In [194]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn import preprocessing
```

In [195]:

```
df = pd.read_csv('D:/data_te.csv')
```

In [196]:

```
df.head()
```

Out[196]:

	Order Id	Date Added	Ref No	Product Id	HSN	Product Name	Order Options	Price	Quantity
0	346206500223	31-01-2022	867326	5286	11041200	6Uec10lqqt	fg int-pune: 22TE025	402.29	1
1	346206500222	31-01-2022	867585	IvHA	19012000	sZRvN7lEWB	fg int-pune: 22TE006	111.12	1
2	346206500221	31-01-2022	868982	r71S	19041090	sWrJ3DdrB6	fg int-pune: 22TE029	145.42	1
3	346206500221	31-01-2022	868982	iljG	19041090	2oTsIxCuIz	fg int-pune: 22TE029	443.73	1
4	346206500220	31-01-2022	871315	MMNL	21061000	azKG9uogCd	fg int-pune: 22TE021	145.42	1

5 rows × 29 columns

In [197]:

```
df.shape
```

Out[197]:

```
(149, 29)
```

In [198]:

```
# 148 rows with 29 columns
```

In [199]:

```
df.columns.values
```

Out[199]:

```
array(['Order Id', 'Date Added', 'Ref No', 'Product Id', 'HSN',
       'Product Name', 'Order Options', 'Price', 'Quantity',
       'Total Excl Tax', 'Product Tax', 'Total Incl Tax', 'Sub Total',
       'Shipping', 'Total Tax', 'Order Total', 'Order Status',
       'Tracking Id', 'Date Shipped', 'Customer GST Number',
       'Supply Type', 'Tax Rate', 'CGST', 'SGST', 'IGST',
       'single_product_weight_in_gm', 'order_weight_in_gm',
       'Product Type', 'Courier Partner'], dtype=object)
```

In [200]:

```
df.dtypes
```

Out[200]:

```
Order Id                         int64
Date Added                      object
Ref No                           int64
Product Id                      object
HSN                              int64
Product Name                    object
Order Options                   object
Price                          float64
Quantity                         int64
Total Excl Tax                 float64
Product Tax                    float64
Total Incl Tax                 float64
Sub Total                      float64
Shipping                       float64
Total Tax                      float64
Order Total                    float64
Order Status                    object
Tracking Id                      int64
Date Shipped                    object
Customer GST Number             object
Supply Type                     object
Tax Rate                        object
CGST                             int64
SGST                             int64
IGST                           float64
single_product_weight_in_gm      int64
order_weight_in_gm               int64
Product Type                    object
Courier Partner                 object
dtype: object
```

In [201]:

```
df.describe()
```

Out[201]:

	Order Id	Ref No	HSN	Price	Quantity	Total Excl Tax	Proc
count	1.490000e+02	149.000000	1.490000e+02	149.000000	149.000000	149.000000	149.000
mean	3.462065e+11	938271.436242	1.701997e+07	230.135436	1.154362	251.914362	32.278
std	3.543084e+01	19521.095864	4.985719e+06	125.685249	0.475406	129.246314	23.358
min	3.462065e+11	867326.000000	4.090000e+02	73.830000	1.000000	73.830000	5.240
25%	3.462065e+11	931579.000000	1.207999e+07	124.880000	1.000000	145.420000	14.050
50%	3.462065e+11	941737.000000	1.904109e+07	167.620000	1.000000	220.000000	26.180
75%	3.462065e+11	951258.000000	2.008192e+07	294.640000	1.000000	392.070000	39.600
max	3.462065e+11	959792.000000	2.106910e+07	510.710000	4.000000	510.710000	80.010

In [202]:

```
# Describe is used inly for numerical data beacuse mean and all other statistical parameter
```

In [203]:

```
# Now as we can see there is no entery in shipping we can actually drop that column
```

In [204]:

```
df = df.drop('Shipping',1)
```

```
<ipython-input-204-22a5e9e9e3fc>:1: FutureWarning: In a future version of pa
ndas all arguments of DataFrame.drop except for the argument 'labels' will b
e keyword-only
  df = df.drop('Shipping',1)
```

In [205]:

```
df.head()
```

Out[205]:

	Order Id	Date Added	Ref No	Product Id	HSN	Product Name	Order Options	Price	Quantity
0	346206500223	31-01-2022	867326	5286	11041200	6Uec10Iqqt	fg int-pune: 22TE025	402.29	1
1	346206500222	31-01-2022	867585	lvHA	19012000	sZRvN7lEWB	fg int-pune: 22TE006	111.12	1
2	346206500221	31-01-2022	868982	r71S	19041090	sWrJ3DdrB6	fg int-pune: 22TE029	145.42	1
3	346206500221	31-01-2022	868982	iljG	19041090	2oTsIxCuIz	fg int-pune: 22TE029	443.73	1
4	346206500220	31-01-2022	871315	MMNL	21061000	azKG9uogCd	fg int-pune: 22TE021	145.42	1

5 rows × 28 columns

In [206]:

```
df.columns.values
```

Out[206]:

```
array(['Order Id', 'Date Added', 'Ref No', 'Product Id', 'HSN',
       'Product Name', 'Order Options', 'Price', 'Quantity',
       'Total Excl Tax', 'Product Tax', 'Total Incl Tax', 'Sub Total',
       'Total Tax', 'Order Total', 'Order Status', 'Tracking Id',
       'Date Shipped', 'Customer GST Number', 'Supply Type', 'Tax Rate',
       'CGST', 'SGST', 'IGST', 'single_product_weight_in_gm',
       'order_weight_in_gm', 'Product Type', 'Courier Partner'],
      dtype=object)
```

In [207]:

```
from datetime import datetime
```

In [208]:

```
df['Date Added'] = pd.to_datetime(df['Date Added'], errors='coerce')
df['Date Added'] = pd.to_datetime(df['Date Shipped'], errors='coerce')
df['Product Name'] = df['Product Name'].astype(str)
df['Quantity'] = df['Quantity'].astype(int)
df['Price'] = df['Price'].astype(float)
```

In [209]:

```
df.head()
```

Out[209]:

	Order Id	Date Added	Ref No	Product Id	HSN	Product Name	Order Options	Price	Quantity
0	346206500223	2022-01-31	867326	5286	11041200	6Uec10lqqt	fg int-pune: 22TE025	402.29	1
1	346206500222	2022-01-31	867585	lvHA	19012000	sZRvN7lEWB	fg int-pune: 22TE006	111.12	1
2	346206500221	2022-01-31	868982	r71S	19041090	sWrJ3DdrB6	fg int-pune: 22TE029	145.42	1
3	346206500221	2022-01-31	868982	iljG	19041090	2oTslxCulz	fg int-pune: 22TE029	443.73	1
4	346206500220	2022-01-31	871315	MMNL	21061000	azKG9uogCd	fg int-pune: 22TE021	145.42	1

5 rows × 28 columns

In [210]:

```
items = df.groupby('Product Id').agg({'Quantity' : 'sum', 'Order Total' : 'mean', 'order_we
items
```

Out[210]:

	Quantity	Order Total	order_weight_in_gm
Product Id			
0	3	451.146667	2140
0lKj	1	131.120000	125
2lBb	1	330.000000	125
2r8x	1	131.120000	125
4XB1	6	326.480000	2190
...	...	...	...
xMfA	4	491.333333	2275
xeVd	1	416.240000	650
y4hg	3	131.120000	375
z8YB	3	264.000000	375
zlS9	1	110.000000	150

63 rows × 3 columns

In [211]:

```
df['Product Name']
```

Out[211]:

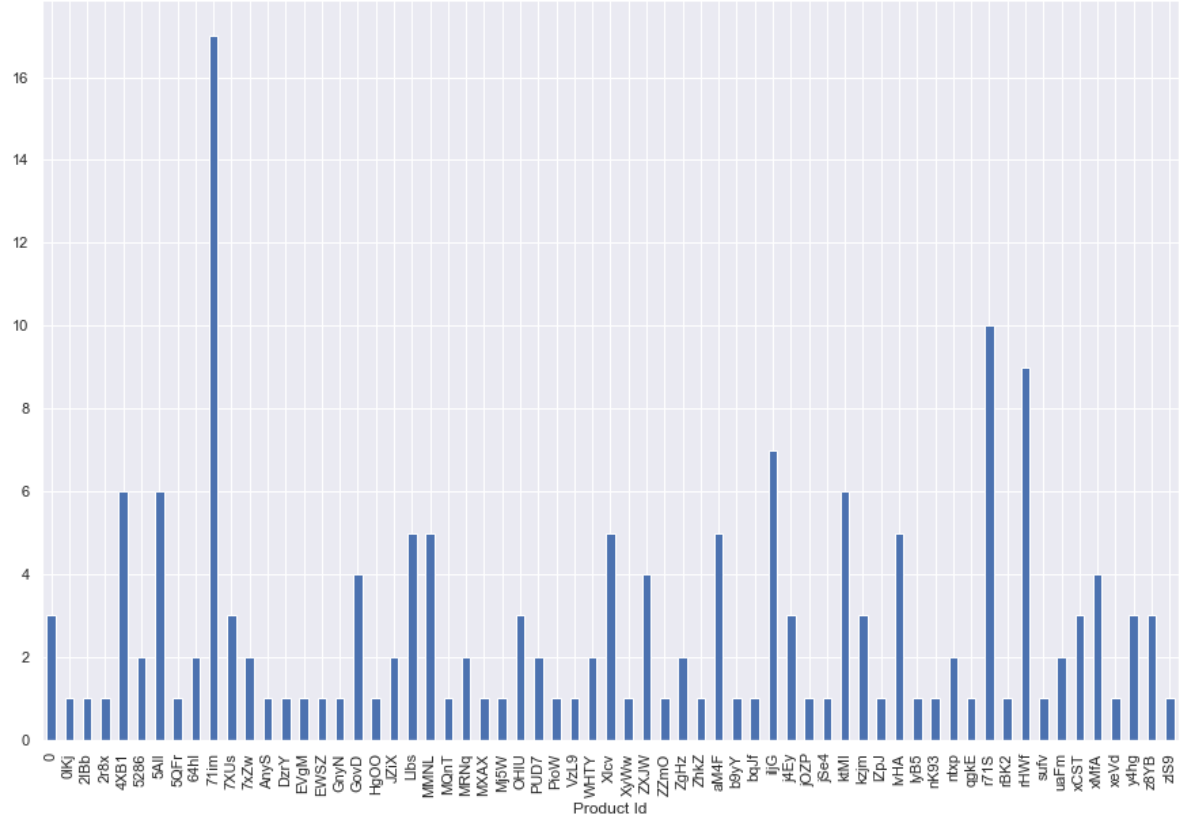
```
0      6Uec10Iqqt
1      sZRvN7lEWB
2      sWrJ3DdrB6
3      2oTsIxCuIz
4      azKG9uogCd
          ...
144    RkaFDwCzQd
145    a3iNLtDYsp
146    8hyj8aaEuy
147    6ii6cvL07i
148    pMEv9tn9Sf
Name: Product Name, Length: 149, dtype: object
```

In [212]:

```
# so we are having a total of 148 rows associated with product Name but product Id for rows
```

In [213]:

```
max = items['Quantity'].plot.bar(figsize = (15,10))
```



In [214]:

```
# so from here we can observe that maximum amount of sales are for 71im, r71S,rHWf.
```

In [215]:

```
# so now for obtaining Insights from data there should be variation in the data but few col
# Cgst, Sgst ,Supply type , Customer Gst Number , Date Shipped , Order Status, order option
# values across all the available rows so for the time being we can drop all these columns
# manner
```

In [216]:

```
df = df.drop(columns=['Date Added', 'Order Options', 'Order Status', 'Date Shipped', 'Custo
```

In [217]:

```
df.head()
```

Out[217]:

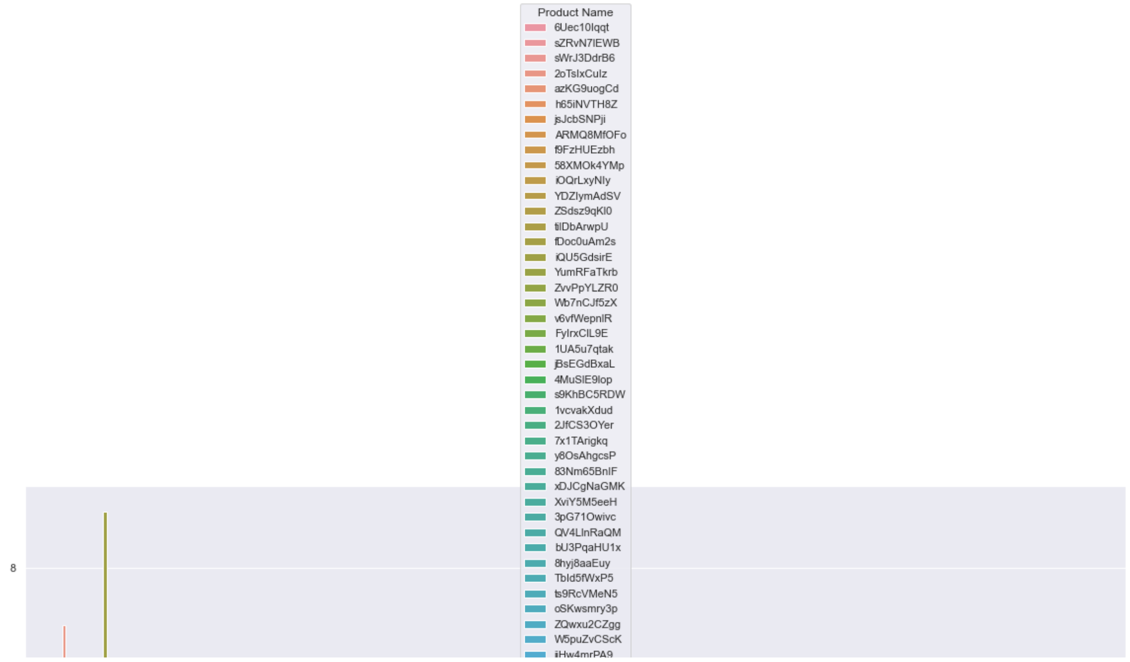
	Order Id	Ref No	Product Id	HSN	Product Name	Price	Quantity	Total Excl Tax	Product Tax
0	346206500223	867326	5286	11041200	6Uec10lqqt	402.29	1	402.29	20.11
1	346206500222	867585	lvHA	19012000	sZRvN7lEWB	111.12	1	111.12	20.00
2	346206500221	868982	r71S	19041090	sWrJ3DdrB6	145.42	1	145.42	26.18
3	346206500221	868982	iljG	19041090	2oTsIxCulz	443.73	1	443.73	79.87
4	346206500220	871315	MMNL	21061000	azKG9uogCd	145.42	1	145.42	26.18

In [218]:

```
# Now we need to perform some analysis with tax that if my Total Price gets Increased what
```

In [219]:

```
sns.set(rc = {'figure.figsize':(20,10)})
for i, predictor in enumerate(df.drop(columns=['Order Id','Product Tax','Total Tax','Order
    plt.figure(i)
    sns.countplot(data=df, x=predictor, hue='Product Name')
```



In [220]:

```
# so from this data we are able to understand the general spread of product quantities sold
```

In [221]:

```
# we are also able to infer from data that product with count =12 is having a maximum GST 1
# having maximum gst 18 wheras product with count 7 is also having a maximum GST 5.
# we can aslo see what product it is by looking at the legend chart
```

In [222]:

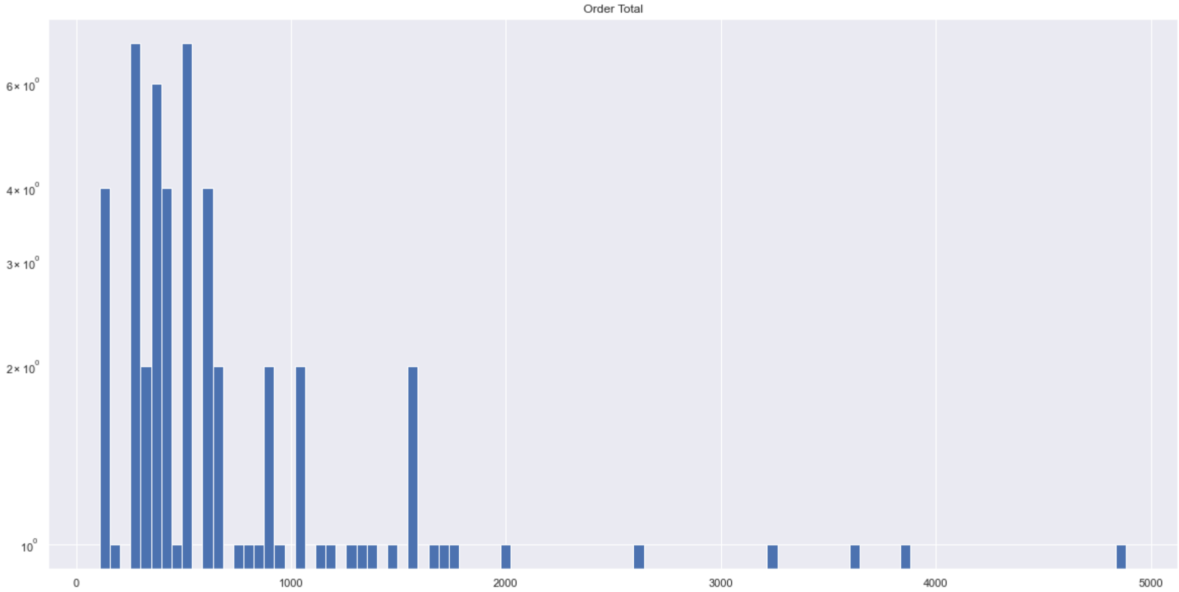
```
# Analyzing the data by order value
```

In [223]:

```
orders = df.groupby(['Product Id']).agg({'Order Total':'sum'}).sort_values('Order Total').r
orders.hist(bins=100, log=True)
```

Out[223]:

```
array([[<AxesSubplot:title={'center':'Order Total'}>]], dtype=object)
```



In [224]:

```
orders['Order Total'].describe()
```

Out[224]:

```
count      63.000000
mean      926.695873
std       951.536787
min       110.000000
25%       352.000000
50%       528.000000
75%      1156.320000
max      4886.640000
Name: Order Total, dtype: float64
```

In [225]:

```
# so from this distibution we are able to understand that maximum sales are for order with
# minimal sales for order with higher amount.
```

In [226]:

```
# Now we need to understand co-relation between different vaiables so for that we will cons
# associated with total order value of a product
```

In [235]:

```
# using label encoding on the product name coloumn we can convert product name into an colu
# further processing.
```

In [236]:

```
df['Product Name']
```

Out[236]:

```
0      11
1      56
2      55
3       4
4      38
       ..
144    25
145    37
146    15
147    12
148    52
Name: Product Name, Length: 149, dtype: int32
```

In [227]:

```
label_encoder = preprocessing.LabelEncoder()
```

In [228]:

```
df['Product Name']= label_encoder.fit_transform(df['Product Name'])
```

In [229]:

```
df.head()
```

Out[229]:

	Order Id	Ref No	Product Id	HSN	Product Name	Price	Quantity	Total Excl Tax	Product Tax	Tot In Ta
0	346206500223	867326	5286	11041200	11	402.29	1	402.29	20.11	422.4
1	346206500222	867585	lvHA	19012000	56	111.12	1	111.12	20.00	131.1
2	346206500221	868982	r71S	19041090	55	145.42	1	145.42	26.18	171.6
3	346206500221	868982	iljG	19041090	4	443.73	1	443.73	79.87	523.6
4	346206500220	871315	MMNL	21061000	38	145.42	1	145.42	26.18	171.6

In [230]:

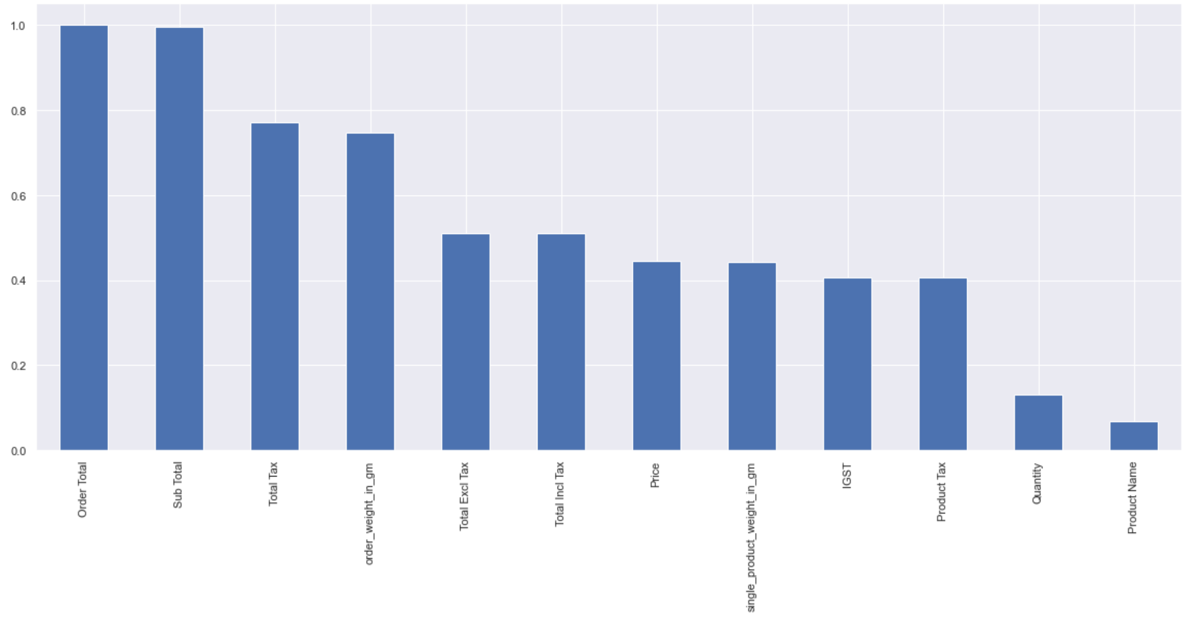
```
df = df.drop(columns=['Order Id', 'Ref No', 'Product Id', 'HSN', 'Tracking Id','Tax Rate'])
```

In [231]:

```
plt.figure(figsize=(20,8))
df.corr()['Order Total'].sort_values(ascending = False).plot(kind = 'bar')
```

Out[231]:

```
<AxesSubplot:>
```



In [233]:

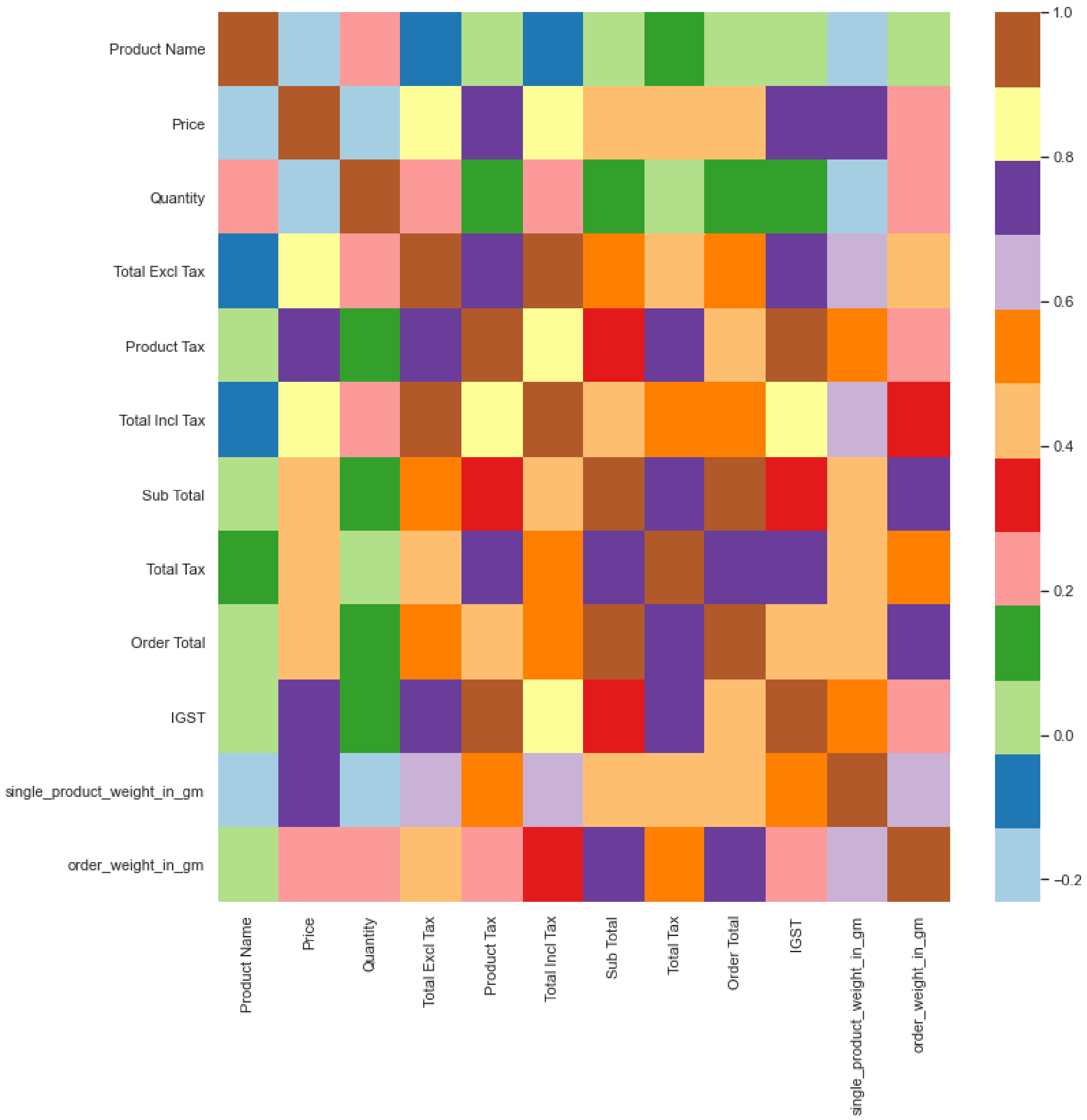
```
# so from this plot we can understand that all the numericals are having atleast a positive
# value. One thing we can note here is that Sub total, total tax , order_weight_in_gm are h
# with the Order Total (That is our output variable with which we are concerned). Where as
# affecting to the Order total that much. So one thing to note over here can be that the na
# the Order Total.
```

In [234]:

```
plt.figure(figsize=(12,12))
sns.heatmap(df.corr(), cmap="Paired")
```

Out[234]:

```
<AxesSubplot:>
```



In [239]:

```
# so now we can observe a corelation map wher we can clearly see which variables are highly
# observing brown and light yellow blocks and we can actually see what parameters are not c
# by observing light green and dark green squares and light blue and dark blue for negative
# Few of the high corelation are:-
# 1.) Product Tax and Igst
# 2.) Sub Total and Order Total
# Few of the low corelation are:-
# 1.) Single_product_weight_in_gm and Product Name
# 2.) Quantity and Single_product_weight_in_gm
```

In [ ]:

```
# Now Bi-variate Analysis will not make any sense here because we are not having any binary
# in the given data. So Now this is the general Analysis and few Insights we have obtained
```