

*Full Length Research*

# Information Resource in Electronics and Communication Engineering & VLSI: Citation Analysis Materials Used by Engineering Theses Students, GNDEC

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The citation analysis method is evaluating the use of information resources by M. Tech students at the GNDEC in preparing their dissertations. Examines the citation in theses dissertations submitted at GNDEC, Ludhiana's ECE & VLSI department from 2012-2020. Citation analysis is a way of measuring the relative importance or impact of an author, an article a publication by counting the number of times that author; the researchers use the references at the end of each study to gather all of the information. The citation review of the authors, types of cited articles, websites, and thesis is also highlighted in the paper. The study is confined to theses submitted to the Electronics Communication & Engineering & VLSI Engineering Central Library the GNDEC. The study (2012-20) is based on 7099 ECE M. Tech. the 802 VLSI theses.

**Keywords:** Citation Analysis, Electronics Communication, Very large-scale integration, Theses, GNDEC, M. Tech Student

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## INTERACTION

A citation is a reference to any object (book, journal article, dissertation, archival manuscript, newspaper editorial, report, website, musical composition, etc.) clearly identifies the source of information. A citation provides sufficient information to acknowledge the author and locate the item.<sup>1</sup> Citation analysis is a statistical tool for ranking cited sources in order to investigate their relative value. A simple distribution of cited texts based on form, number, and age may also be used.<sup>2</sup> Citation analysis is based on the thesis that there some kind of relationship between a citing paper and its cited references. The frequency of the cited document appearing in some citing articles, over the year, is, in some measure, and indication of its influence.<sup>3</sup> Thus, citation analysis not only shows the formal subject relation and distribution or scattering of references but also leads to the study of the age of literature and its impact.

### Citation Analysis:

Citation analysis is the analysis of the citation or bibliographical references that is appended with the research communication. The examination of the frequency, patterns, and graphs of citations in documents. It uses the directed graph of citations links from one document to another document to reveal properties of the documents.<sup>4</sup>

### Definition of Citation Analysis:

Citations provide us bibliometric data about the used in documents. These data can be better utilized for bibliometric studies in many respects.

According to **E. Garfield** " A frequency with citations is made is a measure of research activity or of communication about research activity".<sup>5</sup> **Wikipedia** defines "the term "citation analysis" refers to a form of bibliographic database.' **Diadoto** define citation analysis as "A wide ranging area of bibliometrics that studies the citations to and from documents."<sup>6</sup> According to E.C.White 1985 "Citation analysis plays a prominent role for easy identification of earlier research".<sup>7</sup>

### Review of Literature:

The study of which has been done by the other researchers is defined as a review of literature. A number of studies on various aspects of citation studies have been done.

Veerabasavaiah and Padmavathi (2014) there were 6688 citations in 42 doctoral theses. The data were collected from the bibliographic section listed at the end of each thesis, which included the details of the articles referred to by the researchers for completing their thesis.<sup>8</sup> Amritpal & Rattan (2015) to date, 17 doctoral theses in library and information science have been submitted to Punjabi University, Patiala. And per the study's findings, journal citations were to 48.43 percent of all citations and 59.41 percent of all references were single-authored. Citations in publications were newer than citations in books.<sup>8</sup> Mahajan and Kumar (2018) during 2000 and 2012, 36 history Ph.d theses was submitted to Punjab University, Chandigarh. There were 8488 citations in 36 theses, according to the findings. With 54.16 percent of citations, books were the most common format. Only 1.6 percent of the people used electronic resources.<sup>9</sup> Gupta, D. K. & Sharma, V. (2020) aims to examine the grey literature cited in social science Ph.D. theses submitted to state universities in Haryana (India) during 2011 to 2018. Shodhganga: Indian National Repository of ETD provided data. There have been 14547 citations in 43 different formats. Book chapters were the most common type of citation, accounting at 33.12 percent, followed by journal citations (31.77%).<sup>11</sup> Manpreet S. (2021) the In postgraduate students' use of library resources, the age of the resources is also an essential factor in citation analysis. In postgraduate students' use of library resources, the age of resources is also an important factor in citation analysis. Environment is the subject of the study. Environment Sc. 50 (13.66%) 113 Geo-Technical (30.87) Structural Engineering 147 & Soil Mechanics 53 (14.84%) & Structural 147 (40.16%).<sup>12</sup>

### Guru Nanak Dev Engineering College:

Guru Nanak Dev Engineering College was established in 1956. The trust deed was resisted on 24<sup>th</sup> February 1953 with a commitment by the Nanakana Sahib Education trust to uplift the vast weaker section of Indian polity comprising rural India by admitting 70% students every year from rural areas. The commitment was made to the nation on 8<sup>th</sup> April 1956. The College is affiliated with Punjab Technical University, Jalandhar to run B.Tech, M.Tech. (Regular & Part time) MBA & MCA. One of six faculties at GNDEC the Faculty of Engineering is made Applied Science, Civil Engineering, Computer Engineering, Electrical Engineering, Electronics & Communication Engineering, Information Engineering, Mechanical Engineering, Production Engineering, and MCA & MBA. The institution has a well-established Air Conditioned Central Library having rich collection of books, online books, print Journals, online journals, online journals, back volume journals. The books are classified according to DDC 23rd latest edition through Web Dewey service. Library is fully computerized with E-Granthalaya software package which is an integrated multi-user library management system those supports all in-house operations of the Library. Library collection can also be accessed through Web OPAC at any terminal on the Campus Network. Library is also connected with DELNET for inter library loan and document delivery services. Library resources which include some of the leading IEEE, ASCE, ASME, Science Section, J-Gate Engineering, springer Engineering, Wiley eBook, Pearson Education Book, McGraw Hill Book & EBSCO.

### Scope of the Study:

The study covered a period of 8th years from 2012 to 2020 because the library at GNDEC produced the first set of M.Tech. The chosen period is expected to provide enough latitude to have a clear pattern of information formats consulted:

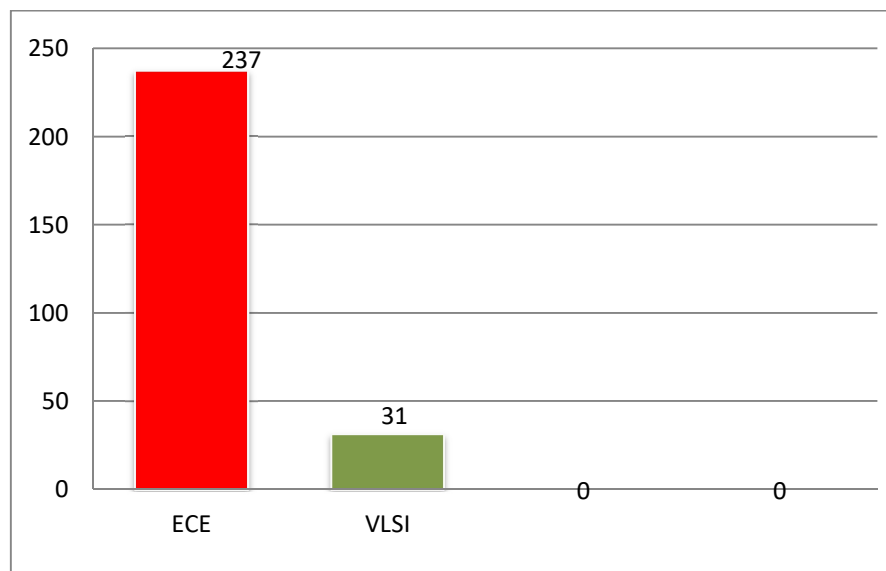
- The research is limited to the PTU theses. To complete M.Tech as well as Engineering.
- The Faculty of Engineering's & Commination departments.
- The current research, 2012–20, is based on the ECE Department's 802 VLSI Engineering & 7099 M. Tech. thesis.
- To decide the distribution of citations by topic.
- To identify the core journals
- This research is being carried out using thesis data from GNDEC Central Library.
- To identify the average number of references cited per thesis.

## METHODOLOGY

The theses used in this study are from the Central Library the Guru Nanak Dev Engineering College, Ludhiana, and are arranged to accession numbers from 2012 to 2020. The total number of theses selected for the sample is ECE 237 & VLSI 31. Two-three seven 237 and Seven one 31 theses, with a total of 7,099 & 802 citations, represented eight engineering. The material cited was categorized as journals, books, conferences, transistors, symposiums, message thesis, Ph.D., link, and others.

### Study the Distribution of M. Tech Thesis:

Table 1 shows 237 and 31 theses, with a total of 7,099 and 802 citations, representing eight engineering disciplines: Civil, Computer, IT, Electronics Communication Engineering, Electrical Engineering, Mechanical and Production. The table shows that researchers have used a maximum of 3584 (50.48%) out of 7099 and Ph.d 26 minimum VLSI followed by 138 Conference (17.33%), maximum of 0.50 Ph.d.



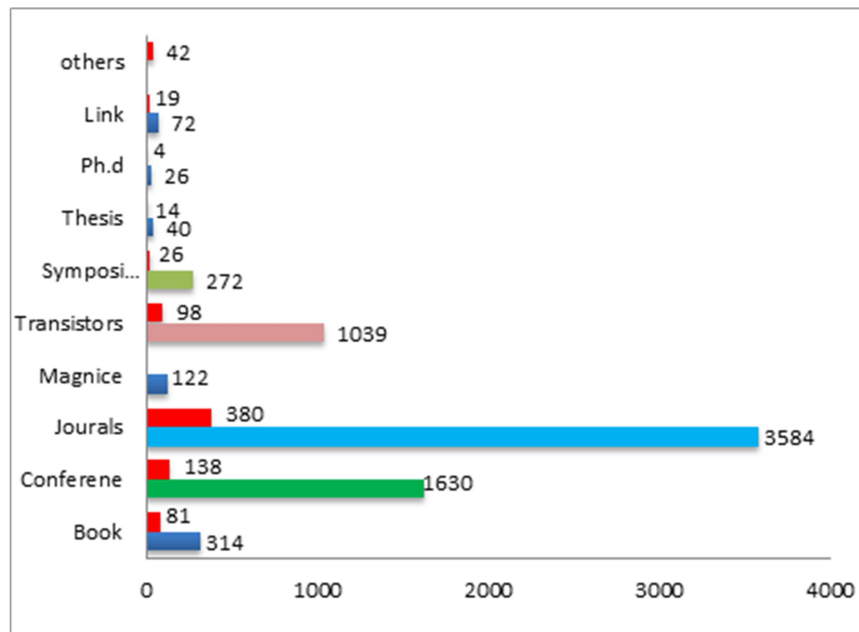
**Study the Distribution of M. Tech Thesis**

**Distribution of ECE & VLSI M. Tech Thesis:**

S No.	Year	ECE	Age%	Citation	Age%	VLSI	Age%	Citation	Age%
1	Book	314	4.42	314	4.42	81	10.17	81	10.17
2	Conference	1630	22.96	1944	27.38	138	17.33	219	27.5
3	Journals	3584	50.48	5528	77.86	380	47.73	599	75.23
4	Message	122	1.71	5650	79.57	-	-	-	-
5	Transistors	1039	14.63	6689	94.2	98	12.31	697	87.54
6	Symposium	272	3.83	6961	98.03	26	3.26	723	90.8
7	Thesis	40	0.56	7001	98.59	14	1.75	737	92.55
8	Ph.d	26	0.36	7027	98.95	04	0.50	741	93.05
9	Link	72	1.01	7099	99.96	19	2.38	760	95.43
10	-	-	-			42	5.27	802	100
	Total	7099	99.96%			802	100%		100%

**Distribution of Citation**

Table 2 shows the distribution of GNDEC Electronics Communication and VLSI department thesis submitted by year. During the years 2012-20, the journal ECE 3584 (50.48%), conference 1630 (22.96 percent), Transistors 1039 (14.63%), Book 314 (4.42%), Symposium 272 (3.83%), Link 72 (1.01%), Thesis 40 (0.56%), and Ph.d 26 (0.36%) received. VLSI 380 (47.73%) theses were submitted. In the years 2020, 1630 (22.96%) and 138 (17.33%) theses were submitted. Similarly highest numbers of 1039 (14.63%) VLSI 98 (12.31%) thesis were submitted in the year 2012-20.

**Sources used in a percentage distribution**

Year	Book	Confer	Journals	Mag	Transit	Sympo	Thesis	Ph.d	Link
2021-20	57	224	587	34	151	38	15	06	39
2020-19	26	109	234	11	67	21	01	07	08
2019-18	40	286	460	15	54	18	05	01	02
2018-17	39	51	525	17	213	50	05	02	09
2017-16	41	370	134	27	175	21	09	01	03
2016-15	11	214	532	--	61	61	--	01	--
2015-14	63	170	651	16	220	50	03	06	05
2014-13	37	200	441	02	98	13	02	02	07
2012-12	00	06	20	00	00	00	00	00	00
Total	314 (4.42)	1630 (22.96)	3584 (50.48)	122 (1.71)	1039 (14.63)	272 (3.83)	40 (0.56)	26 (0.36)	72 (1.01)
								Total	7099 100%

Distribution of Citation according to type of materials

Table 3 shows the distribution of different forms of cited literature used by the Electronics & Communication Engineering M.Tech in their type. Analysis of data indicated that the highest citations are from journals. The total number of 7099 citations, 3584 (50.48%) are from journals, followed by 1630 Conference (22.96%), 1039 Transistors (14.63%) 314 books (4.42%), 272 Symposium (3.83%), 72 Link (1.01%), Thesis 40 (0.56%), 26 (0.36%). The citations were divided into eight categories viz., Book, Conference, Journals, Message, Transistors, Symposium, Thesis, Ph.d & Link.

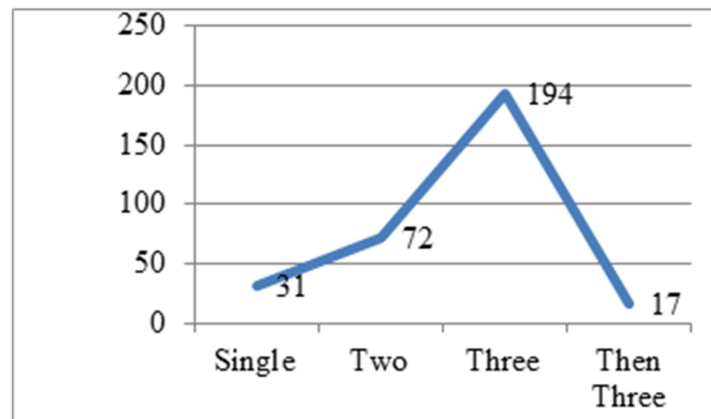
### Authorship of Pattern

An element of scientometric analysis is the analysis of authorship patterns and productivity. The number of authors contributing to publications in terms of authorship pattern is an interesting part of any citation study. Apart from this, there is a need to analyses the author's productivity pattern. Many studies analyses the characteristics of the subject literature and focused their attention on the quality and rate at which authors published in their fields. It has received adequate attention on the part of the present research.

S. No.	Authorship	No. Citations	Age% of Citations
1	Single	31	9.87
2	Two	72	22.92
3	Three	194	61.78
4	Then Three	17	5.41
	Total	314	99.98%

### Authorship Pattern

From table 4 shows the authorship patterns of documents cited. Three authors were in 194 (61.78%) of a 314 citations, by 72 (22.92%) of two authors, 31 (9.87%) of single authors, and 17 (5.41%) by more than three authors. As a result, the most of cited documents have a three authorship pattern.



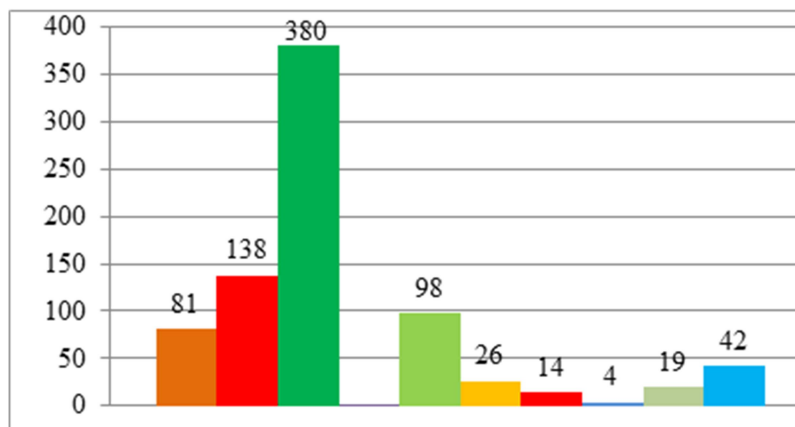
### Authorship Pattern of Citations

The distribution of different types of cited literature utilized by the VLSI M.Tech thesis is shown in Table 5. Analysis of data indicated that the highest citations are from journals. The total number of 802 citations, 380 (50.48%) are from journals, followed by 138 Conference (17.33%), 98 Transistors (12.31%) 81 Book (10.17%), Transistor 98 (12.31%), others 42 (5.27%), Symposia 14 (3.26%), Link 19 (2.38%), Thesis 14 (1.75%), Ph.d 4 (0.50%) respectively.

### VLSI Engineering

Year	Book	Confer	Journals		Transit	Sympo	Thesis	Ph.d	Link	others
2015-16	27	63	52	--	44	10	03	02	13	04
2014-15	23	21	123	--	28	05	08	--	01	16
2013-14	22	33	126	--	26	07	03	02	03	11
2012-13	07	22	79	--	--	04	--	--	02	11
Total	81 (10.17)	138 (17.33)	380 (50.48)	--	98 (12.31)	26 (3.26)	14 (1.75)	04 (0.50)	19 (2.38)	42 (5.27)
									Total	802 100%

### Citation distribution according to VLSI



### Authorship of Pattern

An element of scientometric analysis is the analysis of authorship patterns and productivity. The number of authors contributing to publications in terms of authorship pattern is an interesting part of any citation study. Apart from this, there is a need to analyse the author's productivity pattern. Many studies analyse the characteristics of the subject literature and focused their attention on the quality and rate at which authors published in their fields. It has received adequate attention on the part of the present research.

#### Authorship Pattern of Citation

S. No.	Authorship	Total No. Citations	Age% of Citations
1	Single	07	8.64
2	Two	16	19.75
3	Three	48	59.25
4	Then Three	10	12.34
	Total	81	99.98%

From table 6 shows the authorship patterns of documents cited. Three authors were in 48 (59.25%) of 81 citations, by 16 (19.75%) of two authors, 07 (8.64%) of single authors, and 10 (12.34%) by more than three authors. As a result, the most of cited documents have a three authorship pattern.

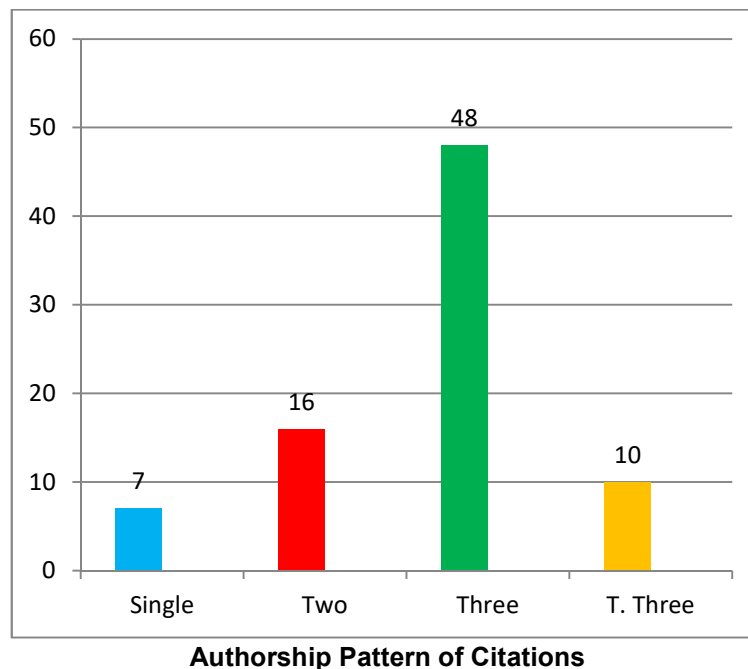
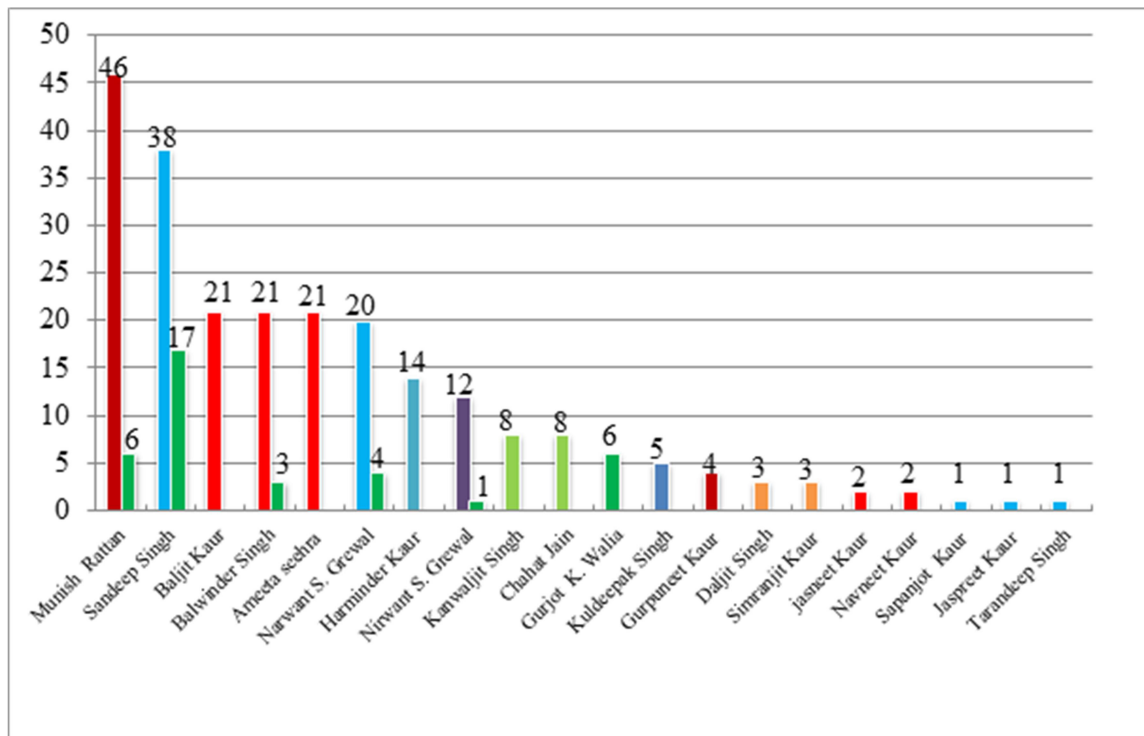


Table 6 shows study this zone was assisted by 20 research guidelines. The ranking is seen in the table following.

## Ranking of Guides

ECE	Year	Age%	Cumulative Citations	VLSI	Age%	Cumulative Citations
Munish Rattan	46	19.40	46	06	19.35	06
Sandeep S. Gill	38	16.03	84	17	54.83	23
Baljit Kaur	21	8.86	105	-	-	-
Balwinder S. Dhaliwal	21	8.86	126	03	09.67	26
Ameeta Seehra	21	8.86	147	-	-	-
Narwant S. Grawal	20	8.43	167	04	12.90	30
Harminder Kaur	14	5.90	181	-	-	-
Nirwant S. Grawal	12	5.06	193	01	03.22	31
Kanwaljit Singh	08	3.37	201	-	-	-
Chahat Jain	08	3.37	209	-	-	-
Gurjot K. Walia	06	2.53	215	-	-	-
Kuldeepak Singh	05	2.10	220	-	-	-
Gurpuneet Kaur	04	1.63	224	-	-	-
Daljit Singh	03	1.26	227	-	-	-
Simranjit Kaur	03	1.26	230	-	-	-
Jasneet Kaur	02	0.84	232	-	-	-
Navneet Kaur	02	0.84	234	-	-	-
Sapanjot Kaur	01	0.42	235	-	-	-
Jaspreet Kaur	01	0.42	236	-	-	-
Tanrndeep Singh	01	0.42	237	-	-	31
Total	237	99.91%		31	99.97%	



Ranking of Guides



According with table 7 above, Munish Rattan is ranked first with 46 successful candidates, followed by Sandeep S. Gill with 38 (16.03%) candidates, and Baljit Kaur, Balwinder S. Dhaliwal and Ameeta Seehra with 21 complete research candidates, Narwant S. Grawal 20 (8.43%), Harminder Kaur 14 (5.90%), K. Singh & Chahat Jain 8 (3.37%), Gurjjot K. Walia 6 (2.53%), Kuldeepak Singh 5 (2.10%), Gurbuneet Kaur 4 (1.63%), Daljit & Simranjit Kaur 3 (1.26%), Jasneet Kaur & Navneet Kaur 2 (0.84%), Sapanjot K, Jaspreet Kaur & Tanrndeep Singh 1 (0.42%). In the 2012-20 academic years, 46 (19.40%) research guides successfully completed 237 research topics. VLSI Sandeep S. Gill is in the top 17 (54.83%) and Nirwant S. Grewal is in the top one 4 (12.90%), Balwinder S. Dhaliwal 3 (9.67%), & Nirwant S. Grewal 1 (3.22%).

### The study's findings

To study M. Tech. Citation analysis, 7099 citations from 237 were studied in the Department of ECE from 2012-2020. In the citation analysis of VLSI theses VLSI, from 2013-2016, 802 citations from 31 theses submitted to the Department of ECE were analyzed.

The findings of their analysis show:

1. The highest number of theses was submitted in ECE journal 651, in 2015-14.
2. In VLSI journal 126, the highest number theses were submitted in 2013-14.
3. Citations to single authorship were dominant than joint authorship in both books 314.
4. A majority of citation to books and journals were from India, followed by the UK and the USA.
5. The highest number of theses was submitted in VLSI 81 Book & journal 380 in 2015-14.

### CONCLUSION

The study discussed above measured the value of Electronics & Communication Engineering & VLSI citations, citations, and publications during 2012–2012. Average number of citations in the journal is around ECE 7099 & VLSI 802 per article. The exponential growth of subject ECE & VLSI M. Tech Thesis. Theses which are the products of research activity have been examined through citation analysis with a view of finding out their effectiveness on the collection development of a library. The theses used in this study are from the Central Library the Guru Nanak Dev Engineering College, Ludhiana, and are arranged to accession numbers from 2012 to 2020. Munish Rattan is ranked first with 46 successful candidates, followed by Sandeep S. Gill with 38 (16.03%) candidates. Sandeep S. Gill of VLSI is ranked 17 (54.83%).

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