EAST WEST UNIVERSITY

Project on

Designing electrical services for a chosen floor plan.

Department of Electrical and Electronic Engineering

Course: EEE300

Section: 01

Semester: Fall 2022

Submitted By:

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Contents

Abstract

The objective of this project is to provide real life implementation and an understanding about modern and innovative electrical services for apartments. We used the knowledge of fitting and fixture layout, Conduit diagram, power fitting diagram, switchboard, distribution board and choose proper safety equipment's like circuit breakers in our project and achieved our goal. We are able to know how we can provide maximum comfort under the power demand. We achieved our course outcomes by this project.

Objective

Designing a bedroom apartment with needed fittings and fixers. Also make a suitable conduit layout, power fitting layout, connection of every switchboard and also connection of distribution board. Also calculating the current ratings.

Course Outcomes:

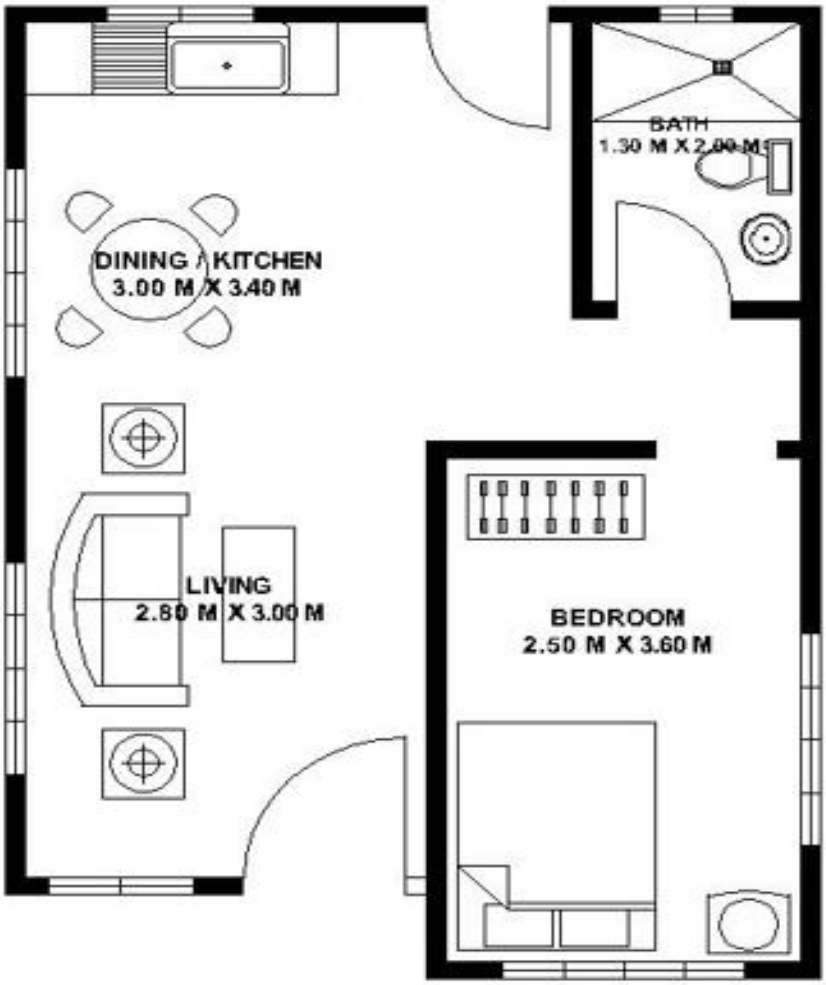
The assignment will address the following Course Outcomes of EEE 300 –

CO1: Analyze electrical power demand in a building based on customer needs.

CO2: Design electrical wiring complete layout including fitting, fixture, switchboard, and distribution board subject to specifications and constraints considering applicable standards and codes.

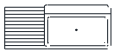
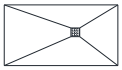
CO4: Prepare and present basic technical documentation of a building services system.

Floor Plan:

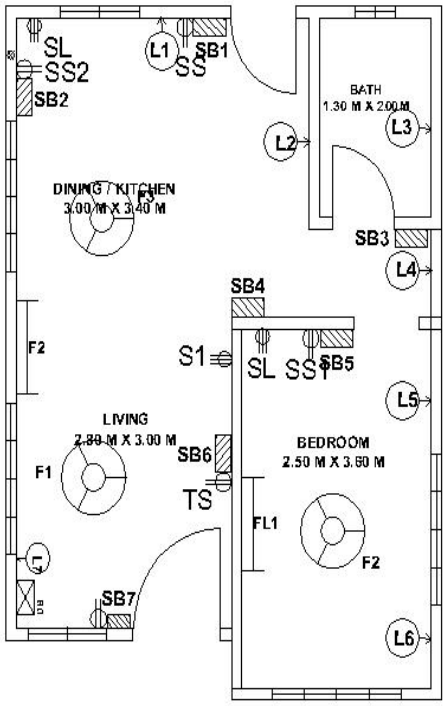

BATH
1.30 M X 2.00 M
DINING / KITCHEN
3.00 M X 3.40 M
LIVING
2.80 M X 3.00 M
BEDROOM
2.50 M X 3.60 M

Legends of Floor Plan

LEGENDS

	Kitchen Sink
	Dining Table
	Bath Tub
	Toilet
	Sink
	Table
	Sofa
	Bed
	Closet
	Dressing Table
	Tea Table
	Door
	Window

Fittings and Fixture Layout:



Legends

- Wall Bracket Light at Lintel Level (L)
- Distribution Board (DB)
- 40W Fluorescent Wall Light Fitting (FL)
- Switch Board Concealed (SB1,SB2,SB3....)
- 3-Pin 15A Socket at Skirting Level (SBL)
- Ceiling Fan 56 inch (F)
- 2-Pin 5A Socket at SB Level (SS)
- 2-Pin 5A Socket at Table Height (ST)
- 3-Pin 15A Socket at Lintel Level (SL)
- **2-Pin 5A Socket at Skirting Level For Tv**
- **Exhaust Fan**

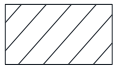
Legends of Fittings and Fixture

Legends


Wall Bracket Light at Lintel Level (L)

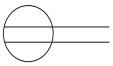

Distribution Board (DB)


40W Fluorescent Wall Light Fitting (FL)


Switch Board Concealed (SB1,SB2,SB3....)


3-Pin 15A Socket at Skirting Level (SBL)


Ceiling Fan 56 inch (F)


2-Pin 5A Socket at SB Level (SS)

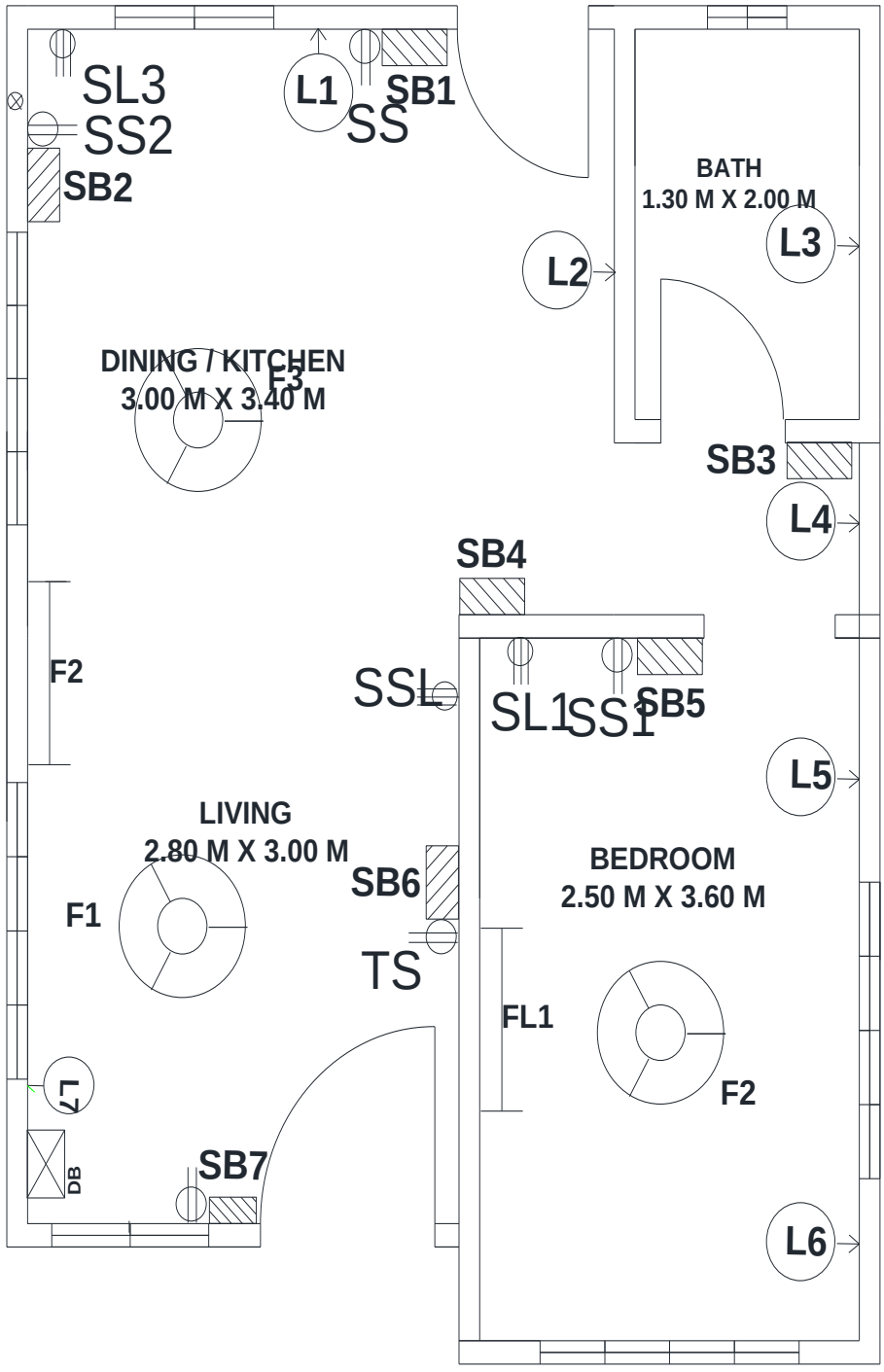

2-Pin 5A Socket at Table Height (ST)


3-Pin 15A Socket at Lintel Level (SL)


2-Pin 5A Socket at Skirting Level For Tv

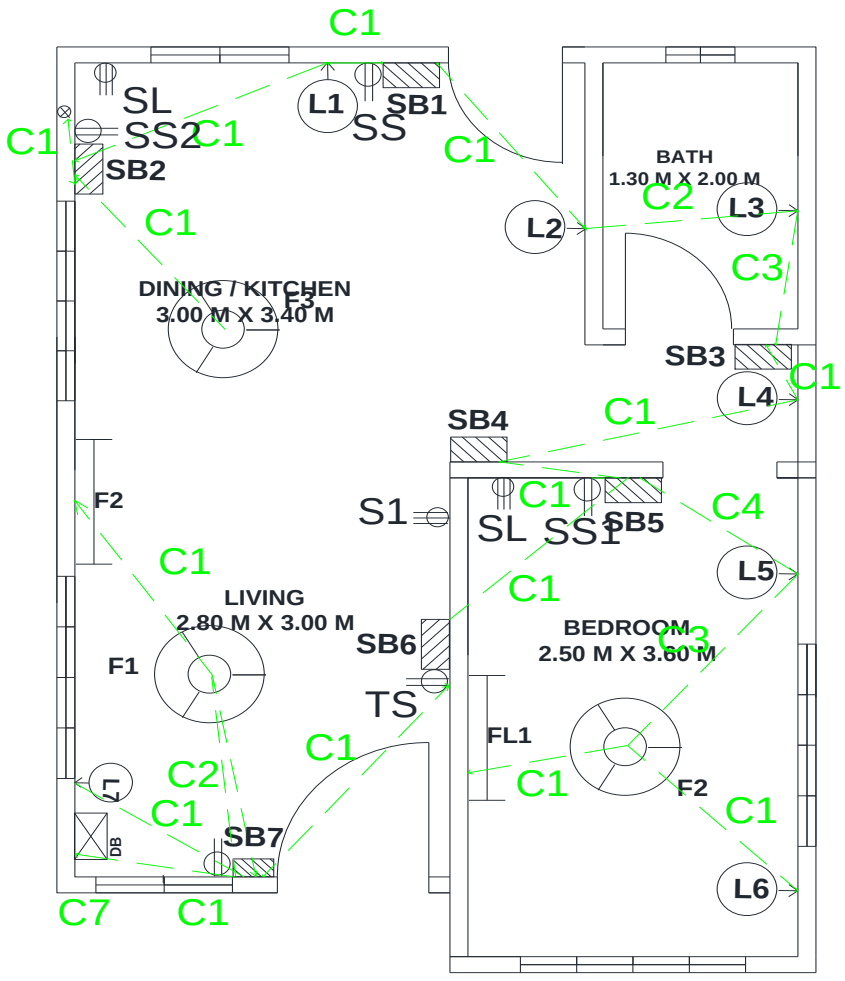

Exhaust Fan

Conduit Layout 1:



Here the conduits are mostly in 90-degree alignment. The interconnection here between SB1, SB2, SB3, SB4, SB5, SB6, and SB7.

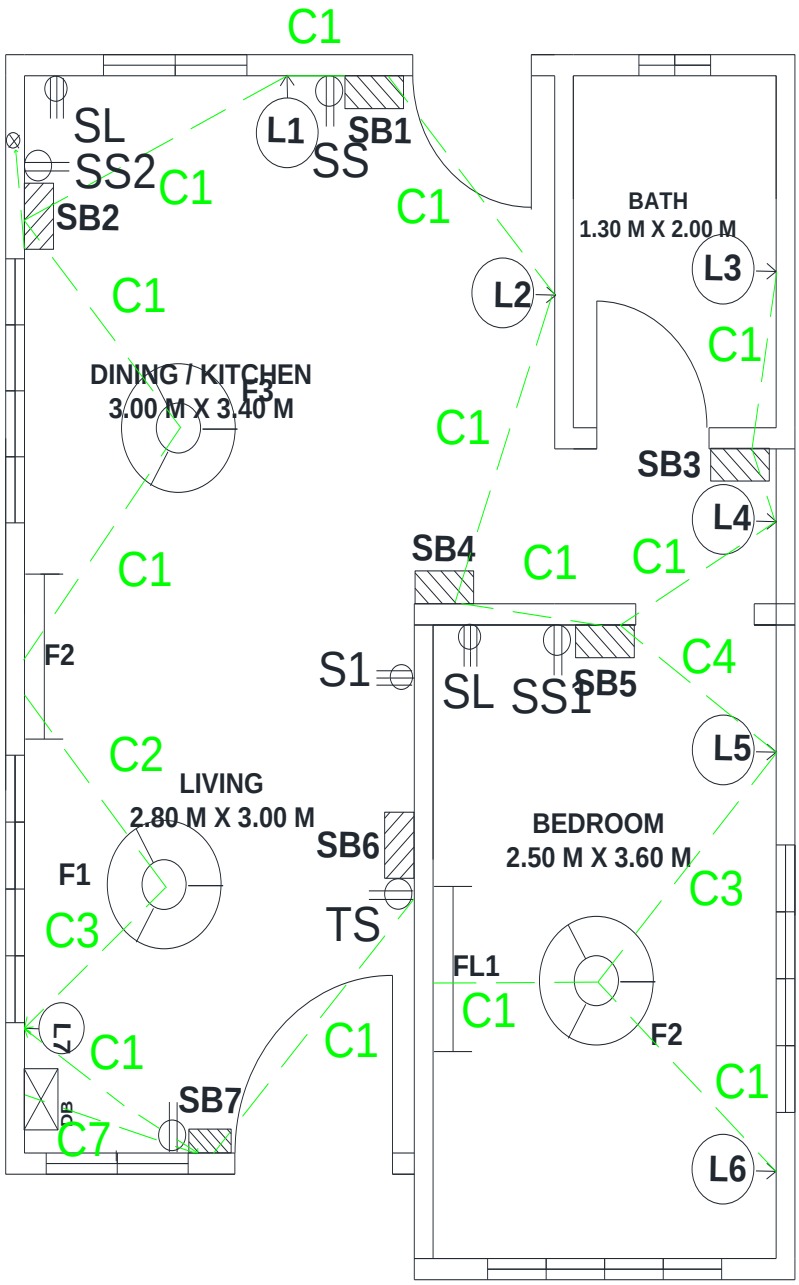
Conduit Layout 2



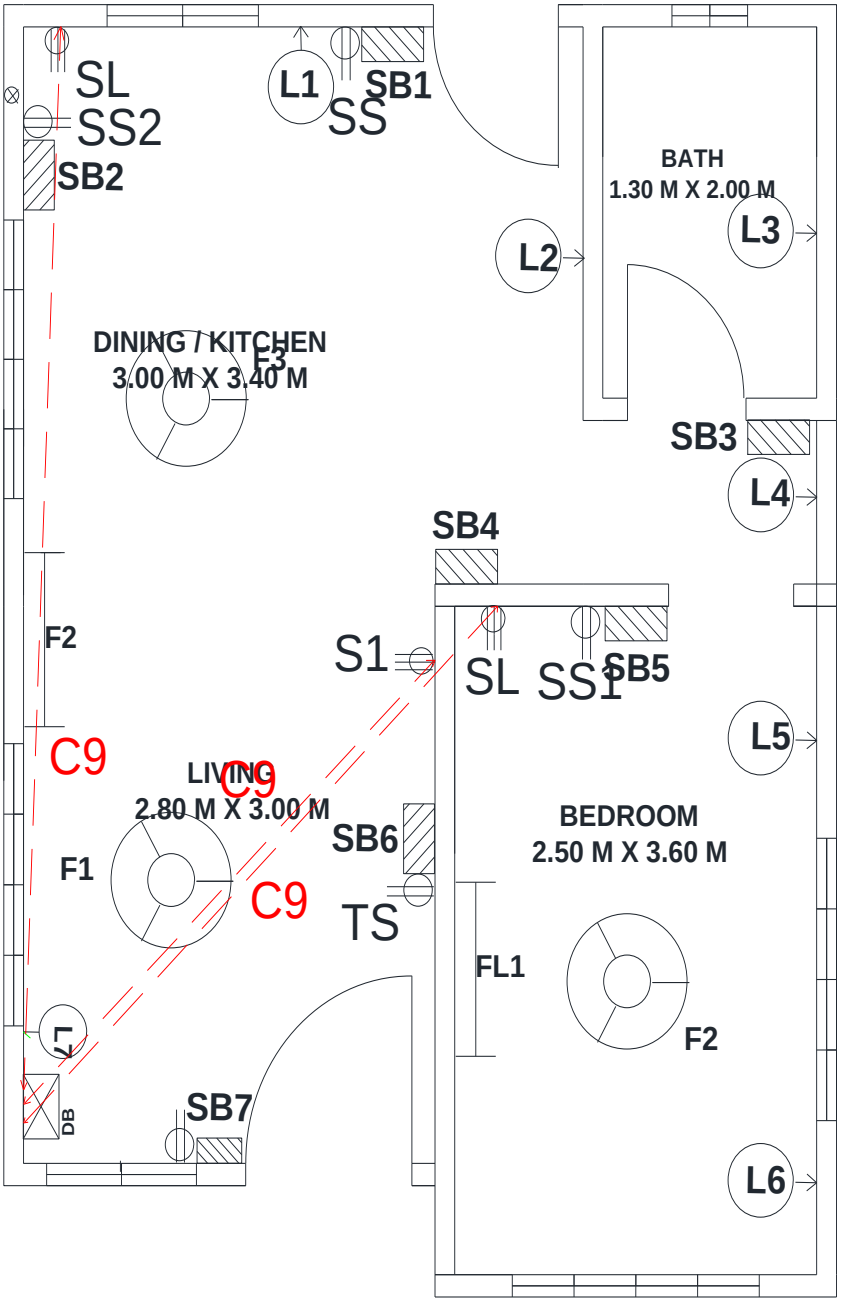
In this layout the inter connection conduit from SB5 and SB7 to Distribution board are to much long.

Final Conduit Layout (1)

From this three-conduit layout, i will use layout-1. Because layout-1 consist of less length then layout 2. We do not worry about the number of conduits but need to reduce conduit length as much as possible. Conduit layout-1 fulfils these criteria to reduce conduit length by using one conduit for multiple connection which is cost effective and efficient.



Power Fitting

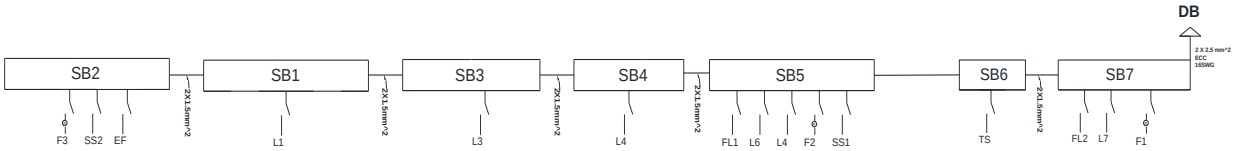


This is the fittings and fixture diagram. In this diagram I have tried to avoid overlap in every possible case.

Legends of Wires:

C1 = 2X1.5mm^2
C2 = 4X1.5mm^2
C3 = 6X1.5mm^2
C4 = 8X1.5mm^2
C5 = 10X1.5mm^2
C6 = 12X1.5mm^2
C7 = 14X1.5mm^2
C8 = 2X2.5mm^2
C9 = 2X4mm^2

Switchboard Connection Diagram



Current Rating Calculation for Circuit Breakers

For SB2:

F3 = 70W (continuous load)

EF= 50W Exhaust Fan. (non-continuous load)

SB2 = (F3) × 125% +EF × 100% = (70) × 125% + 50 × 100% = 137.5W

And Power factor 0.8 for 25% safety considered as per BNBC rule. [1]

So, $\frac{137.5\text{W}}{220\text{ V}\times 0.8}$

= 0.781A

For SB1:

L1 =10 W LED (continuous load)

SB1 = (L1) × 125% = 10 × 125% =12.5 W

And Power factor 0.8 for 25% safety considered as per BNBC rule. [1]

So, $\frac{12.5W}{220\ V \times 0.8}$

= 0.071A

For SB3:

L3 =10 W LED (Non continuous load)

SB3 = (L3) × 100% = 10 × 100% =10 W

And Power factor 0.8 for 25% safety considered as per BNBC rule. [1]

So, $\frac{10W}{220\ V \times 0.8}$

= 0.057A

For SB4:

L4 =10 W LED (Non continuous load)

SB4 = (L4) × 100% = 10 × 100% =10 W

And Power factor 0.8 for 25% safety considered as per BNBC rule. [1]

So, $\frac{10W}{220\ V \times 0.8}$

= 0.057A

SB5

FL1 = 20W (continuous load)

L6=10W LED(Non continuous load)

L4=10W LED(Non continuous load)

F2=70W (continuous load)

SB5 = (FL1+F2) × 125%+(L4+L6) ×100% =(20+70) ×125%+(10+10) ×100% =132.5 W

And Power factor 0.8 for 25% safety considered as per BNBC rule. [1]

So, $\frac{132.6W}{220\ V \times 0.8}$

=0.753 A

SB7

FL2=20W (continuous load)

L7 = 10W LED (Non continuous load)

F1= 70W (Non continuous load)

SB7 = (FL2) × 125% +(L7+F1)×100%= 20 × 125%+(10+70)×100% =105 W

And Power factor 0.8 for 25% safety considered as per BNBC rule. [1]

So, $\frac{105\text{W}}{220\text{ V}\times 0.8}$

= 0.597A

Here, Total current draws from, = SB1+SB2+SB3+SB4+SB5+SB7 = 0.071A +0.781A +0.057A +0.057A +0.753 A+0.597A=2.316A

So here I can use a 6A circuit -breaker.

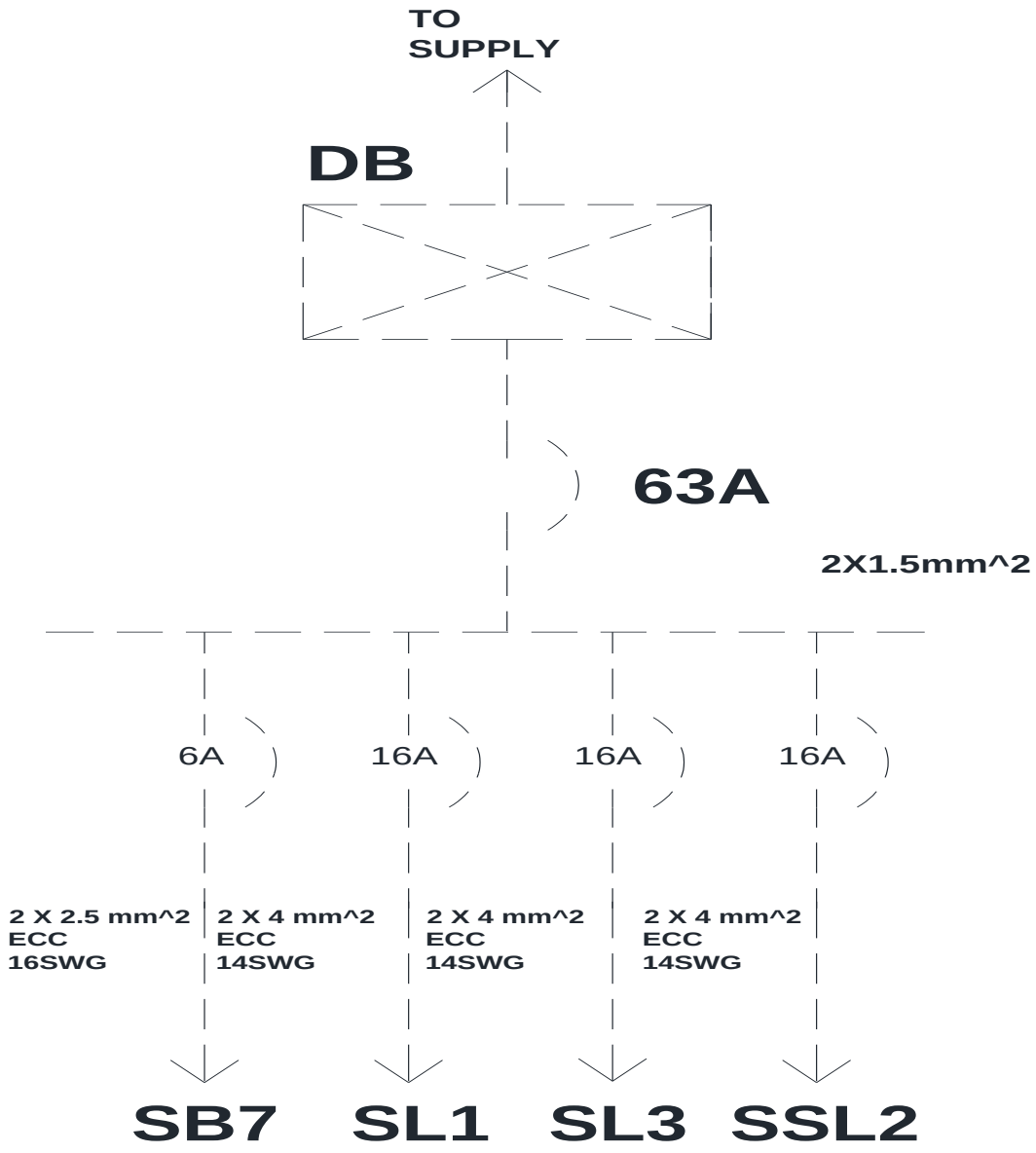
For, AC current rating 9.75A which relates to SL1 15A 3pin socket, so I have used 15A MCB.

Also, Oven current rating 10.87A which relates to SL3 10A 3pin socket, so I have used 16A MCB

Lastly, Fridge current rating 3A which relates to SSL2 5A 3pin socket, so I have used 16A

Now, Total current = 6+16+16+16 = 54A So, I should use 63A MCB

Distribution Board



Conclusion

Now I can be able to design a floor plan of any dimension and also identify about its fittings and fixture, conduit layout, power fitting layout, switch board and distribution board diagram from this project. I have learned how to prepare and present building service system for an apartment and how to design fitting fixture, conduit layout power fitting, switch board diagram distribution board diagram using AutoCAD and also learn how to apply (BNBC 2020: , Part 8, Chapter 1) instructions.

References:

1. Bangladesh National Building Code (BNBC 2020)Part 8, Chapter 1

2. List of the Power Consumption of Typical Household Appliances: https://www.daftlogic.com/information-appliance-power-consumption.htm

3. Size of Air Conditioner (A.C) for different area:

Power Consumption of Typical Household Appliances (daftlogic.com)

4. Exhaust Fan Current Rating: https://www.cohesivehomes.com/how-much-electricity-do-exhaust-fans-use#:~:text=Exhaust%20fans%20typically%20use%20anywhere,for%20commercial%20systems%20as%20well.

5. MCB rating of distribution box

https://electricalnotes.wpcomstaging.com/2015/10/02/calculate-size-of-main-elcb-brach-mcb-of-distribution-box/