials. (5)

b) What are the factors to be considered in the selection of flooring materials? (5)

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PART II: BASIC MECHANICAL ENGINEERING
(2019 Scheme)

Max. Marks: 50 Duration:90 min

PART A
Answer all questions, each carries 4 marks.

12 Why petrol engines are called as SI engines and diesel engines are called as CI engines? (4)

13 What is meant by scavenging and how is it achieved in a two stroke engine? (4)

14 Describe any four desirable properties of refrigerants. (4)

15 Compare conventional machine tools and CNC machines. (4)

16 Describe the working of a cluster rolling mill giving a sketch. (4)

PART B
Answer one full question from each module, each question carries 10 marks

Module-IV

17 Explain the air standard Diesel cycle with P-V and T-S diagrams. Derive the expression for its efficiency. (10)

OR

18 a) Explain the CRDI system in automobiles. (5)

b) A Carnot engine, working between 650 K and 310 K, produces 150 kJ of work. Find thermal efficiency and heat added during the process. (5)

Module-V

19 a) A centrifugal pump discharges water at a rate of 200 litres/minute against a head of 16 m when running at 300 rpm. Calculate the power required to run the pump if the overall efficiency of the pump is 50 %. (3)

b) Explain the working of a single plate clutch with neat sketch. (7)

OR

20 a) Explain the split air conditioner and its working. (4)

b) With the help of a neat sketch explain the working of a reciprocating pump. (6)

Module-VI

21 What is casting? With the help of a neat sketch explain the process of sand mould casting. (10)

OR

22 Give the block diagram of a lathe, indicate the principal parts and list out the important operations performed on a lathe. (10)

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ESTI20 BASIC CIVIL ENGINEERING

PART-A

1. Carpet area means the net usable floor area of an apartment, excluding the area covered by the external walls, areas under service shafts, exclusive balcony or verandah area and exclusive open terrace area, but includes the area covered by the internal partition walls of the apartment.

The floor area of buildings is the sum of the area of each floor of the building measured to the outer surface of the outer walls including the area of lobbies, cellars, elevator shafts and in multi-dwelling buildings all the common spaces. Areas of balconies are excluded.

4. Ramps are sloping surfaces used to provide an easy connection between the floors or access from ground to floors. They are especially useful when a large number of people or vehicles have to be moved from floor to floor. Ramps should be constructed with a non-slippery surface. They are usually provided at places such as garages, railway stations, stadiums, town halls, offices, hospitals, etc.

Escalators are power driven, inclined and continuous stairway used for raising or lowering passengers. These are used to move large number of people from floor to floor of buildings. They are installed at commercial centres, shopping malls, airports, railway stations, etc. These stairs have continuous operation without the need of operators. They have large capacity with low power consumption.

2) Question - 2

Properties of good building bricks:-

* Bricks should be sound proof and have low thermal Conductivity
* Bricks should have uniform Copper-colour.
* It should be free from Cracks, Voids and grits
* It should be of standard Size

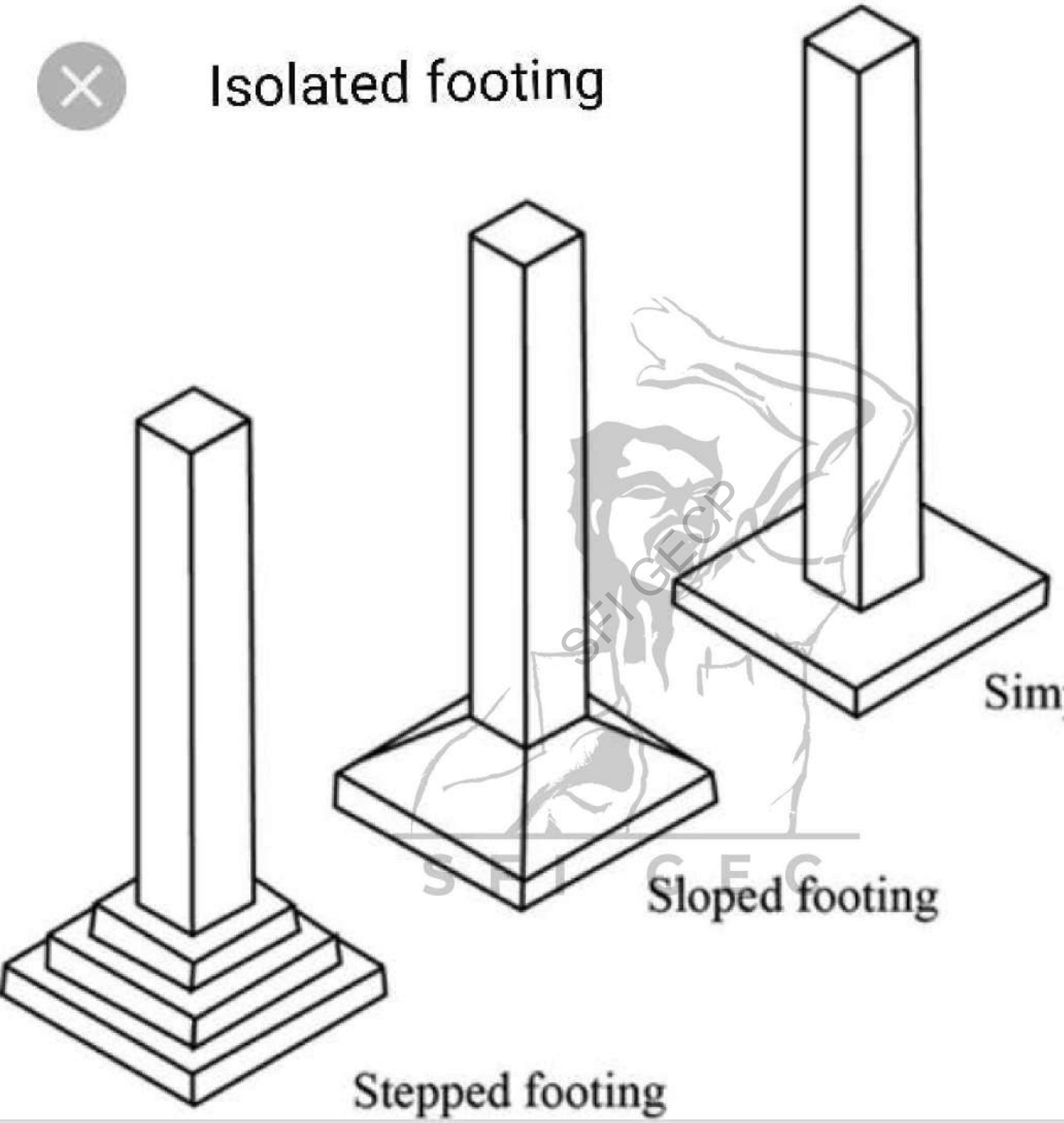
~~Part - B~~

3) Question 3

Determination of the proportion of the particle, with Cutain ranges, in an aggregate by Seperation on various sieves of different size openings may be defined as sieve analysis. In sieve analysis, a known dry weight of dry aggregate is sieved successively through 15 sieves which is specific for the type of aggregate.

Sum of the Cumulative percentage of the residue retained on each IS sieves divided by 100 is known as fineness modulus. It is the index to determine the fineness of the particle Higher the Cumulal fineness modulus, Coarser the particle size

Isolated footing

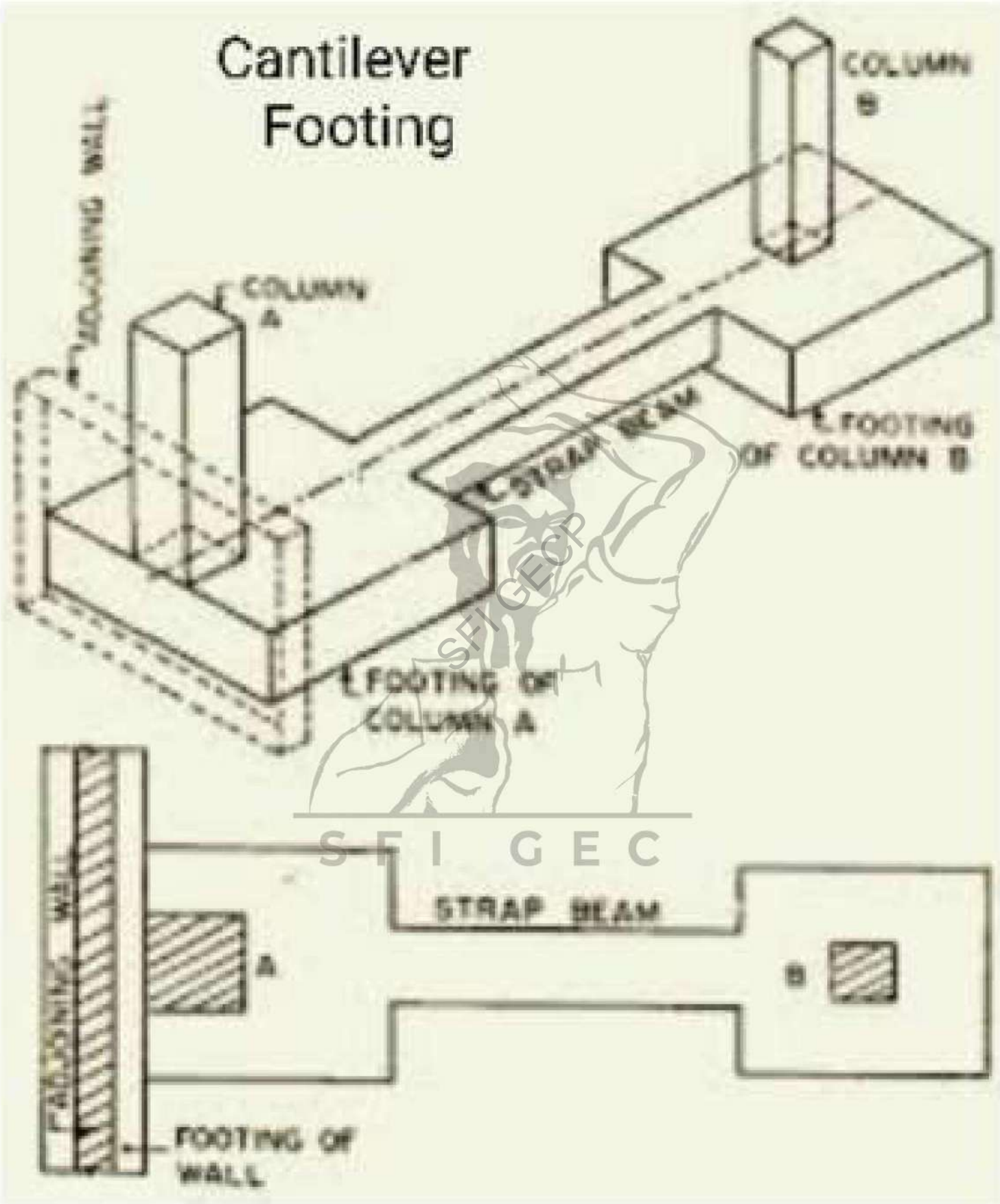


Simple footing

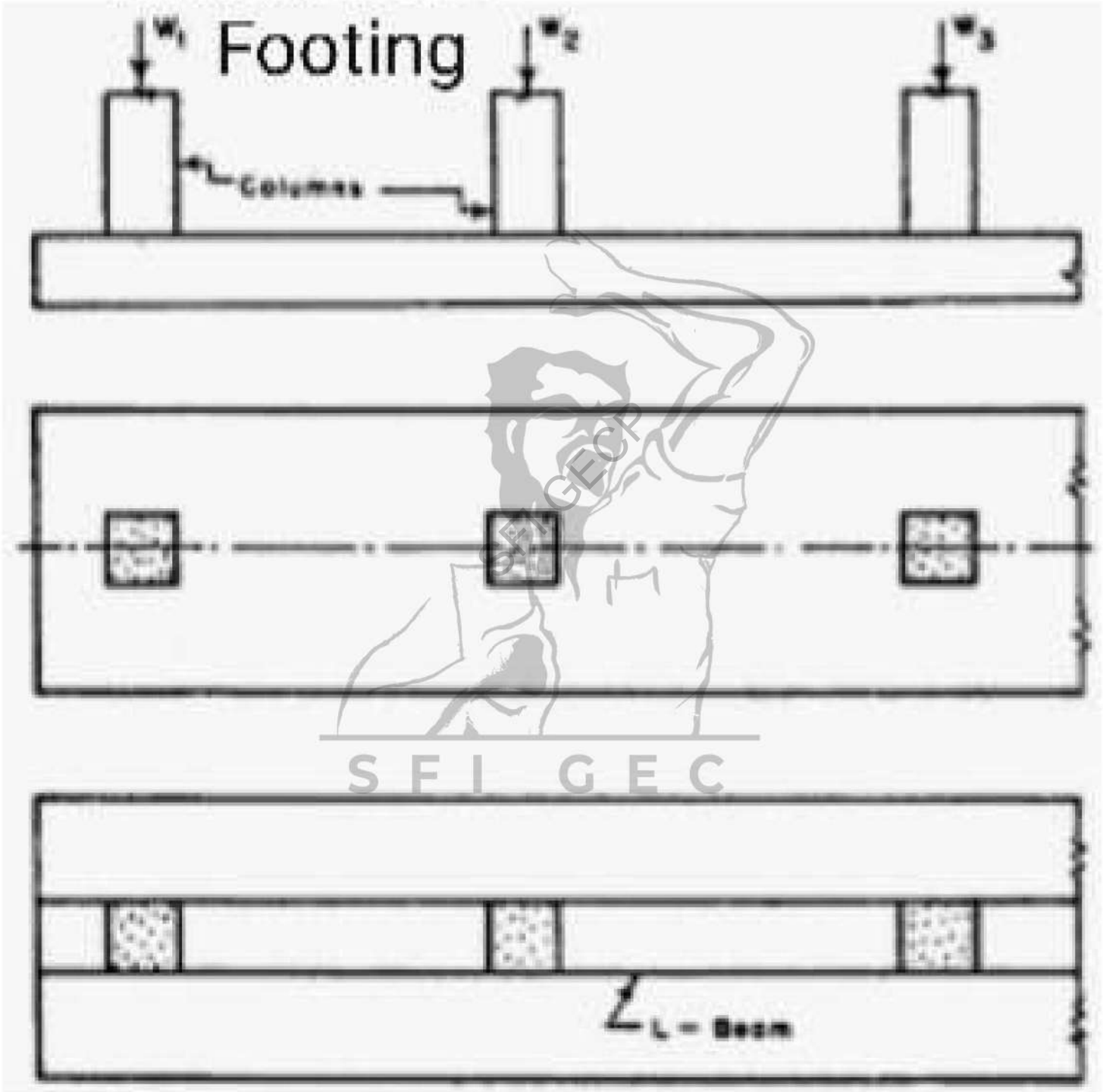
Sloped footing

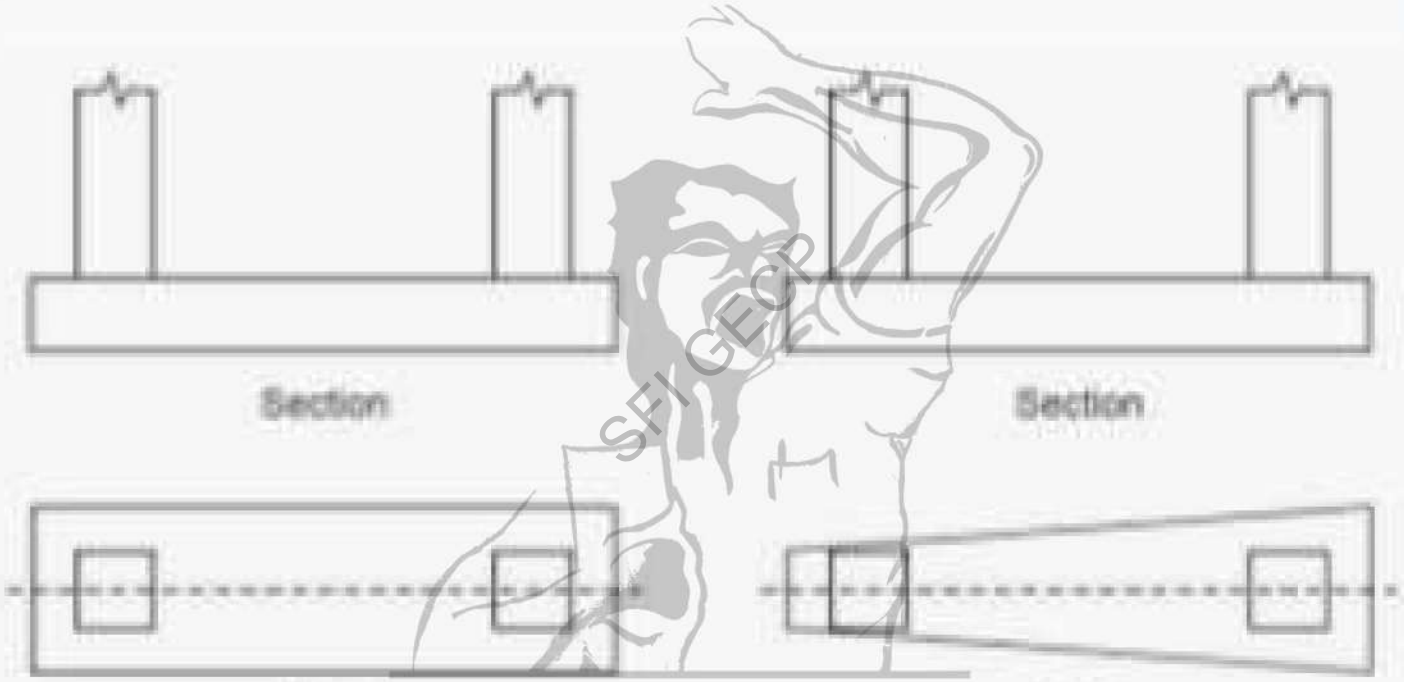
Stepped footing

Cantilever Footing



Continuous Footing





(a) Rectangular combined footing (b) Trapezoidal combined footing

PART-B

Module-1

6. Components of a residential buildings:

1→ Substructure or Foundation

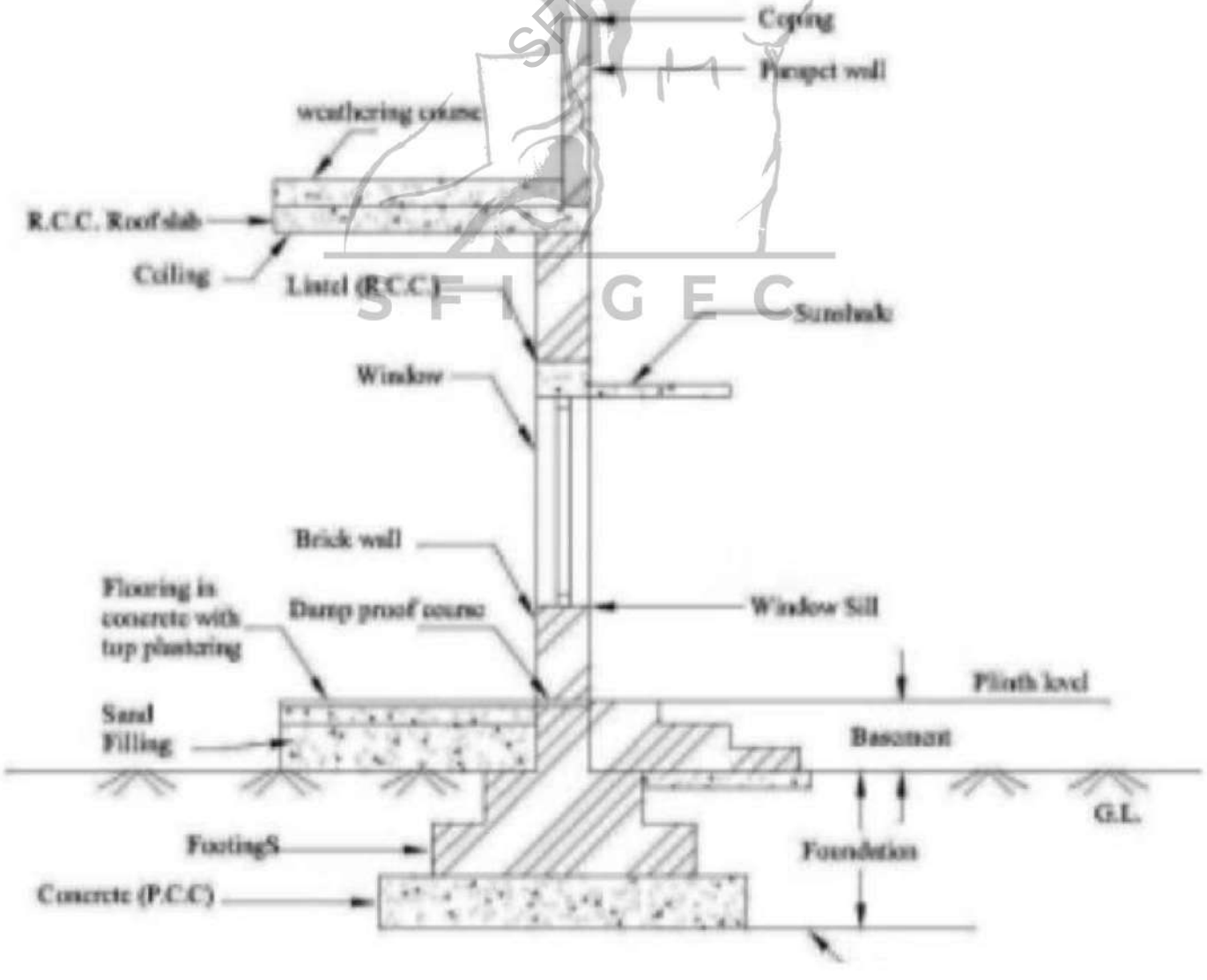
2→ plinth

3→ Super structure.

① Substructure: It is the portion of the building, below ground level, which transmits the load of super structure to the soil. Its the most critical part of the building which safeguards the building against the forces of wind, uplift, soil pressure etc. Provides safety.

② Plinth: Its the middle part of building above the surface of the surrounding ground up to the surface of the floor. It helps in transmitting loads.

③ Super structure: It is the part of building constructed above the plinth level. It includes walls, piers, floors, doors, windows, lintels, sunshades, roofs, steps, etc



7. a) → Property lines - including property lines on your development site plan is one of the most important elements.

→ Distance between buildings and property lines - understanding your site goes beyond staying inside your own property lines. Surrounding infrastructure and buildings play an important role in shaping your design.

→ Existing and proposed conditions - For officials and plan reviewers to grasp the full scope of your design, you'll want to present both existing and proposed conditions

→ Construction Limits and Lay Down Areas. This shows the areas of the property where construction take place. It also will delineate the area located on or near the site where the construction-related supplies, storage, and partial assemply takes place.

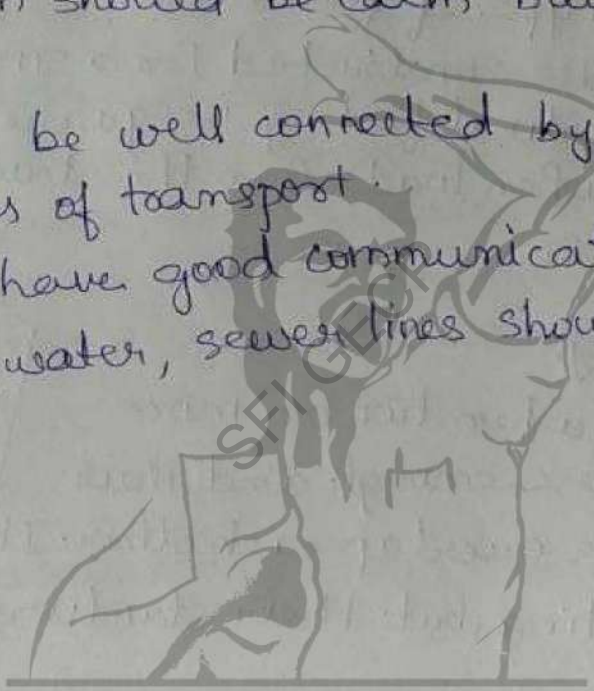
→ parking Area - Make sure to include parking diagram

b) National Building Code (NBC) controls ultimately all construction activities in our country. It provides guidelines for all regulations related to building construction Information and mandatory practices are available in NBC related to development and building planning, structural and design aspects, building services, plumbing services and solid waste management, etc.

Kerala Building Rules - In our country, states and union territories have framed building rules and rules of fire fighting, solid waste management based NBC. In kerala we follow KBR.

Coastal Regulation Zone (CRZ) – Central government has declared the coastal stenches upto its territorial limit of our country excluding the islands of Andaman & Nicobar and Lakshadweep as Coastal Regulation zones inorder to ensure livelihood securities to people residing in coastal area, to conserve and protect coastal stretches and to promote development through sustainable manner

c) → The site should be fair with good quality soil.
→ The location should be calm but reasonably developed
→ It should be well connected by the roads and other modes of transport.
→ It should have good communication facilities
→ Electricity, water, sewer lines should be available



Part B Question - 8 (3)

8) Different kind of Cements :-

1) Portland Cement

* Ordinary Portland Cement is used for normal Construction and has adhesive and cohesive Properties. So that it form good bond with other material.
* It Consist of lime, Silica, Alumina, Calcium Sulphate, Iron oxide, magnesia, sulphur trioxide.

Uses :-

* Cement mortar, Cement Concrete and reinforced Cement Concrete can be made.
* Cement mortar is use as a binding material, to cover surfaces of masonry, Pointing of brick or Stone masonry and for different type of floor and floor finishes

2) Rapid hardening Cement

* It develop Strength Rapidly. It is due to higher fineness of grinding and higher C_3S and lower C_2S Contents

Uses :-

In pre-fabricated Constructions
Road Repair work
In Cold weather Climate for better resistance

against frost damage

3) Coloured Cement

* These Cements are obtained by adding pigments to ordinary portland Cement.

Uses:

- For finishing works and plastering of walls
* For decorative works.
- manufacture of tiles and Cast Stones.

4) Hydrophobic Cement

* It is produced by grinding ordinary Cement Clinker with water repelling film-forming Substances such as oleic acid and stearic acid

Uses:-

- It is water repellent Cement, used where water tight conditions are required

5) Expansive Cement

- This Cement Suffers hardly any Change of Volume during drying.

Uses:-

- In machine founding and Cement grouting in prestress Concrete ducts.

* Also used for Concrete repair work.

6) Acid Resisting Cement

* Used in Construction of acid resisting floors in factories

7) Quick Setting Cement

* As it quickly sets, it is ideal for water Construction

8) Sulphate resisting Cement

* Uses
  - For marine Structure
  - For Foundation in Sulphate infested Soil
  - For Sewage treatment Structures.

9) High Alumina Cement

* It is used for the water retaining Structure because it is very impervious and Corrosion resistant
* Used for refractory Concrete and furnance lining.

10) White Cement

* Used for White washing and plaster work.
* Used in floor finishing and pointing works.

Question - 9 (5)

a) Objectives of Surveying:-

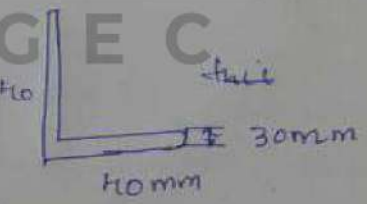
* Preparation of archeological, geological and military maps
* Establishment of boundaries of properties with reference to the available records
* Plot Sub division
* Securing data for making Plans and maps.
* Measurement of distance b/n points
* Setting out of alignment of engineering structures

b) Types of Steel Sections:-

1) Angle Section

It Consist of two legs, which are of equal or unequal size. These Sections are specified as (ISA)

ISA 40 x 40 x mm



2) Channel Section

It Consist of a web with two equal flanges as shown in figure

I - Sections

* These are also known as rolled steel joist. It consist of two flanges connected by web. It is designated by overall depth, width of flange and weight per metre length.

T- Sections

* It has the shape of letter T and it consist of a flange.

Flat Sections

* They are plate like sections with more length and less width.

Steel Plates

They are specified by thickness. Steel plates of 5mm to 50mm are used. They are used in in columns bases and flanges for columns.

Corrugated Sheets

They are formed by passing steel sheets through grooves.

Steel Reinforcements :-

1) Plane Steel Bar :-

Round Section, made up of mild steel, mediuro tensile steel or high tensile steel are used in reinforced Cement Concrete

2) High Strength deformed Steel Bars :-

These bars are Cold twisted deformed, Tor Steel bars are manufactured in India. These bars have longitudinal ribs in the form of Continous helix. These are transvere rib placed in b/n the longitudinal ribs. This develop high bond Strength.

3) TMT Steel Bars :-

Heat treatment is a thermal process undergone by the steel in the Solidstate. This includes hot rolling, micro alloying and Controlled cooling. The most Common practices finishing online heat treatment while rolling). Commonly Known as thermo mechanical Treatment process (TMT). Bars done through this process is also Called TMT bars.

Module-III

10.a) Different types of foundation:

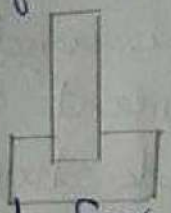
① shallow (open foundation):

→ depth less than or equal to width of foundation

② Deep foundation:

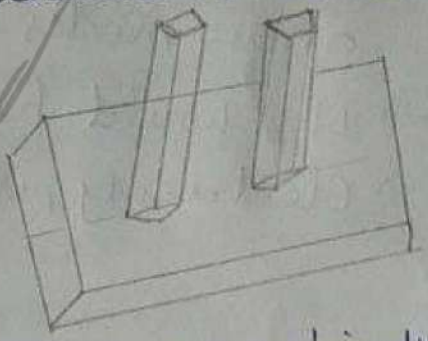
→ depth greater than width of foundation

Types of shallow foundation:-



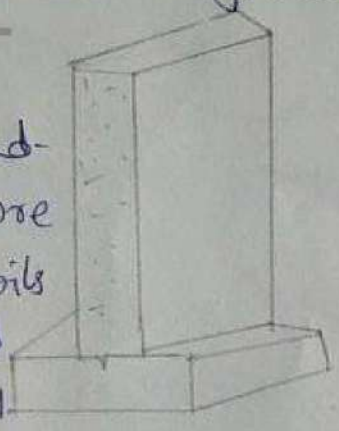
1→ Individual or isolated footing:

Most common type of foundation used for building construction. Its constructed for a single column. Shape of individual footing is square or rectangle and is used when loads from the structure is carried by the columns.



2→ Combined footing:

It is constructed when two or more columns are close enough and their isolated footings overlap each other. It is a combination of isolated footing, but their structural design differs

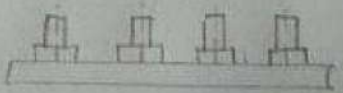


3→ Wall or strip footing

Their base is wider than a typical load-bearing wall foundations. Provides more stability. These should not be used on soils where there is any possibility of a ground flow of water above bearing layer of soil.

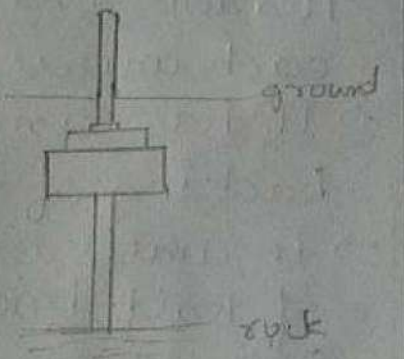
4. Raft or Mat foundations

They are spread across the entire area of building to support heavy structural loads from columns & walls. It is suitable for expensive soils with less bearing capacity.



Types of Deep foundation:

5→ Pile foundation:



It is a type of deep foundation which is used to transfer heavy loads from the structure to a hard rock strata much deep below the ground level. This is also used to prevent uplift of the structure due to lateral loads such as earthquake and wind forces.

6→ Drilled shafts or Caisson foundation:

It has an action similar to pile foundations, but discussed are high capacity cast-in-situ foundations. It resists loads from structure through shaft resistance and toe resistance. It is used where the depth of hard strata below ground level is located within 10m to 100m.

b). English bond:

→ Alternative courses are either headers or stretchers in elevation.
→ There are no continuous vertical joints.
→ Every alternate header is centrally placed over a stretcher.
→ The hearting of each of the thicker walls consists of only headers.
→ When wall thickness is an even multiple of half bricks, present the same appearance on both faces

Flemish bond

→ Headers and stretchers placed alternately in each course.

→ It has same appearance in the facing and backing of the wall in each course.

→ In walls with thickness equal to odd multiple of half bricks, half bats and three quarter bats are used, where as no bats are required for walls with other thickness

(11.a) Types of roof covering materials:

1→ Thatch roofing: This is the cheapest roof covering, commonly used in villages. Its light in weight, but is highly combustible. It absorbs moisture and will decay easily.

2→ Wood: Thin, tapered pieces of wood primarily used to cover roofs and walls of buildings to proted them from the weather.

3→ Tile Roofing: Made of a ceramic material and is hard and brittle, poorly suited for places where tree limbs can fall on a house's roof.

4→ Asbestos Cement sheet (AC sheet): These are widely used sheets for industrial buildings, factories, theatre, etc. They are manufactured from asbestos mixed with OPC. They are cheap, light weight and durable.

5→ Galvanized Iron sheets (GI sheets): These are iron sheets galvanized with zinc to prevent corrosion. They are stronger than AC sheets but are costly.

6→ Aluminium sheets: They are long lasting, economical and corrosion free sheets. Its light in weight with better appearance. They are mainly used for industrial buildings and for temporary construction.

7→ Fibre Glass sheets (FRP sheets): Fibre reinforces polymer sheets are made with glass or any suitable fibre with a suitable resin. They are UV protected, non-combustible, light weight and durable sheets.

b) Factors:

1→ Durability: Material should be strong and durable enough to resist various weathering actions

2→ Appearance: Appearance of floor should be aesthetic. Flooring products made of different materials are available in markets with different colors

3→ Initial cost: selection of cost of flooring material is done based on several factors such as overall cost, estimate of structure, etc

4→ Hardness: The material should be hard enough to resist the wear and tear caused by loads

5→ Smoothness: The top surface of the floor should be smooth and level.

6→ Damp resistance: Material should exhibit good resistance against dampness especially in kitchens & bathrooms

7→ cleanliness: Floor selected should be easy to clean. It should not absorb any solutions like oil, grease, etc

8→ Sliperiness: Floor should not cause slipperiness when wet

9→ Fire resistance

10→ Maintenance should be possible

11→ Thermal insulation

12→ Sound insulation

12) Petrol engines are also known as Spark Ignition (SI) engines because here, an electric spark is used for igniting the fuel air mixture while diesel engines are referred to as Compression Ignition (CI) engines as air is compressed to a very high temperature and pressure before the fuel is injected in the form of a spray. Here, the fuel ~~or~~ ignites due to the high temperature of the compressed air.

13) Scavenging is the process of purging the exhaust gases and replacing them with fresh air/fuel mixture in the cylinder of an internal combustion engine. As the piston moves down, it exposes an exhaust port through which the exhaust gases rush out. As the piston descends more, it begins to expose two or more fresh-charge ports, which are connected to the crankcase by short ducts. As pressure in the cylinder is now low and pressure in the crankcase higher fresh charge from the crankcase rushes into the cylinder through the fresh-charge ports.

Date

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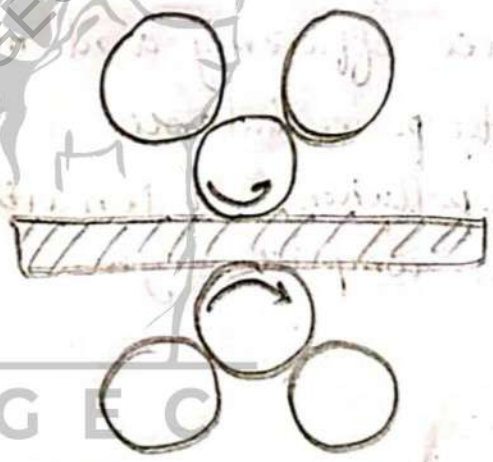
14. a. Critical Temperature - The critical temperature of the refrigerant should be high enough as compared to the condensing temperature to reduce the power requirements

b. Specific heat - Specific heat of the refrigerant liquid should be low to minimise the amount of vapours formed during the throttling process.

c. Viscosity - Viscosity of the refrigerant should be low to reduce pressure drops, size of pipes, valves etc.

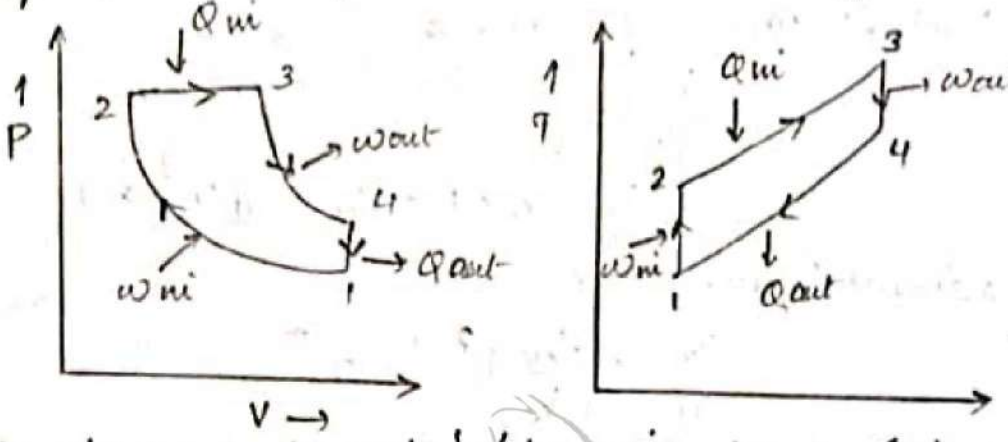
15. CNC machining operates through computer software that controls and optimizes cutting, milling, doulling and other types of tools reliable overseen by a trained and certified programmer. In contrast conventional machining operates through machinist alone.

16 Cluster rolling mill : For rolling very thin sheets or foils an arrangement known as cluster mill is used. It consists of a pair of working rolls of very small diameter, supported by a number of back rolls on either side



Module IV

17. Diesel cycle is the cycle on which the diesel engine works. Diesel cycle consists of four reversible process. Heat is supplied at constant pressure and rejected at constant volume. Expansion and compression occurs adiabatically.



Consider a cylinder with 'm' kg of air. Let P_1, V_1, T_1 be the pressure, volume and temperature of air inside the cylinder at state 1. It is compressed adiabatically to state 2, doing work on air. Curve 1-2 represents this process. Now heat is supplied to the air at constant pressure from an external hot body till state 3 is reached. This process is represented by a horizontal line 2-3 in PV diagram. At state 3 hot body is removed and the air is allowed to expand adiabatically to state 4 doing external work. It is represented by curve 3-4 in PV diagram. Heat is rejected at constant volume to an external cold body till state 1 is reached. Process is represented by vertical line 4-1 in PV diagram.

Heat supplied during constant volume process 2-3 =

$$m C_p (T_3 - T_2)$$

Heat rejected during constant volume process 4-1 =

$$m C_v (T_4 - T_1)$$

Efficiency $\eta = 1 - \frac{\text{heat rejected}}{\text{heat supplied}} = 1 - \frac{m C_v (T_4 - T_1)}{m C_p (T_3 - T_2)}$

$$1 - \frac{C_v (T_4 - T_1)}{C_p (T_3 - T_2)} = 1 - \frac{1}{\gamma}\left(\frac{T_4 - T_1}{T_3 - T_2}\right)$$

Let $\frac{V_3}{V_2}$ be the cut off ratio ρ, $\frac{V_4}{V_3}$ be the expansion ratio r_1 and $\frac{V_1}{V_2}$ the compression ratio r. Relation b/w

$$\frac{V_4}{V_3} = \frac{V_4}{V_2} \times \frac{V_2}{V_3} \quad \cdot \quad \frac{V_1}{V_2} \times \frac{V_2}{V_3}$$

$$r_1 = r \times \frac{1}{\rho} = \frac{r}{\rho}$$

adiabatic process 1-2

$$\frac{T_2}{T_1} = \left(\frac{V_1}{V_2}\right)^{\gamma-1}$$

$$T_2 = T_1\left(\frac{V_1}{V_2}\right)^{\gamma-1} \Rightarrow T_2 = T_1 r^{\gamma-1}$$

constant pressure process 2-3

$$\frac{T_3}{T_2} \cdot \frac{V_3}{V_2} = \rho$$

$$T_3 = T_2 \times \rho \Rightarrow T_3 = T_1 r^{\gamma-1} \times \rho$$

adiabatic process 3-4

$$\frac{T_3}{T_4} = \left(\frac{V_4}{V_3}\right)^{\gamma-1} = r_1^{\gamma-1}$$

$$\left(\frac{r}{\rho}\right)^{\gamma-1} = \frac{r^{\gamma-1}}{\rho^{\gamma-1}} \Rightarrow T_4 = T_3 \times \frac{\rho^{\gamma-1}}{r^{\gamma-1}}$$

Substituting (3) $T_4 = T_1 \cancel{r^{\gamma-1}} \times \rho \times \frac{\rho^{\gamma-1}}{\cancel{r^{\gamma-1}}} = T_1 \rho^{\gamma}$

efficiency $\eta = 1 - \frac{1}{\gamma}\left(\frac{T_4 - T_1}{T_3 - T_2}\right)$

$$= 1 - \frac{1}{\gamma}\left(\frac{T_1\rho^{\gamma} - T_1}{T_1 r^{\gamma-1} \times \rho - T_1 r^{\gamma-1}}\right)$$

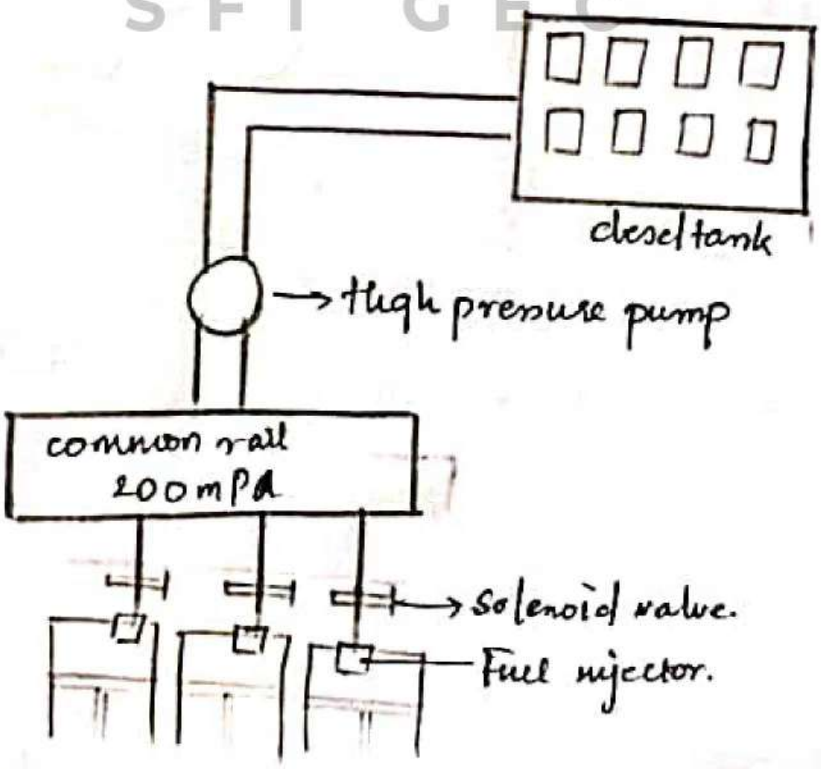
$$1 - \frac{1}{\gamma}\left(\frac{\rho^{\gamma} - 1}{r^{\gamma-1} \times \rho - r^{\gamma-1}}\right)$$

$$1 - \frac{1}{\gamma} \times \frac{1}{r^{\gamma-1}}\left[\frac{\rho^{\gamma} - 1}{\rho - 1}\right]$$

18. CRDI is used in diesel engines. In diesel fuel system, high pressure pumps are required for injection of fuel at high velocity. Each fuel injector needs seperate high pressure pumps. These pumps are mechanical device and the quantity of fuel needed to be delivered and other factors are hold identified by mechanical pumps. In CRDI, these seperate pumps are avoided and a single high pressure pump is used. In order to increase the pressure of diesel, a high pressure pump is used and this high pressure diesel is stored in a common rail. This common rail is connected to the fuel injectors in each cylinder. The opening of the common rail to the fuel injector is controlled by a solenoid valve, which is an electrical component controlled by EC. It controls the amount of diesel entering the injector and also the time required for the process. ECU process the data receiving from different sensors and also control each fuel injector individually.

Advantages

- Higher efficiency and mileage
- Better power balance
- Less pollution and less vibration & noise
- More compact engine



15 (b) $T_1 = 650\ K$

$T_2 = 310\ K$

$W = 150 \times 10^3\ J$

$$\eta = 1 - \frac{T_2}{T_1} = 1 - \frac{310}{650} = 0.523$$

$$= 52.3\%$$

$$\eta = \frac{W}{\text{Heat supplied}} \Rightarrow \text{Heat supplied} = \frac{W}{\eta}$$

$$= \frac{150 \times 10^3}{0.523} = 28.68 \times 10^4\ J$$

Module - V

19a) $Q = 200 L/min$

$= 0.2 m^3/min$

$= 0.0033 m^3/s$

$H = 16m$

$\eta = 50\% = 0.5$

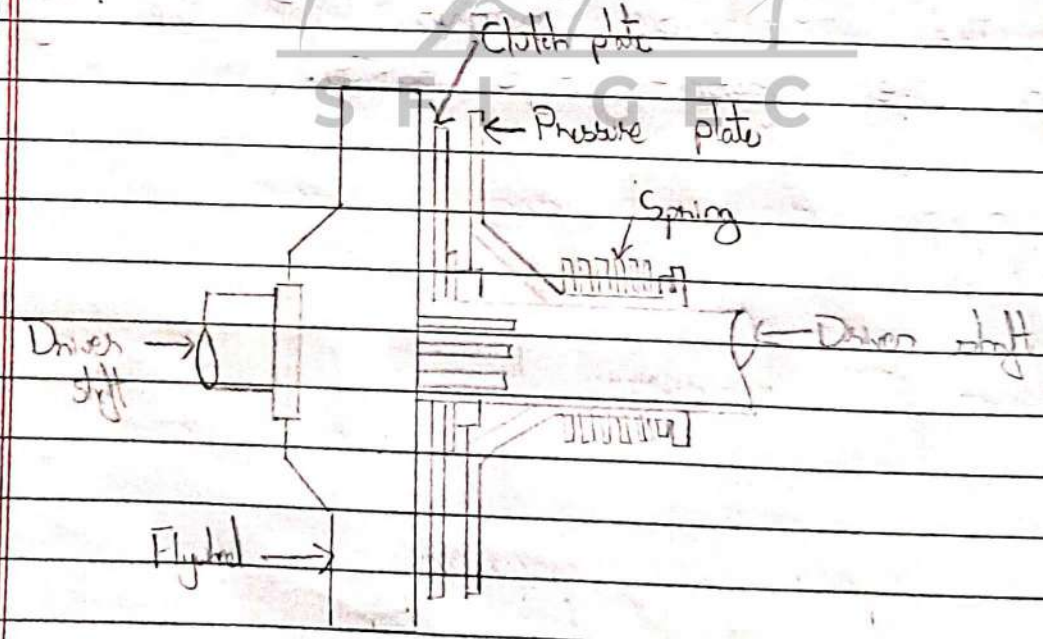
Overall efficiency, $\eta = \frac{\rho g Q H}{P \times 1000}$

Power, $P = \frac{\rho g Q H}{\eta_o \times 1000}$

$= \frac{1000 \times 9.8 \times 0.0033 \times 16}{0.5 \times 1000}$

$= 1.034 kW$

b)

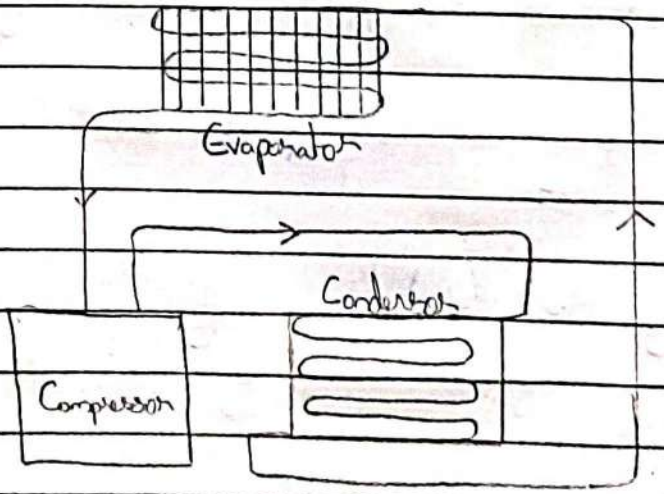


Working:

A spring loaded pressure plate presses the clutch plate against the flywheel, when the clutch is engaged. A friction between the lining on the clutch plate and the flywheel on one side and the friction between the lining on the clutch plate and pressure plate on the other side cause the clutch plate and the driven shaft to rotate. When the pressure plate is pulled back by further compression of the spring, contact between the flywheel and clutch plate breaks and then the flywheel rotates without driving the clutch plate and the driven shaft. Thus the rotation of driven shaft can be stopped without stopping the engine.

OR.

20a) The working principle of a split air conditioner is same as that of room air conditioners. Here, the unit consisting of evaporator and fan is located inside the room and the other unit consisting of compressor, condenser and the fan can be kept anywhere outside the room. The indoor and outdoor units are connected by extended suction and liquid pipelines. The system works on vapour compression cycle.



Working:

→ The fan draws the hot air from the room to the indoor unit

→ At indoor unit, this hot air makes contact with the evaporator coils.

→ Hot air rejects heat to the low temperature, low pressure liquid refrigerant flowing inside the evaporator coils and get cooled.

→ This cooled air is then supplied back to the room and the room gets cooled.

→ At the evaporator, the low temperature low pressure liquid refrigerant converted into low temperature low pressure vapour refrigerant after absorbing heat from hot room air

→ The refrigerant is fed into the compressor where it is pressurised

→ The pressurised gas then goes through the condenser which condenses it into a liquid refrigerant.

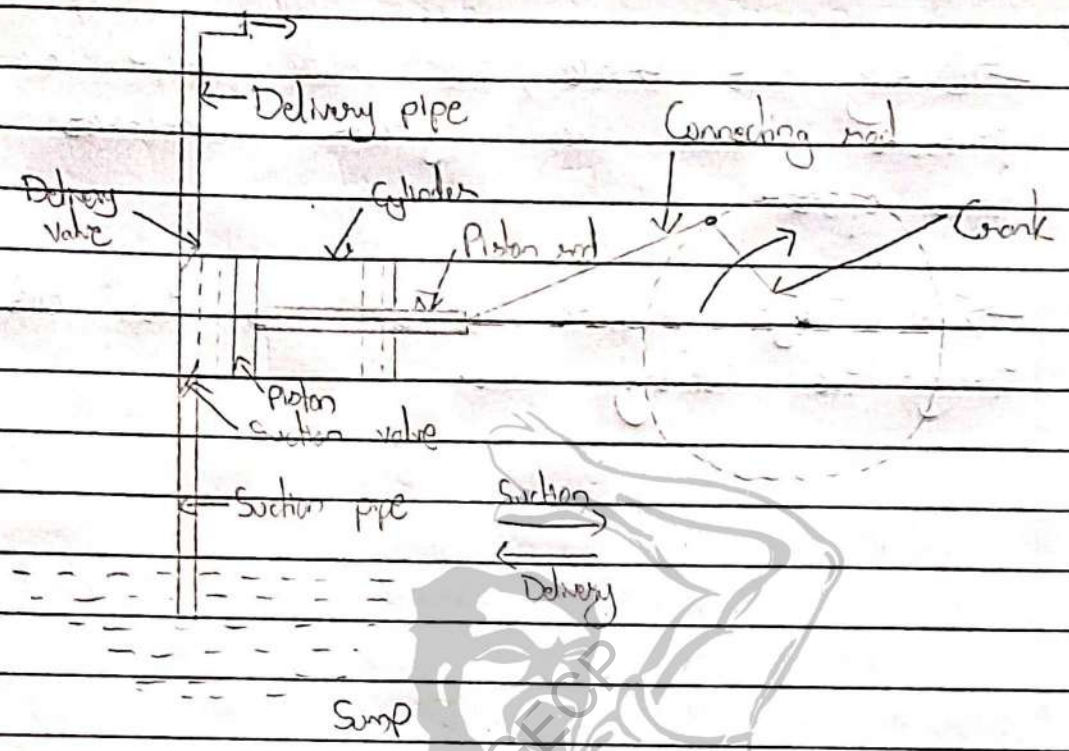
→ The liquid is still pressurized and travels through expansion tubes.

→ During the reduction of pressure the refrigerant also releases a great deal of heat and becomes much cooler

→ The gas then passes back to the evaporator to repeat

the process

b)



Working:

→ Crank is rotated by using an electric motor

→ As the crank rotates the piston inside the cylinder reciprocates by means of a connecting rod

→ As the piston moves from inner dead centre to outer dead centre the volume inside the cylinder increases and a vacuum will be created inside the cylinder.

→ As a result, the suction valve opens and water will enter the cylinder through the suction valve.

→ This stroke is called suction stroke

→ After reaching the outer dead centre, the piston starts to move towards inner dead centre.

→ During this stroke, the inlet valve closes and pressure inside the cylinder increases and delivery valve opens.

→ The high pressure water is then discharged through the delivery valve.

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21. Casting is the process of producing metallic parts of desired shape and size by pouring molten metal into a mould having a cavity of the part to be cast and then allowing the molten metal to solidify. The resulting solid will have the shape of the cavity and is called casting.

Casting Procedure

1. One half of the pattern is placed with its flat surface on a moulding board
2. The drag is placed on the board with the pins downward.
3. The drag is filled with moulding sand and properly rammed.
4. Excess sand above the top level of drag is removed and levelled with the top of the drag.
5. The drag is turned over and placed on another board.
6. The other part of the pattern is kept over the first half and parting sand is sprinkled over the surface. Now the cope is placed over the drag.
7. Runner and riser pins are placed at appropriate places and cope is filled with

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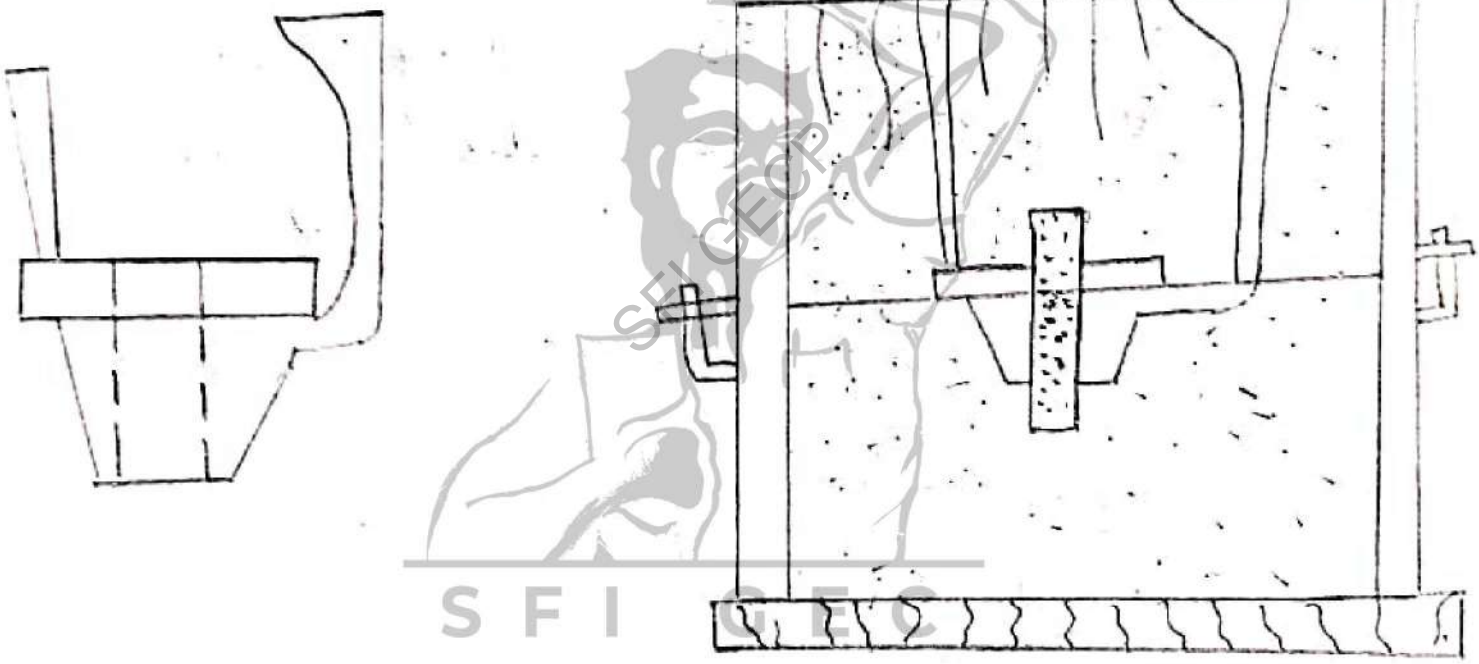

moulding sand, rammed properly.

8. Excess sand above the top level of cope is removed and levelled with the top of cope. Vent holes are made to ensure the escape of gases which are formed when molten metal is poured.
9. Runner and riser pins are removed and pouring basin is at the top of the sprue.
10. The cope is turned over and kept on a board.
11. Pattern halves are carefully removed from cope and drag.
12. Passage for the molten metal into the mould cavity known as gate is prepared on the top surface of the drag.
13. Repairs, if any, and cleaning of the mould cavity is carried out
14. Surface of the mould cavity is sprinkled with fine graphite powder in order to get a good surface finish
15. Core is kept in position
16. The cope is kept back, carefully in position on the drag and clamped. The mould is now ready for pouring the molten metal
17. After pouring the molten metal sufficient time is allowed for solidification, after that casting is taken out by breaking the mould.

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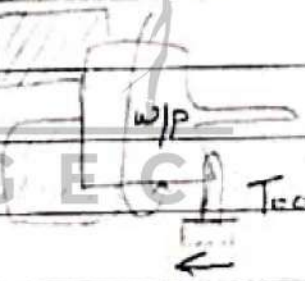
22. Major Lathe operations

1. Facing.

It is the first operation performed in a lathe. It is the operation of machining the ends of a work piece to obtain flat surface. In this process, cutting tool travels at right angle to the rotation of work piece

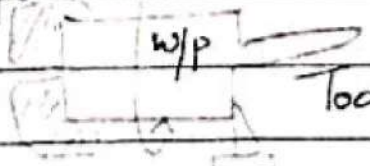
2. Turning

It is the material removal process to obtain a cylindrical surface. Turning operation is carried out with a single point cutting tool which travels parallel to the rotation of work piece



3. Taper Turning

It is the process of producing conical surface by gradual change of diameter from a cylindrical work piece.



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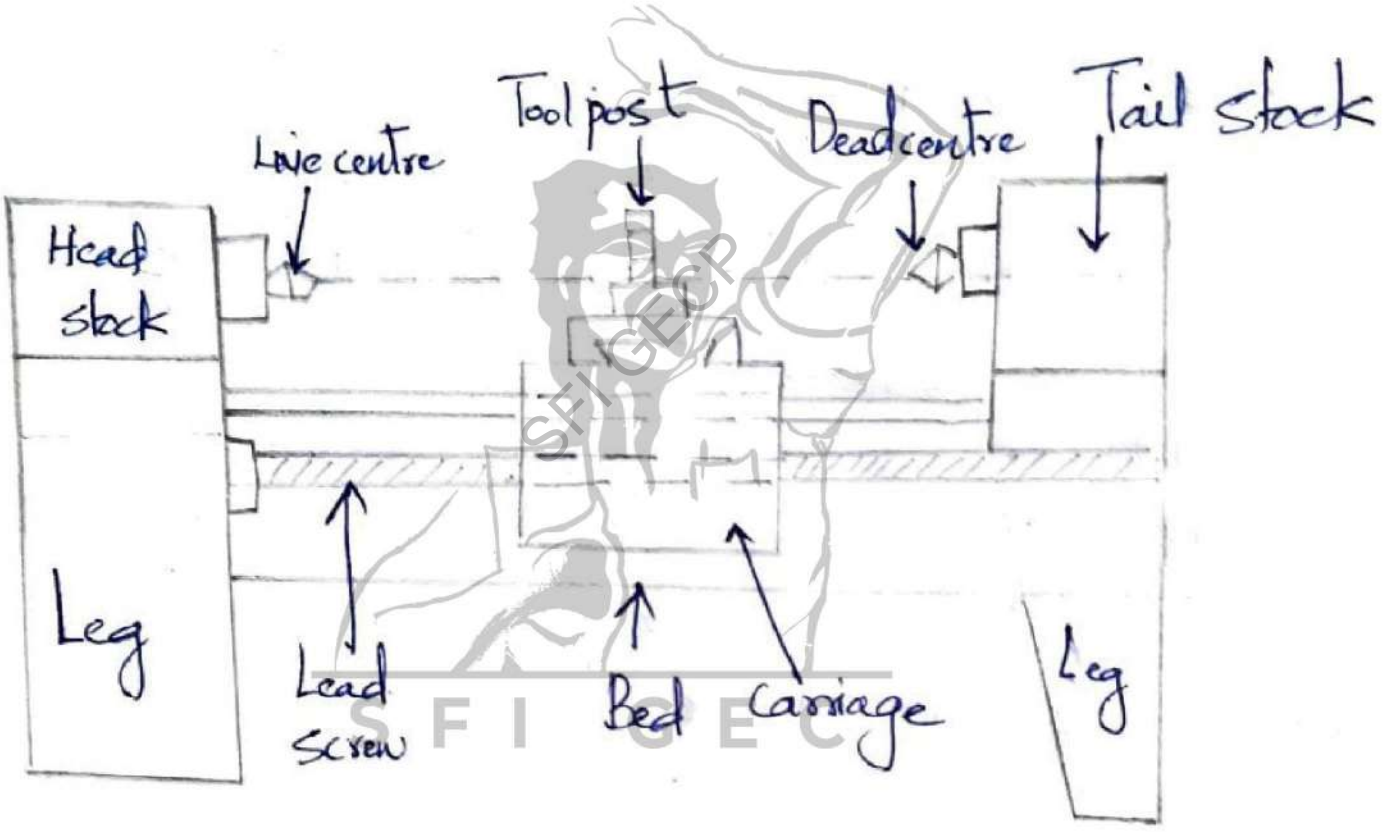
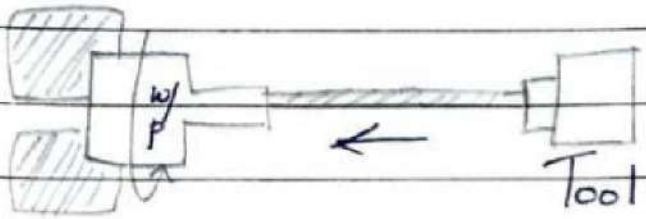
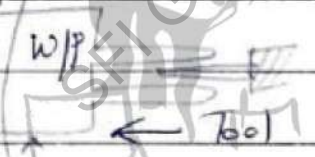

Tool post
Tail stock
Live centre
Dead centre
Head stock
Leg
Lead screw
Bed
Carriage
Leg

4. Drilling.



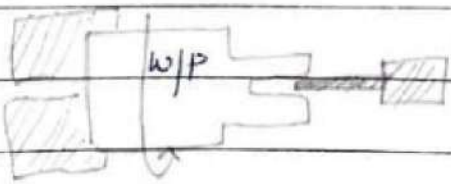
It is the process of making a hole in a work piece. It is done by drill bit is held in a tool holder which is mounted on tail stock. Tool advances towards the rotating workpiece and drilling takes place.

5. Boring



In boring process, a single point cutting tool is used to enlarge a hole.

6. Reming.



It is the process of sizing and finishing a hole by beams of a reamer. A reamer cannot produce a hole in a solid work

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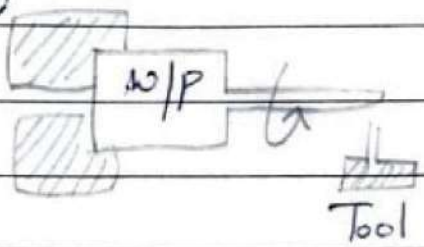
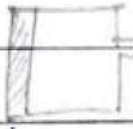
piece and it can be only used for sizing and finishing operations

7. Chamfering.



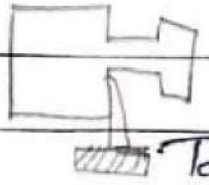
It is the process of turning a taper at the end of workpiece

8. Knurling.



It is the process of turning a taper at the end of work piece operation of diamond shaped pattern is printed on the surface of workpiece.

9. Grooving.
It is also known as necking. It is used to make grooves on w/p.



10. Threading: Process of making thread on w/p
11. Parting: Split the w/p into 2 parts.

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