"Comparative study of S&P BSE Sensex with 10 Sectoral Indices for a period of 5 years 2014-19"

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Abstract : Bombay Stock Exchange *(BSE) is an Indian stock exchange located in Mumbai, Maharashtra, India. Established in 1875 and is considered to be one of Asia' s fastest stock exchanges, with a speed of 200 microseconds and one of India' s leading exchange groups and the oldest stock exchange in the South Asia region. Bombay Stock Exchange is the world's 10th largest stock market by market capitalization at $1.7 trillion as of 23 Jan 2015. More than 5,000 companies are listed on BSE, making it the world's top exchange in terms of listed members. The main objective of study is To perform comparative study of S&P BSE Sensex with 10 Sectoral Indices, To identify whether there is a difference in risk factors across the sectoral indices*
Keywords: *Study of S&P BSE Sensex with 10 Sectoral Indices,*

I.   Introduction

The Bombay Stock Exchange is the oldest exchange in Asia. It traces its history to 1855, when four Gujarati and one Parsi stockbroker would gather under banyan trees in front of Mumbai's Town Hall. The location of these meetings changed many times as the number of brokers constantly increased. The group eventually moved to Dalal Street in 1874 and in 1875 became an official organization known as "The Native Share & Stock Brokers Association".

On 31 August 1957, the BSE became the first stock exchange to be recognized by the Indian Government under the Securities Contracts Regulation Act. In 1980, the exchange moved to the PhirozeJeejeebhoy Towers at Dalal Street, Fort area. In 1986, it developed the BSE SENSEX index, giving the BSE a means to measure overall performance of the exchange. In 2000, the BSE used this index to open its derivatives market, trading SENSEX futures contracts. The development of SENSEX options along with equity derivatives followed in 2001 and 2002, expanding the BSE's trading platform.

Historically an open outcry floor trading exchange, the Bombay Stock Exchange switched to an electronic trading system developed by CMC Ltd in 1995. It took the exchange only fifty days to make this transition. This automated, screen-based trading platform called BSE On-line trading (BOLT) had a capacity of 8 million orders per day. The BSE has also introduced the world's first centralized exchange-based internet trading system, BSEWEBx.co.in to enable investors anywhere in the world to trade on the BSE platform.

1.Importance and Significance of the Study.
- Study helps the investors to take correct actions on Investments from time to time.
- Comparative study clearly guides the investors to review the performance of the SectoralIndices .

2. Objective
- To perform comparative study of S&P BSE Sensex with 10 Sectoral Indices
- To identify whether there is a difference in risk factors across the sectoral indices.
- To analyze the importance of sectoral analysis in the stock investment.
- To calculate the performance of all indices of BSE.

II.   Indentations And Equations

1.Research Methodology
Research is essentially a logical and an organized enquiry seeking facts through objectives verifiable methods in order to discover the relation among them and to refer from the board principles or laws. It is really a method of critical thinking.

1.1 Data collection
a. Primary data:
Primary data are those which are collected for the first time. They are original in character. They are collected by the researchers for the   first time for their own use.

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b. Secondary data:

Secondary data are those, which have already been collected by others. When it is not possible to collect data in primary form the researchers may take the help of secondary data. Secondary data are those, which have already been collected with some other view in mind.

Research methodology is a systematic way, which consists of series of action steps, necessary to effectively carry out research and the desired sequencing to these steps.
- Formulating the objective of the study
- Designing the methods of data collection
- Selecting the sample plan
- Collecting the data
- Processing and analyzing the data
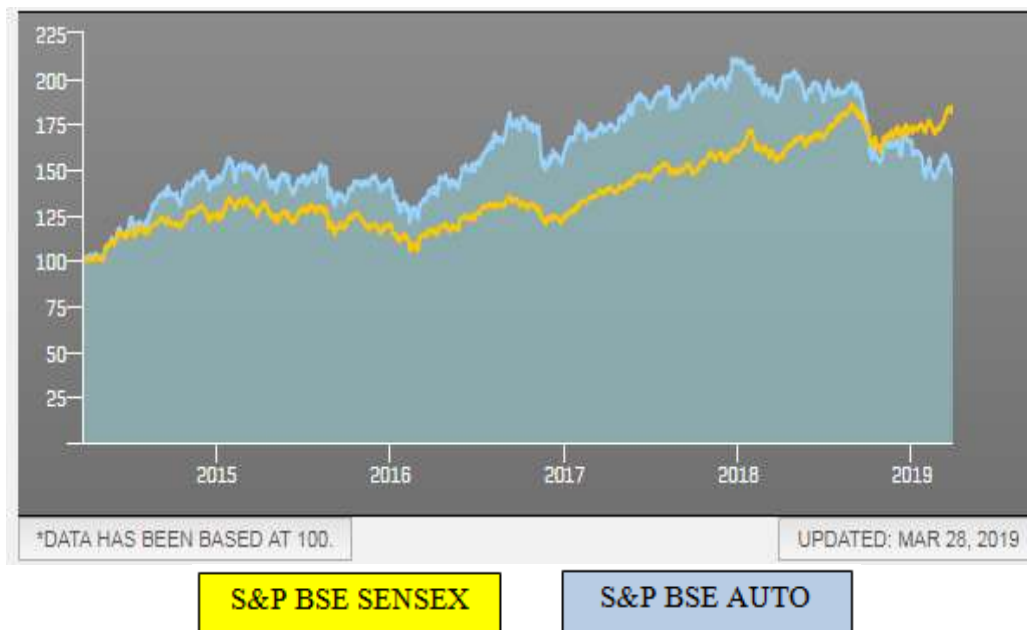- Reporting the findings

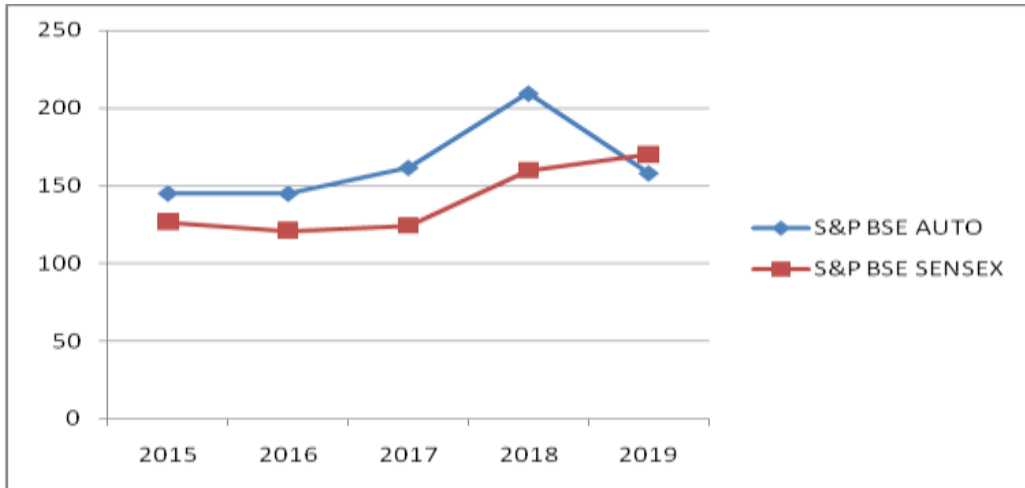## III. Figures And Tables

1.1. Data Analysis and Interpretation

The data analysis is done from April 2014 to March 2019.

1- S&P BSE AUTO

Average return of S&P BSE AUTO AND S&P BSE SENSEX

INDEX NAME	INDEX LEVEL	5 YR ANN. RETURNS
S&P BSE AUTO (TR) LAUNCH DATE: JAN 02, 2006	22,290.15	8.24 %▲
X S&P BSE SENSEX (TR) LAUNCH DATE: AUG 19, 1996	55,740.47	13.09 %▲

*DATA HAS BEEN BASED AT 100.   UPDATED: MAR 28, 2019

S&P BSE SENSEX   S&P BSE AUTO

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Interpretation:

As per the above data we can see that with the 5 Year returns of S&P BSE AUTO are increasing in comparison of the returns of S&P BSE SENSEX.

	2015	2016	2017	2018	2019
S&P BSE AUTO	144.96	144.82	161.47	209.50	157.95
S&P BSE SENSEX	126.53	120.87	124.19	159.94	170.08

To find Correlation co-efficient of S&P BSE AUTO and S&P BSE SENSEX

$$r = \frac{n \sum_{i=1}^{n} x_i y_i - \sum_{i=1}^{n} x_i \sum_{i=1}^{n} y_i}{\sqrt{(n \sum_{i=1}^{n} x_i^2 - (\sum_{i=1}^{n} x_i)^2)(n \sum_{i=1}^{n} y_i^2 - (\sum_{i=1}^{n} y_i)^2)}}$$

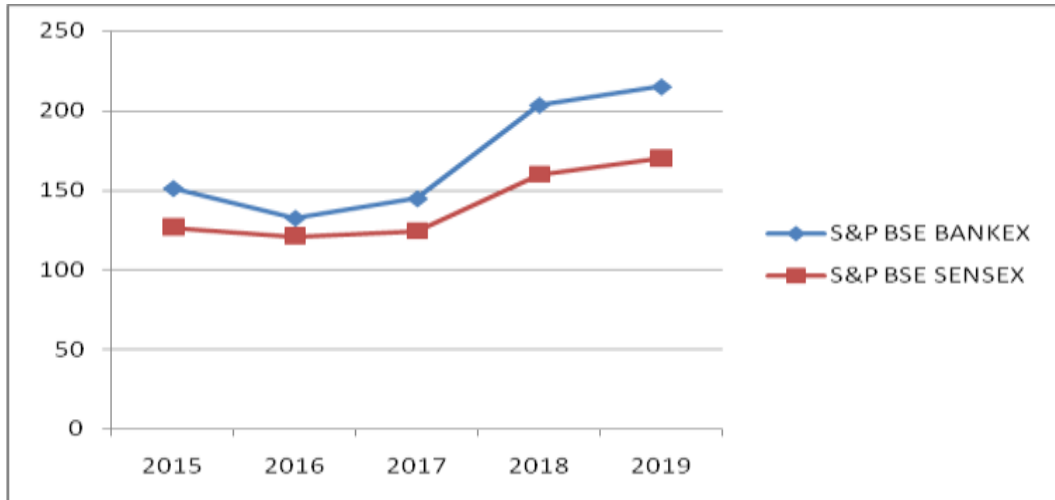**Correlation coefficient (r): 0.56857203038281**
Correlation coefficient relation (r) is moderate.

2- S&P BSE BANKEX
Average return of S&P BSE BANKEX AND S&P BSE SENSEX

INDEX NAME	INDEX LEVEL	5 YR ANN. RETURNS
S&P BSE BANKEX (TR) LAUNCH DATE: AUG 01, 2006	39,290.71	19.49 % ▲
☒ S&P BSE SENSEX (TR) LAUNCH DATE: AUG 19, 1996	55,740.47	13.09 % ▲

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Interpretation:
As per the above data we can see that with the 5 Year returns of S&P BSE BANKEX are increasing in comparison of the returns of S&P BSE SENSEX.

	2015	2016	2017	2018	2019
S&P BSE BANKEX	151.15	132.46	144.76	203.50	215.03
S&P BSE SENSEX	126.53	120.87	124.19	159.94	170.08

To find Correlation co-efficient of S&P BSE BANKEX and S&P BSE SENSEX

$$r = \frac{n \sum_{i=1}^{n} x_i y_i - \sum_{i=1}^{n} x_i \sum_{i=1}^{n} y_i}{\sqrt{(n \sum_{i=1}^{n} x_i^2 - (\sum_{i=1}^{n} x_i)^2)(n \sum_{i=1}^{n} y_i^2 - (\sum_{i=1}^{n} y_i)^2)}}$$
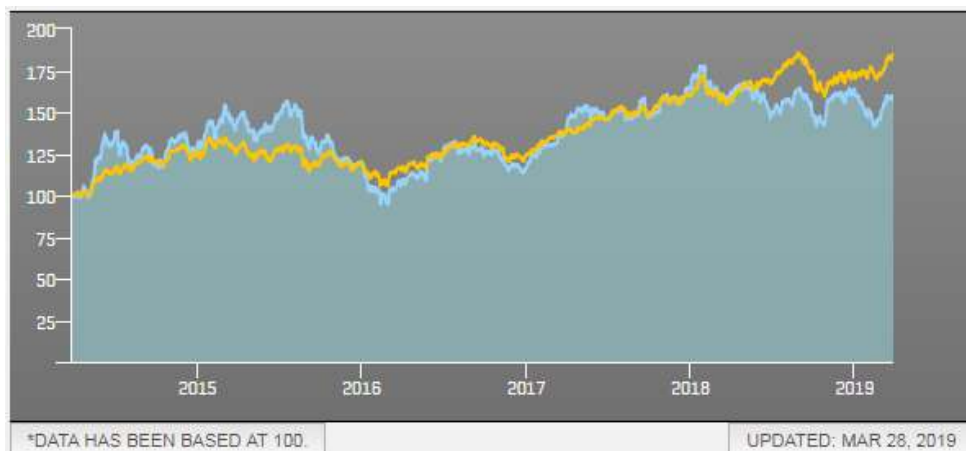
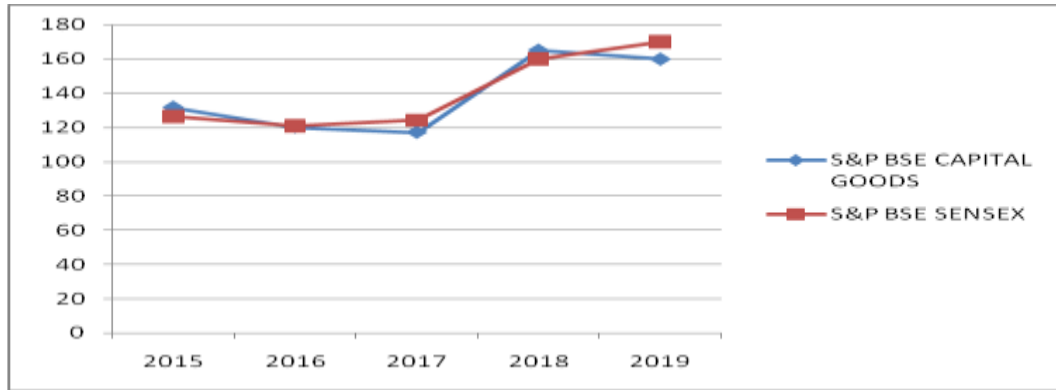**Correlation coefficient (r): 0.99453901344138**
Correlation coefficient relation (r) is high.

3- S&P BSE CAPITAL GOODS
Average return of S&P BSE CAPITAL GOODS AND S&P BSE SENSEX

INDEX NAME	INDEX LEVEL	5 YR ANN. RETURNS
S&P BSE CAPITAL GOODS (TR) LAUNCH DATE: JAN 02, 2006	20,682.84	9.85 % ▲
☒ S&P BSE SENSEX (TR) LAUNCH DATE: AUG 19, 1996	55,740.47	13.09 % ▲

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Interpretation:

As per the above data we can see that with the 5 Year returns of S&P BSE CAPITAL GOODS are increasing in comparison of the returns of S&P BSE SENSEX.

	2015	2016	2017	2018	2019
S&P BSE CAPITAL GOODS	131.68	120.19	117.09	164.93	159.76
S&P BSE SENSEX	126.53	120.87	124.19	159.94	170.08

To find Correlation co-efficient of S&P BSE CAPITAL GOODS and S&P BSE SENSEX

$$r = \frac{n\sum_{i=1}^{n} x_i y_i - \sum_{i=1}^{n} x_i \sum_{i=1}^{n} y_i}{\sqrt{(n\sum_{i=1}^{n} x_i^2 - (\sum_{i=1}^{n} x_i)^2)(n\sum_{i=1}^{n} y_i^2 - (\sum_{i=1}^{n} y_i)^2)}}$$

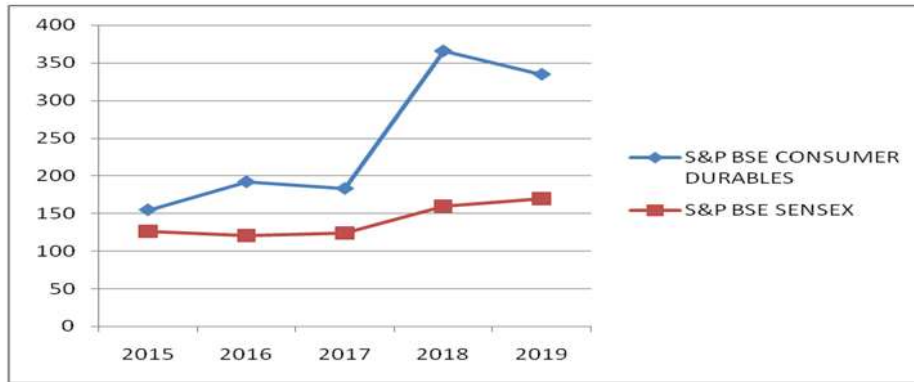**Correlation coefficient (r): 0.9523810032684**
Correlation coefficient relation (r) is high.

4- S&P BSE CONSUMER DURABLES
Average return of S&P BSE CONSUMER DURABLES AND S&P BSE SENSEX

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Interpretation:

As per the above data we can see that with the 5 Year returns of S&P BSE CONSUMER DURABLES are increasing in comparison of the returns of S&P BSE SENSEX.

	2015	2016	2017	2018	2019
S&P BSE CONSUMER DURABLES	154.41	191.69	182.82	365.57	334.56
S&P BSE SENSEX	126.53	120.87	124.19	159.94	170.08

To find Correlation co-efficient of S&P BSE CONSUMER DURABLES and S&P BSE SENSEX

$$r = \frac{n \sum_{i=1}^{n} x_i y_i - \sum_{i=1}^{n} x_i \sum_{i=1}^{n} y_i}{\sqrt{(n \sum_{i=1}^{n} x_i^2 - (\sum_{i=1}^{n} x_i)^2)(n \sum_{i=1}^{n} y_i^2 - (\sum_{i=1}^{n} y_i)^2)}}$$
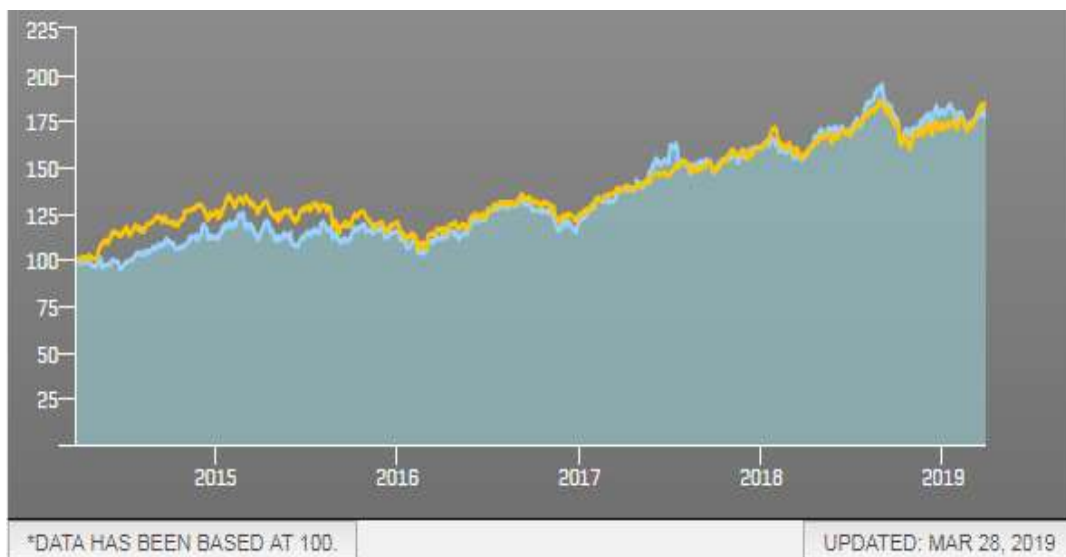
Correlation coefficient (r): 0.9381008793468
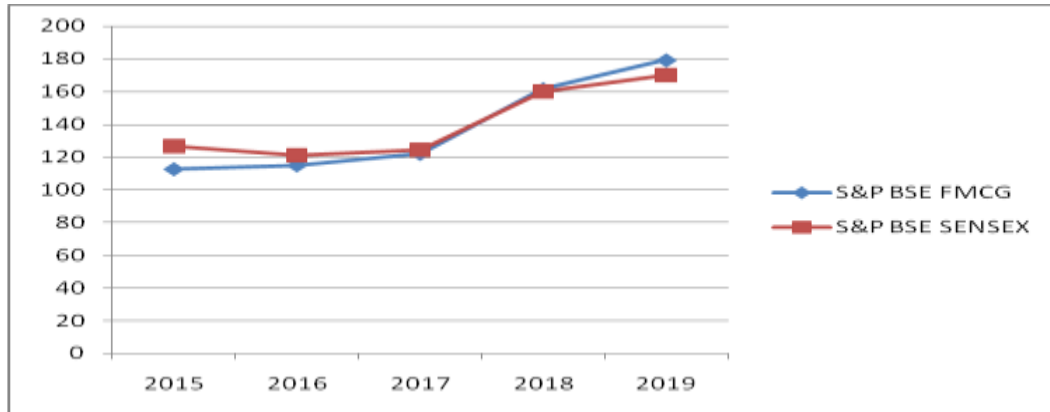**Correlation coefficient relation (r) is high.**

5- S&P BSE FMCG
Average return of S&P BSE FMCG AND S&P BSE SENSEX

INDEX NAME	INDEX LEVEL	5 YR ANN. RETURNS
S&P BSE Fast Moving Consumer Goods TR LAUNCH DATE: AUG 23, 2004	14,812.49	12.46 % ▲
☒ S&P BSE SENSEX (TR) LAUNCH DATE: AUG 19, 1996	55,740.47	13.09 % ▲

Interpretation:

As per the above data we can see that with the 5 Year returns of S&P BSE FMCG are increasing in comparison of the returns of S&P BSE SENSEX.

	2015	2016	2017	2018	2019
S&P BSE FMCG	112.56	114.93	121.99	161.61	179.28
S&P BSE SENSEX	126.53	120.87	124.19	159.94	170.08

To find Correlation co-efficient of S&P BSE FMCG and S&P BSE SENSEX

$$r = \frac{n \sum_{i=1}^{n} x_i y_i - \sum_{i=1}^{n} x_i \sum_{i=1}^{n} y_i}{\sqrt{(n \sum_{i=1}^{n} x_i^2 - (\sum_{i=1}^{n} x_i)^2)(n \sum_{i=1}^{n} y_i^2 - (\sum_{i=1}^{n} y_i)^2)}}$$

Correlation coefficient (r): 0.98692746902772
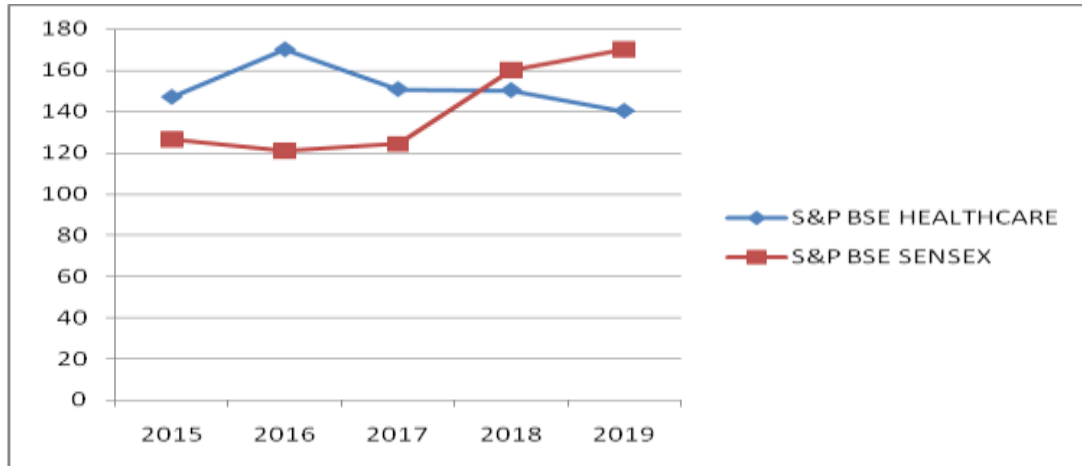**Correlation coefficient relation (r) is high.**

6-S&P BSE HEALTHCARE
   Average return of S&P BSE HEALTHCARE AND S&P BSE SENSEX

INDEX NAME	INDEX LEVEL	5 YR ANN. RETURNS
S&P BSE Healthcare TR LAUNCH DATE: APR 15, 2015	15,760.63	7.72 % ▲
X S&P BSE SENSEX (TR) LAUNCH DATE: AUG 19, 1996	55,740.47	13.09 % ▲

Interpretation:

As per the above data we can see that with the 5 Year returns of S&P BSE HEALTHCARE are increasing in comparison of the returns of S&P BSE SENSEX.

	2015	2016	2017	2018	2019
S&P BSE HEALTHCARE	146.90	169.93	150.70	150.22	140.18
S&P BSE SENSEX	126.53	120.87	124.19	159.94	170.08

To find Correlation co-efficient of S&P BSE HEALTHCARE and S&P BSE SENSEX

$$r = \frac{n \sum_{i=1}^{n} x_i y_i - \sum_{i=1}^{n} x_i \sum_{i=1}^{n} y_i}{\sqrt{(n \sum_{i=1}^{n} x_i^2 - (\sum_{i=1}^{n} x_i)^2)(n \sum_{i=1}^{n} y_i^2 - (\sum_{i=1}^{n} y_i)^2)}}$$

Correlation coefficient (r): -0.6343139572167
Correlation coefficient relation (r) is low.

7- S&P BSE IT
Average return of S&P BSE IT AND S&P BSE SENSEX

INDEX NAME	INDEX LEVEL	5 YR ANN. RETURNS
S&P BSE Information Technology TR LAUNCH DATE: APR 15, 2015	19,080.87	13.97 %▲
☒ S&P BSE SENSEX (TR) LAUNCH DATE: AUG 19, 1996	55,740.47	13.09 %▲

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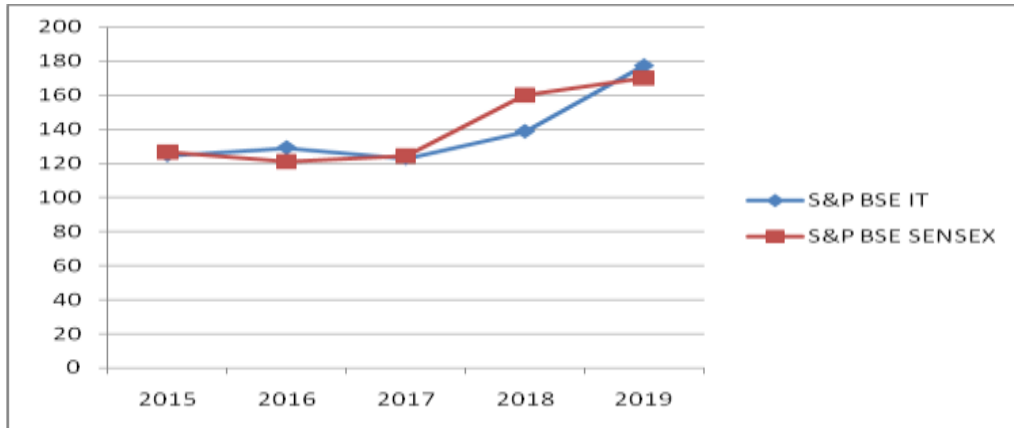
Interpretation:

As per the above data we can see that with the 5 Year returns of S&P BSE IT are increasing in comparison of the returns of S&P BSE SENSEX.

	2015	2016	2017	2018	2019
S&P BSE IT	124.77	129.12	122.89	138.67	177.34
S&P BSE SENSEX	126.53	120.87	124.19	159.94	170.08

To find Correlation co-efficient of S&P BSE IT and S&P BSE SENSEX

$$r = \frac{n \sum_{i=1}^{n} x_i y_i - \sum_{i=1}^{n} x_i \sum_{i=1}^{n} y_i}{\sqrt{(n \sum_{i=1}^{n} x_i^2 - (\sum_{i=1}^{n} x_i)^2)(n \sum_{i=1}^{n} y_i^2 - (\sum_{i=1}^{n} y_i)^2)}}$$

Correlation coefficient (r): 0.86388191114415
**Correlation coefficient relation (r) is high.**

8-S&P BSE METAL
Average return of S&P BSE METAL AND S&P BSE SENSEX

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Interpretation:

As per the above data we can see that with the 5 Year returns of S&P BSE METAL are decreasing in comparison of the returns of S&P BSE SENSEX.

	2015	2016	2017	2018	2019
S&P BSE METAL	114.40	80.33	120.26	182.94	136.97
S&P BSE SENSEX	126.53	120.87	124.19	159.94	170.08

To find Correlation co-efficient of S&P BSE METAL and S&P BSE SENSEX

$$r = \frac{n \sum_{i=1}^{n} x_i y_i - \sum_{i=1}^{n} x_i \sum_{i=1}^{n} y_i}{\sqrt{(n \sum_{i=1}^{n} x_i^2 - (\sum_{i=1}^{n} x_i)^2)(n \sum_{i=1}^{n} y_i^2 - (\sum_{i=1}^{n} y_i)^2)}}$$
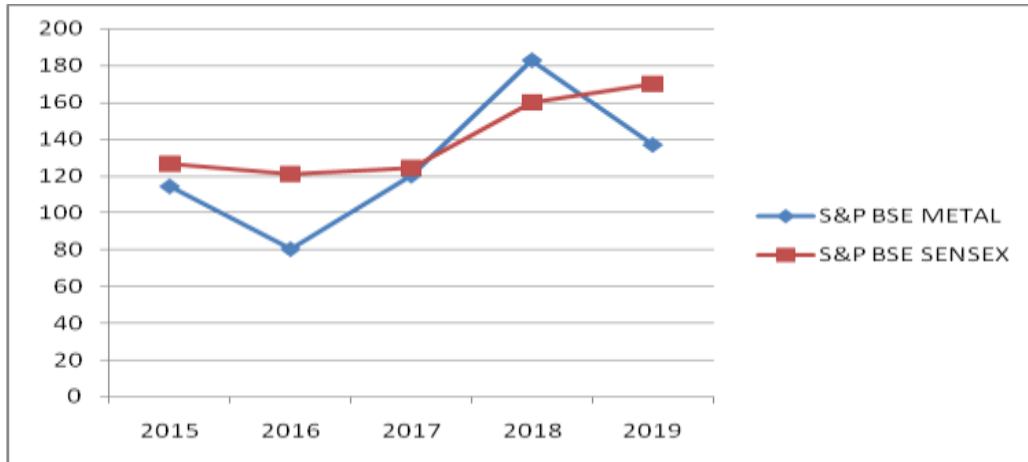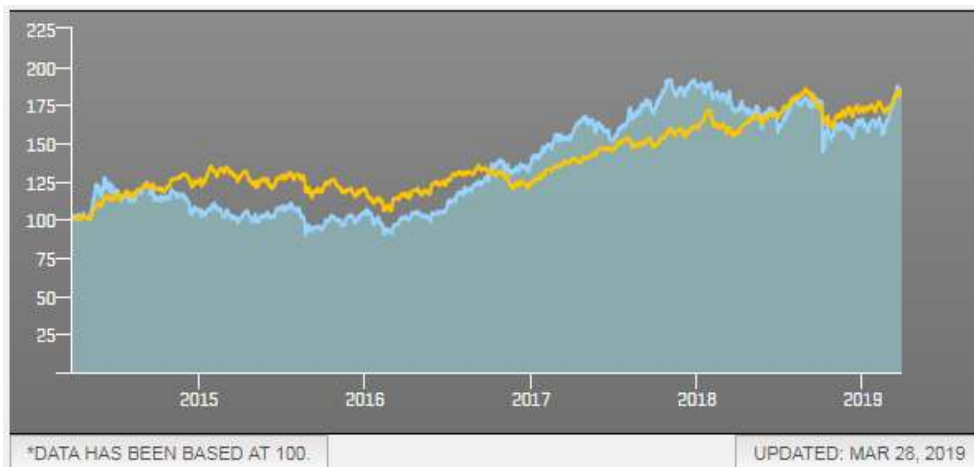
Correlation coefficient (r): 0.75304042846183
Correlation coefficient relation (r) is moderate.

9-S&P BSE OIL & GAS
Average return of S&P BSE OIL & GAS AND S&P BSE SENSEX

INDEX NAME	INDEX LEVEL	5 YR ANN. RETURNS
S&P BSE OIL & GAS (TR) LAUNCH DATE: JAN 02, 2006	19,864.36	13.09 % ▲
☒ S&P BSE SENSEX (TR) LAUNCH DATE: AUG 19, 1996	55,740.47	13.09 % ▲

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Interpretation:

As per the above data we can see that with the 5 Year returns of S&P BSE OIL & GAS are increasing in comparison of the returns of S&P BSE SENSEX.

	2015	2016	2017	2018	2019
A. S&P BSE OIL & GAS	106.36	103.78	137.43	186.94	160.82
S&P BSE SENSEX	126.53	120.87	124.19	159.94	170.08

To find Correlation co-efficient of S&P BSE OIL & GAS and S&P BSE SENSEX

$$r = \frac{n\sum_{i=1}^{n} x_i y_i - \sum_{i=1}^{n} x_i \sum_{i=1}^{n} y_i}{\sqrt{(n\sum_{i=1}^{n} x_i^2 - (\sum_{i=1}^{n} x_i)^2)(n\sum_{i=1}^{n} y_i^2 - (\sum_{i=1}^{n} y_i)^2)}}$$
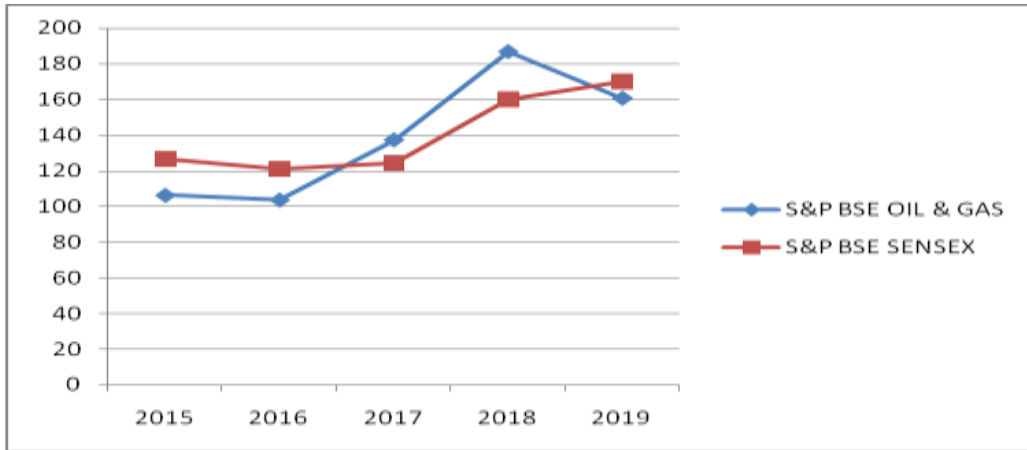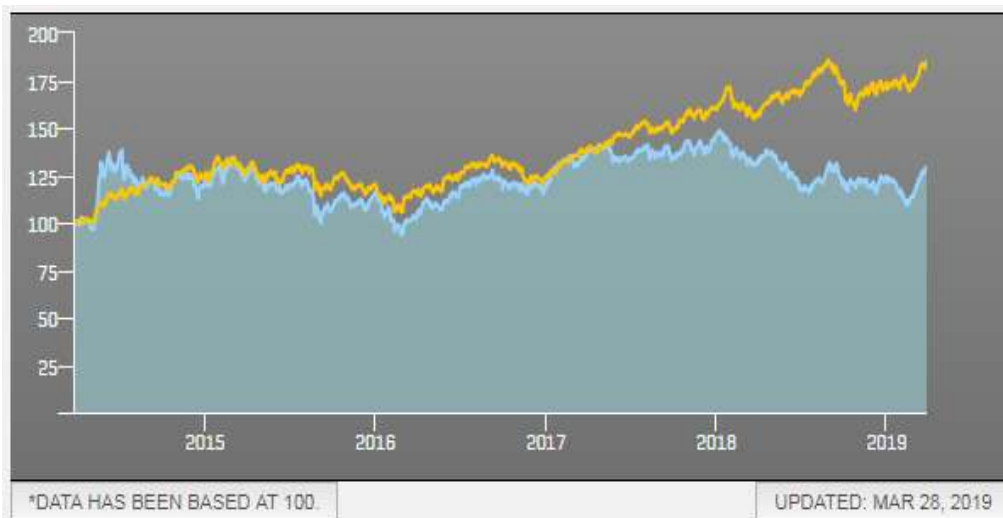
Correlation coefficient (r): 0.84201763316468

 Correlation coefficient relation (r) is high.

10-S&P BSE POWER

Average return of S&P BSE POWER AND S&P BSE SENSEX

INDEX NAME	INDEX LEVEL	5 YR ANN. RETURNS
S&P BSE POWER (TR) LAUNCH DATE: NOV 09, 2007	2,469.07	5.01 % ▲
☒ S&P BSE SENSEX (TR) LAUNCH DATE: AUG 19, 1996	55,740.47	13.09 % ▲

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Interpretation:

As per the above data we can see that with the 5 Year returns of S&P BSE POWER are decreasing in comparison of the returns of S&P BSE SENSEX.

	2015	2016	2017	2018	2019
S&P BSE POWER	119.02	116.34	119.27	146.07	120.97
S&P BSE SENSEX	126.53	120.87	124.19	159.94	170.08

To find Correlation co-efficient of S&P BSE POWER and S&P BSE SENSEX

$$r = \frac{n\sum_{i=1}^{n} x_i y_i - \sum_{i=1}^{n} x_i \sum_{i=1}^{n} y_i}{\sqrt{(n\sum_{i=1}^{n} x_i^2 - (\sum_{i=1}^{n} x_i)^2)(n\sum_{i=1}^{n} y_i^2 - (\sum_{i=1}^{n} y_i)^2)}}$$
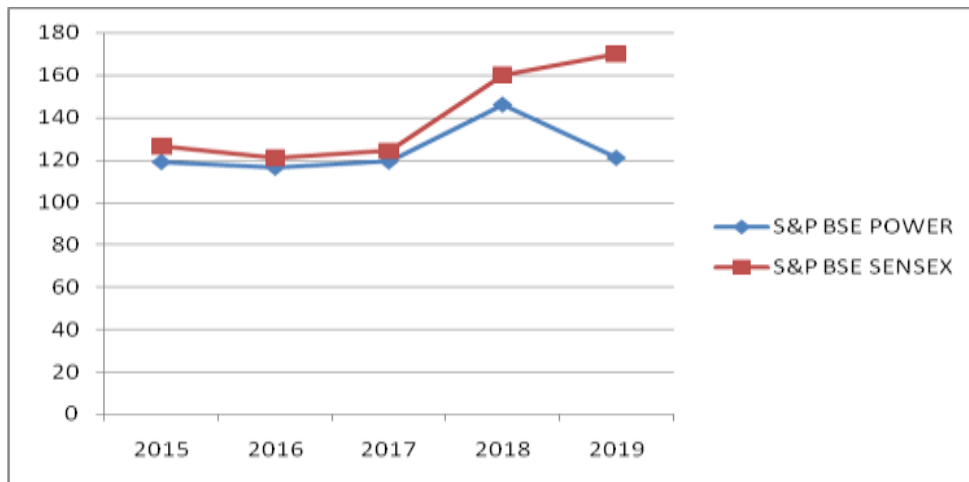
Correlation coefficient (r): 0.56666781840415
Correlation coefficient relation (r) is high.

11- S&P BSE REALTY
Average return of S&P BSE REALTY AND S&P BSE SENSEX

INDEX NAME	INDEX LEVEL	5 YR ANN. RETURNS
S&P BSE REALTY (TR) LAUNCH DATE: JUL 09, 2007	2,238.99	8.38 % ▲
☒ S&P BSE SENSEX (TR) LAUNCH DATE: AUG 19, 1996	55,740.47	13.09 % ▲

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Interpretation:
As per the above data we can see that with the 5 Year returns of S&P BSE REALTY are decreasing in comparison of the returns of S&P BSE SENSEX.

	2015	2016	2017	2018	2019
S&P BSE REALTY	110.97	97.62	94.58	188.58	134.27
S&P BSE SENSEX	126.53	120.87	124.19	159.94	170.08

To find Correlation co-efficient of S&P BSE REALTY and S&P BSE SENSEX

$$r = \frac{n\sum_{i=1}^{n} x_i y_i - \sum_{i=1}^{n} x_i \sum_{i=1}^{n} y_i}{\sqrt{(n\sum_{i=1}^{n} x_i^2 - (\sum_{i=1}^{n} x_i)^2)(n\sum_{i=1}^{n} y_i^2 - (\sum_{i=1}^{n} y_i)^2)}}$$

Correlation coefficient (r): 0.77204536722346
Correlation coefficient relation (r) is high.

IV. Conclusion

- Comparison of 5 years annual returns of SENSEX with various sectoral indices.
- In depth analysis of each sector.
- 5 year annual returns of S&P BSE AUTO on an average are increasing and correlation coefficient relation with S&P BSE SENSEX is moderate.
- 5 year annual returns of S&P BSE BANKEX on an average are increasing and correlation coefficient relation with S&P BSE SENSEX is high.
- 5 year annual returns of S&P BSE CAPITAL GOODS on an average are increasing and correlation coefficient relation with S&P BSE SENSEX is high.
- 5 year annual returns of S&P BSE CONSUMER DURABLES on an average are increasing and correlation coefficient relation with S&P BSE SENSEX is high.

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- 5 year annual returns of S&P BSE FMCG on an average are increasing and correlation coefficient relation with S&P BSE SENSEX is high.
- 5 year annual returns of S&P BSE HEALTHCARE on an average are increasing and correlation coefficient relation with S&P BSE SENSEX is low.
- 5 year annual returns of S&P BSE IT on an average are increasing and correlation coefficient relation with S&P BSE SENSEX is high.
- 5 year annual returns of S&P BSE METAL on an average are decreasing and correlation coefficient relation with S&P BSE SENSEX is moderate.
- 5 year annual returns of S&P BSE OIL & GAS on an average are increasing and correlation coefficient relation with S&P BSE SENSEX is high.
- 5 year annual returns of S&P BSE POWER on an average are decreasing and correlation coefficient relation with S&P BSE SENSEX is high.
- 5 year annual returns of S&P BSE REALTY on an average are decreasing and correlation coefficient relation with S&P BSE SENSEX is high.
- 5 year annual returns of S&P BSE TECK on an average are increasing and correlation coefficient relation with S&P BSE SENSEX is high.

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[1].   **Books:**
[2].   Book by Prasanna Chandra
[3].   Book by C R Kothari
[4].   Book by R M Joshi
[5].   **Websites:**
[6].   **WWW.BSE.COM**
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