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(विज्ञानिक तथा औद्योगिक अनुसंधान परिषद)

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April 12, 2017

Certificate

This is to certify that, Mr. Tufeil Sartaj Khan has worked on a project entitled "Conversion of sugar into sugar alcohol" at the Catalysis & Inorganic Chemistry Division, CSIR-National Chemical Laboratory, Pune-411008 under my supervision from Aug 08, 2016 to January 31, 2017 toward the partial fulfillment of the requirement of M.Sc. (Organic Chemistry) course at the Department of Chemistry, Poona College of Arts, science & Commerce, Camp Pune-411001.

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CERTIFICATE

This is to certify that the work presented in this dissertation entitled "Synthesis of (R-X-R)-motif peptide and carbamate trimers for conjugation to gold nanoparticles in cell delivery applications" submitted by Ms. Vaishali M. Lohakare as a part fulfillment of her M.Sc. degree, was carried out by the candidate at the CSIR-National Chemical Laboratory, Pune, under my supervision.

Moneesha 13/01/2017

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This is to certify that the work incorporated in the project report entitled "Synthesis and Characterization of Novel Poly-Aleuritic acid" submitted by **Mr. Tabrez Rafique Shaikh** who carried out the research under my supervision at the **National Chemical Laboratory, Pune- 08** in partial fulfillment for the award of the Degree of **Master of Science in Organic Chemistry**. Certified further, that to the best of my knowledge the work reported herein does not form part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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This is to certify the report entitled "Biosynthesis of Hydroxyapatite nanoparticles from bone using Endophytic Fungus (*Fusarium oxysporum*) and its characterization, antimicrobial activity & phytotoxicity assay" submitted by Quazi Mohzibudin towards partial fulfilment of degree of MASTER OF SCIENCE in Chemistry from AKI's Poona college of Arts Science and Commerce Pune, is a record of research work carried out by her during the period of her study from 1st July 2016 to 31 March, 2017.

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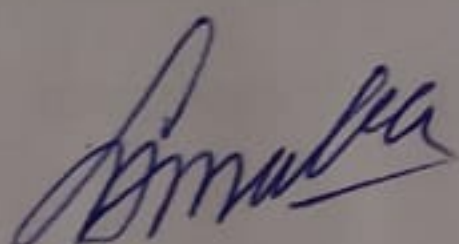
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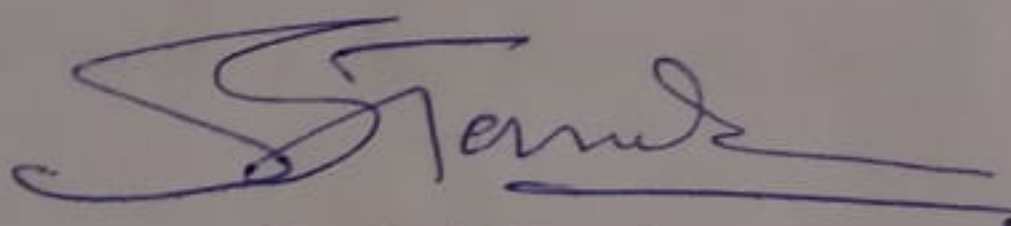
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This is to certify that the report entitled “HETEROGENEOUS, REUSABLE MONTMORILLONITE K-10 CLAY SUPPORTED TIN CHLORIDE ($\text{SnCl}_2/\text{K-10}$) CATALYZED SYNTHESIS OF ANILIDE VIA BECKMANN REARRANGEMENT” submitted by Ms. SANA ALIMOHAMMAD TAMBOLI of AKI's Poona College of Arts, Science and Commerce, Pune, Maharashtra embodies the work done by her under my supervision.



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Review on Digital Signature through RSA Algorithm

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Abstract

Digital signature schemes are mostly used in cryptographic protocols to provide services like entity authentication, authenticated key transport and authenticated key agreement. It is used in a variety of applications to ensure the integrity of data exchanged or stored and to prove to the recipient the inventor's identity[1]. There are many other algorithms which are based on the prime factorization and discrete logarithms problem but different weaknesses and attacks have been developed against those algorithms[1]. This Research paper presents proposed scheme of digital signature algorithm which is based on factoring the product of two large prime numbers, the factoring problem with RSA algorithm using minimum two integer numbers.

Proposed scheme of RSA have better security feature that involves the use of multiple integer numbers. As RSA has its own security issues that only a single integer number is used and is capable of generating single signature only[5]. So for the purpose of security, proposed scheme has been presented which is comparatively much more secure and involves the use of multiple integer numbers to the primary integer number and increases difficulty of decryption key. The significant aspect of this proposed idea is that multiple public key exponents and private key exponents are used. General Terms : Digital Signature, Public key, Private key

Keywords: Encryption, Decryption, Public key exponents, Private key exponents, Authenticity, Integrity, Non-repudiation.

Introduction

Digital signature is one of the main applications for public key cryptography. In common parlance, 'signature' refers to the writing of one's name or putting a mark for authentication or executing a document by the signatory[2][3]. The following are the main functions performed by a signature:

1.1) Identification : By signing the document, the signatory identifies himself by the unique style of writing his name or the mark.

1.2) Authentication : By performing the act of signing a document, the signatory acknowledges that he authorizes and adopts the text therein some meaningful way.

1.3) Security : the individuality of the style of writing or the mark of grants security against forgery.

1.4) Binding : A signature signifies intent of the signatory to be bound by the signed document.

1.5) Evidence : A signature Is an evidence of the aforesaid identification, authentication and of being bound to the signed document.

1.2.1) Commercial certification authorities

If you are a developer and you want to obtain a digital certificate from a commercial certification authority, such as VeriSign, Inc., you or your organization must submit an application to that authority. Depending on your status as a developer, you should apply for a Class 2 or Class 3 digital certificate for software publishers[4][5]:

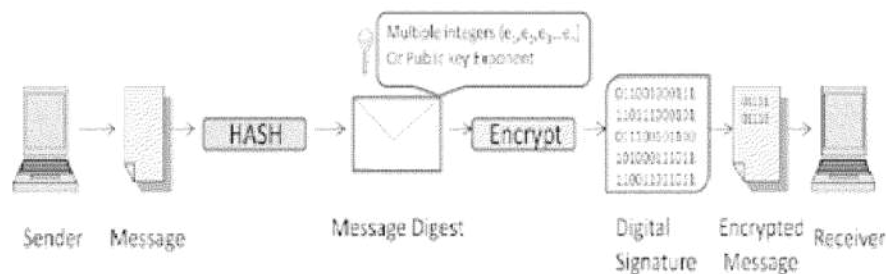
1.2.2) Class 2 digital certificate

A digital certificate designed for people who publish software as individuals. This class of digital certificate helps provide assurance about the identity of the individual publisher[5].

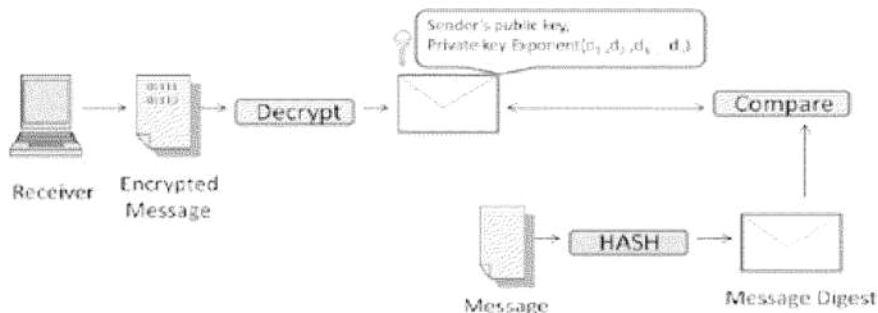
1.2.3) Class 3 digital certificate

A digital certificate designed for companies and other organizations that publish software. This class of digital certificate helps provide greater assurance about the identity of the publishing organization. Class 3 digital certificates are designed to represent the level of assurance provided by retail channels for software. An applicant for a Class 3 digital certificate must also meet a minimum financial stability level based on ratings from Dun & Bradstreet Financial Services[5].

SENDER (Digital Signature Creation)



RECEIVER (Digital Signature Verification)



Related Work

In the RSA Signature Scheme proposed combine signing and public key encryption[5]. Existing RSA algorithm is following:

- i) Choose two distinct prime numbers p & q .
- ii) Compute $n = p \cdot q$
- iii) Compute $\phi(n) = \phi(p) \cdot \phi(q) = (p-1) \cdot (q-1)$
- iv) Choose an integer e such that $1 < e < \phi(n)$, $\gcd(e, \phi(n)) = 1$ where e & $\phi(n)$ are co-prime; here e is a public key exponent.
- v) Determine d as $d = e^{-1} \pmod{\phi(n)}$, $e \cdot d \equiv 1 \pmod{\phi(n)}$, Here d is kept as the private key exponent. So, public key (e, n) and private key (d, n) For Encryption: Sender transmits his public key (e, n) to receiver and kept private key (d, n) secret and receiver send message m to sender. Cipher text, $c = m^e \pmod{n}$ For Decryption: Sender can recover message m from cipher text c by using his private key exponent d by message, $m = c^d \pmod{n}$

Conclusions

RSA is a strong encryption algorithm that has stood a partial test of time. RSA implements a public-key cryptosystem that allows secure communications and “digital signatures”, and its security rests in part on the difficulty of factoring large numbers[6].

RSA is slower than certain other symmetric cryptosystems. RSA is, in fact, commonly used to securely transmit the keys for another less secure, but faster algorithm. Several issues in fact exist that could potentially damage RSA's security, such as timing attacks and problems with key distribution. We will work on RSA Algorithm to compare to other cryptographic algorithm for better result.

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INDEX

Sr. No	Title of Paper	Authors	Pg. No.
1	"Innovative techniques of Urban Cooperative Banks (UCB) for overcoming challenges"	Dr.Sunil Zagade Prof. Sambhaji Sudam Tayade	1
2	Need of Knowledge Management In Various Fields	Mrs. Dipali P. Meher1, Dr. Nilesh Mahajan2	4
3	Digital Marketing for Companies and Institutions ("Rome was not built in a day")	Mrs. Smita Bajpai	11
4	Role Of Cyber Security And Privacy	Ms. ArifaOrfan, Mr. Shehrevat Davierwala	17
5	Social Media: A Useful Medium For Higher Education	Ms. Hadisah Nehzati, Mr. Shehrevat Davierwala	20
6	Understanding Hyperlinks in Web Structure Mining and Page Ranking Algorithm	Nadaf Farzana Peer Mohammed Shaikh Fatima Rafique	23
7	Study of Ranking WebPages using Structure Mining	Mr. Kamil Khan, Ms. Fatima Shaikh,	29
8	Wireless home automation using zigbee	Mrs. Sonal Benare, Mrs Rachna Chavan	34
9	Growth of Digital Wallets	M. T. Nehete, V. G. Wagh, Y. M. Zope	38
10	A study of use of Artificial Intelligence in day today life	Ms. Katkam Mayuri Mr. Mohsin Tamboli	43
11	Cyber Terrorism: An Overview	Mrs. Yogita Anand Kurkure Ms. Heena Mushtak Shaikh	48
12	Green Management	Prof. LaxmanJajodia	52
13	Growth of Digital and Mobile Wallets	Mr. Ulhas Bansode	54
14	Text message Security Techniques: a survey	Mrs. Aparna G. Korde Dr. Charansing N. Kayte	57
15	Artificial Intelligence: An Overview	Mrs. Anupama Patil	60
16	Social Media – Catalyst As A Marketing Tool	Mrs Preeti A Hukkeri	67
17	MOBILE COMMERCE- The Next Big Thing	Mr. Nitesh Maheshwari	74
18	A Study of Knowledge management and Information Technology for development of E-Commerce	Ms. Shadmeen Shaikh Ms. Summaiya Tamboli Mr. Sallauddin Sajjan	80

Text message Security Techniques: a survey

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ABSTRACT

In today's world, the communication is the basic necessity of every growing area. Everyone wants the secrecy and safety of their communicating data. In order to share the information in a concealed manner three techniques could be used i) Cryptography and ii) Steganography and combine crypt-steganography[1]. Each technique has its own merits and demerits. Our main goal in this paper is to survey various techniques of text message security.

KEYWORDS: Cryptography, Steganography, crypt-steganography.

INTRODUCTION

The developments of technology in communications industry have radically altered the ways in which we communicate and exchange information. Along with the speed, efficiency, and cost-saving benefits of the digital revolution come new challenges to the security and privacy of communications and information traversing the global communications infra- structure. However, the challenges can be manageable with the advanced technologies of secure networks but every time these technologies may not be reliable for communication of secrete information over a long distance that produce a need of additional security mechanisms to secure secrete information [2].

We use the following security techniques for text message security.

I. Cryptography:

Cryptography is used to scramble the information, deals with changing the meaning and appearance of message. It changes the plain text into cipher text by the process of encryption, uses the mathematical techniques and various algorithms such as public key cryptography, private key or symmetric and asymmetric algorithm for securing the information.

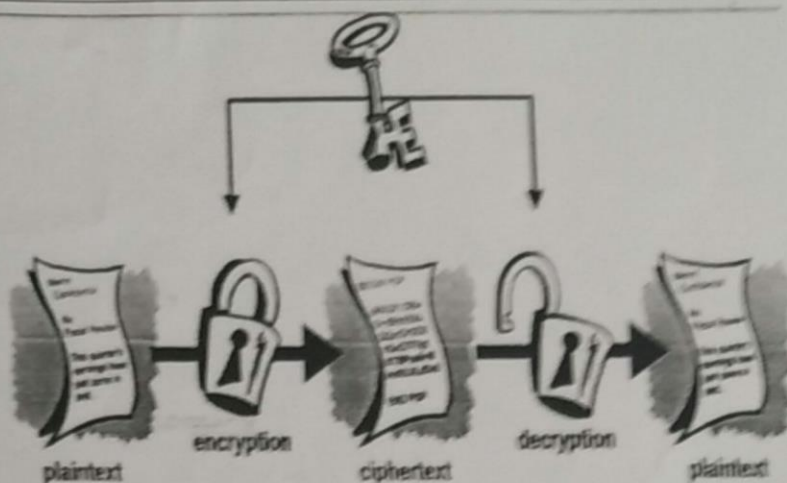


Fig 1. Cryptography process model

However, cryptography provide secure solutions to a set of parties, by encrypting plain text into cipher text but the cyber attacker easily arouse these text and intercepts the communication between two separate users to modify, inject, or drop any communication packet. To improve these limitations and to reduce the issues of cryptographic methods an alternative mechanism, the steganography has use widely.

II. Steganography

Steganography is the technique of embedding hidden messages in such a way that no one, except the sender and intended receiver(s) can detect the existence of the messages. The main goal of steganography is to hide the secret message or information in such a way that eavesdroppers are not able to detect it [7].

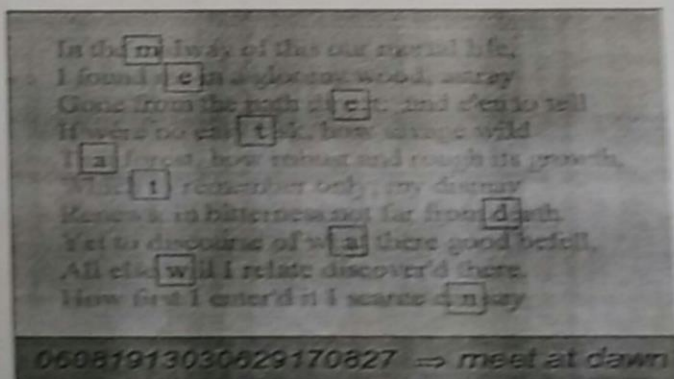


Fig 2. Text steganography

The Steganography technique embeds hidden content in unremarkable cover media so as not to arouse an eavesdropper's suspicion in some cases; sending encrypted information may draw attention, while invisible information will not.

However, both cryptography and steganography provide the security but no one standalone techniques are not enough of secure information efficiently. [2]

III. Combining steganography and cryptography (Crypto-Steganography)

No one standalone system is enough to provide the facility of a complete secure system but the concepts of combining the cryptography with steganography technique can provide two layer of security, where in case of failing the steganography system the secret message remain safe because of encoding technique.[2]

1) Text Steganography with Cryptography

In this type combination we simply do not hide simple text message. We hide ciphertext message after encryption process, after that we can hide this cipher text message in any multimedia files like video, audio, and image

CONCLUSION

In the present world, the data transfer using internet is rapidly growing because it is so easier as well as faster to transfer data to destination. So many individual and business people use to transfer business documents important information using internet.

Security is an important issue while transferring the data using internet because any unauthorized individual can hack the data and make it useless or obtain information un-intended to him.

In this paper we present a text security techniques and will improve step by steps and we use these techniques in online business, online banking and many others.

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FDI IN INDIA: OPPORTUNITIES AND ISSUES FOR FINANCIAL SECTOR

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Abstract

This paper reviews the some of the various "Theories explaining financial sector FDI", Microeconomic framework, Importance and barriers to FDI and Diverse economic environment. We will also be discussing the Risk management challenges, dynamic foreign exchange rates and the opportunities of developing Retail marketing in India. From the review, of the financial management and Macroeconomic and risk diversification theories would seem particularly well-suited to explain this reality. The financial management importance helps the microeconomic framework to entitle the GDP with the FDI resources.

Keywords: Financial sector, FDI, GDP, Economics

I. INTRODUCTION

For the implementation of the FDI, first of all we need to review the theories which are explaining the financial sector FDI, and once the theory has been implemented in respect with local market then we can implement the same in the retail market in order to magnify the result from the international FDI. The different methods needs to be verified and should be taken in order to implement the FDI in the countries policy. For this there should be a study of Risk Management Challenges, dynamic foreign exchange rates and the opportunities of developing Retail marketing in India.

Post Globalization, some reforms were introduced in the banking sector to strength Indian banks and make them internationally competitive and banks to play a vital role in the economic development of the country. The banking sector was opened up for private participation and the entry of new private banks increased competition. The efficiency of the

banking sector was improved as suggested by indicators such as gradual in cost of intermediation and decline in nonperforming loans. Efficiency in the banking sector was driven by improved technology and competition.

II- THEORIES EXPLAINING FINANCIAL SECTOR FDI

Various theories have been introduced and as per the study the financial sector will be increased once the FDI retail market. A discussion on macroeconomic theories were started only because to praise more emphasis on the potentiality of the financial FDI.

Microeconomic/Behavioral Framework-

"Virtually all existing theoretical paradigms focus on the comparison of benefits and costs of the investment decision. As with any kind of investment, the bank will face uncertainty about the expected profits of such decision, and even expected costs. On the cost side, introduces the widely accepted notion that foreign banks face significant cost disadvantages when compared with local competition. These additional costs can arise as a consequence of cultural differences, legal barriers or increased control problems, just to cite a few examples. Therefore, in order to operate profitably in a foreign market, international banks must be able to realize gains that are unavailable to local competitors." Hymer (1969) Thus the gains were established and realized benefit on operating the financial sector like (i) factors explaining competition (ii) local market non-efficient operations; and (iii) diversification in geographical position.

Comparative advantage-

Most important issue is the availability of information for taking decisions, One of the most well-known ways of exploiting the comparative advantages stemming from private information in a foreign market is to "follow the client". This implies that banks expand in those countries where their corporate clients choose to invest so as to be able to offer them the services they need (Brimmer and Dahl (1975), Gray and Gray (1981), Ball and Tschoegl (1982). Moreover, a bank has a clear interest in keeping other financial institutions away from developing a relationship with its corporate clients, because this can result in the loss of market quota in its home market. In other words, a bank's expansion abroad can sometimes be a defensive reaction to avoid losing important corporate clients at home. This "defensive reaction" hypothesis was first offered by Grubel (1977) for US banks' decision to move overseas (the so called "second wave" of banking internationalization, starting in the 1960s).

Voting Power Methods:

FDI can thus acquire the right power through voting of an enterprise through various methods for an enterprise:

- Starting the own WOS (Subsidiary wholly owned by the company) or company registered elsewhere,
- Investment made in shares of other associate or joint ventures;
- M&A of associates enterprises;

IV-IMPORTANCE AND BARRIERS TO FDI

A research study introduced and as some of the important of FDI are as, "An increase in FDI may be associated with improved economic growth due to the influx of capital and increased tax revenues for the host country. Host countries often try to channel FDI investment into new infrastructure and other projects to boost development. Greater competition from new companies can lead to productivity gains and greater efficiency in the host country and it has

been suggested that the application of a foreign entity's policies to a domestic subsidiary may improve corporate governance standards. Furthermore, foreign investment can result in the transfer of soft skills through training and job creation, the availability of more advanced technology for the domestic market and access to research and development resources. The local population may benefit from the employment opportunities created by new businesses."

In order to avoid the competition with their own products the investing company use to transfer their older production capacity and essential machines to the host country all because of the under development of the updated version and lac of technological updation too.

V-DIVERSE ECONOMIC ENVIRONMENT

It is defined in by the analyst as, "Operating in a globalized environment means being answerable to different countries with different political environments and cultural norms, as well as trade procedures and tax conditions to comply with. In addition, the credit conditions may be totally different from what they are domestically. Anticipate day-to-day financial management challenges when operating internationally and devise ways to maintain healthy equilibrium within this economic framework to ensure your business's continued growth and survival."

Dynamic Foreign Exchange Rates

On the similar note dynamic foreign exchange rates are also essential in financial management system. Thus it is being explained as, "in a globalized economy, the cash that goes in and out of the various countries is subject to fluctuations in exchange rates. This creates uncertainty for financial managers when it comes to the value of the home currency in relation to foreign currencies. Continuous fluctuations in the foreign exchange market could mean slow business for global organizations. If you need part of your financing for projects in emerging economies where you conduct your business,

fluctuating exchange rates can subject you to higher interest rates. You have to monitor the foreign exchange market closely for suitable rates that benefit your organization.”

Opportunities for Retail Development in India

Retail marketing gets various opportunities to grow up in the Indian market. Not only retailing but Manufactures as well as suppliers, and buyers have various opportunities, some of which are mentioned below:

- Ø Provides visibility to bands
- Ø Urbanization
- Ø Nuclear Family
- Ø Plastic Revolution
- Ø Indian consumers
- Ø Indian Farmers
- Ø Inflation control

VI- CONCLUSION:

Thus in light of the above study it has being noted that through dynamic economic environment and foreign exchange rates the FDI and the financial management has been possible in the current scenario. But in order to obtain more opportunities in the retail market it need to light up the opportunities in the field of Urbanization, increasing the workforce of Indian farmer, Indian consumer and then need to control the inflation of the country.

From the above discussions it can be concluded that since India is a developing country and the people who are working in non-government organisations have less social security after their retirement. To encourage the saving habits among them our banking sectors are introducing various schemes. Apart from all the above, since the capital raising capacity in India is very less to take the Indian banking sector to worldwide we require investment from abroad in Indian banking system.

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Evolution and Progress of the Global Corrugated Box Industry, During Past Two Centuries.

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ABSTRACT

The Packaging industry has remained as a main contributor behind the screen to promote Logistics and Transport too far off distant destinations of the world. All merchandise goods are sent by means of shipping railways, roadways and Airways in the form of Cargo and Cargo consists of Boxes and Containers made up of either metal, wood, chinaware, porcelain, jute & nylon sacks etc.

So the modern packaging Industry which is using predominantly Corrugated Fiber Boxes has tremendously boosted the moral transport and logistics, transport has boosted the trade & in the chain relationship trade has boosted world's income, growth & development. This paper therefore highlights the role & contribution to worlds Income & development.

It must be noted that this area of research has remained unexplored in research conducted in the fields of economics, business management and Industrial economics. In general and Ph-d research works as well as Research Paper published in different Forums of Indian Academicians this Research is first of its kind which is not an overstatement if it is verified and cross tallied by going through bibliographies of Research work published in India.

This paper will provide the data based information concerning the corrugated box industry in the world. It will present the economic importance with reference to the volume, earnings and role in logistics and transport of global trade.

Introduction

During 1850 a very notable revolution took place in the Packaging Industry instead of heavy and costly metallic containers transporters found plywood or wooden boxes and containers which were lighter in weight having same capacity of carriage of cargo just like metallic containers later on plywood boxes and most common form was to pack Cotton Bales and other voluminous things to be dumped in huge sacks or bags or wrappers were found to be less expensive and lighter substitutes to metallic containers from 1850s to 1950 and jute was used 80% of the total Packaging material and Corrugated Box known as Kraft paper boxes were used only 20-30%. Due to the inventions of Robert Gair, Albert Joes, Robert Thompson, Henry Norris etc. Corrugated Box Packaging as well as Corrugated Fiber Box Containers were introduced which were the most suitable, inexpensive, economical, efficient, durable and having the quality to withstand all adverse inclement weather conditions & the material packed in them remained very safe & sound during long transits and bad handling, throwing during loading and unloading. Even the most delicate glasses & crockery could be safely moved to long distances because of Corrugates Box Industry since they were light, it became economical to carry them on Ships & Aeroplanes & even on Road Transport by Trucks. By 1950s there was a sea change in Packaging Industry. CFB packing secured more than 80% share in the total packing and jute had the remaining share of 20%. The advantage of Boxes is they use organic material which can be recycled & nothing goes to waste. Wood metal etc. cannot be recycled easily

and economically. Corrugated paper boxes which are made of pulp are environment friendly. **The time slot in which this industry began to operate.**

During World War I wood containers of various types were used almost exclusively. In addition to the same the jute bales of Cotton were used for global transport. Pine wood boxes were very common as well as the metallic & glass containers & China wares were used during 1850's to the world war I & Britain was the epi centre & nuclear force which used to obtain all sorts of raw- materials such as Raw ginned cotton , metallic ores ,tea, coffee,& other Beverages, food grains fruits & other edibles. Mica, Lac & other adhesives. From the major Colonial Countries like India, China, S E Asian Countries West Asia & African Colonies.

At the time of the outbreak of the Ist World War special overseas types of fibreboard had not been developed. The traditional Containers of food, metal & glass were strong only for export under peacetime conditions but were unsatisfactory & unsuitable for the rough handling, outside storage & exposure to prolong rain or high humidity encountered in war time shipping.

The desperate need, for War time Container in which movement of the tremendous volume of shipment of supplies to outline bases which the Army had established at that time, made it absolutely essential that suitable grades of fibreboard be developed for overseas use. The main advantage of Fibre Board is that it is lightweight, requires less volume to carry maximum load its sturdiness & less vulnerability to the inclement weather conditions

The contribution of investors and pioneers who introduced altogether new and most suitable packaging material namely cardboard box packaging.

The first commercial paper board box (which was not corrugated) was produced in England in 1817. Cardboard box packaging was common in 19th century. A Scottish born 'Robert Gair' invented the precut card board or paper board box in 1890 in Germany. Flat pieces manufactured in bulk were folded into boxes. Gairs Invention came about surprisingly as a result of an accident. He was a Brooklin printer and paper bag maker during the 1870's. One day when he was printing an order of sealed bags, a metal ruler normally used to crease bags shifted in position and cut them. Gair discovered that by cutting and creasing in one operation he could make pre-fabricated paper board boxes applying this idea to corrugated box board was a straight forward development when the material became available around the turn of 20th century.

The advent of Flaked cereals increased the use of cardboard boxes. Kellogs company was first to use cardboard boxes as cereal cartons.

Corrugated was also called pleated paper and was patented in England in 1856 and used as a liner for tall hats. Corrugated box board was not patented and used as a shipping material until Dec 20, 1871. Finally the patent was issued to Albert Jones of New York city for single sided Corrugated Board. Jones used the corrugated board for wrapping bottles and glass lantern chimneys. The first-machine for producing large quantity in corrugated board was built in 1874 by G Smith and in the same year Oliver Long improved Jones design by inventing corrugated board with liner sheets on both the sides. This happens to be the modern corrugated card board.

Growth of corrugated box industry in 20th century

During 19th Century and half of 20th Century there were 2 types of Container Boards namely jute container boards and Kraft Industry of Corrugated Boxes. Table below gives how over the years of around 27 years between 1925 to 1952 how Jute was replaced by the Corrugated Kraft Board Boxes.

TABLE – I				
EVOLUTION & GROWTH OF KRAFT PAPER				
YEAR	AVERAGE		PERCENT	
	JUTE	KRAFT	JUTE	KRAFT
1925	763	20	97.4	2.6
1926	826	37	95.7	4.3
1927	788	77	91.1	8.9
1928	832	165	83.4	16.6
1929	884	234	79.1	20.9
1930	819	269	75.3	24.7
1931	726	346	67.7	32.3
1932	604	362	62.5	37.5
1933	735	479	60.5	39.5
1934	737	491	60	40
1935	889	552	61.7	38.8
1936	1029	676	60.4	39.6
1937	1048	752	58.2	41.8
1938	675	877	43.5	56.5
1939	794	1084	42.3	57.7
1940	796	1170	40.5	59.6
1941	1074	1487	41.9	58.1
1942	821	1451	36.1	63.9
1943	1051	1442	42.4	57.6
1944	1126	1471	43.3	56.7
1945	1145	1446	44	56
1946	1219	1503	44.8	55.2
1947	1309	1829	41.7	58.3
1948	1123	2126	34.6	65.4
1949	771	2210	25.9	74.1
1950	921	2770	25	75
1951	1086	2965	26.8	73.2
1952	771	2925	20.8	79.2

In 1925 in the total container boards jute boards had 97.4% share and Corrugated Kraft Board had a share of 2.6%. By 1952 jute share collapsed to 20.8% only whereas percentage of Corrugated Board became 79.2%. This is amazing growth and popularity of the alternative technology of corrugated Boxes due to their cost, strength, humidity proof and light weight factors.

By 2010 the share of corrugated box in the total cargo has become greater than 95% that is why the established jute producers have entered into kraft segment in the recent years and continue to produce both the varieties because demand for packaging has been rapidly increasing since 1991 onwards when many countries including communist China and Russia have started participating in International trade and due to the combined consensus of accepting Liberalisation, Open Market Competitive Economy, Rationalisation of Customs & Tariffs, Discouragement to selfish practices of Dumping & harsh protectionism due to the monitoring of WTO from 2001 onwards there has been a

slow decline in the total quantum of World trade because in recent years many developed countries are facing the problems of economic slowdown, debt crises, stringency of credit and stagnant rates of GDP growth inspite of its sustained rate of growth of production and sale which can be revealed by the figures furnished in the table given below.

In a period from 1925 to 1952 the first phase and from 1952 to 2014 being the second phase of the historical and very significant role of Corrugated Fibre box Industry.

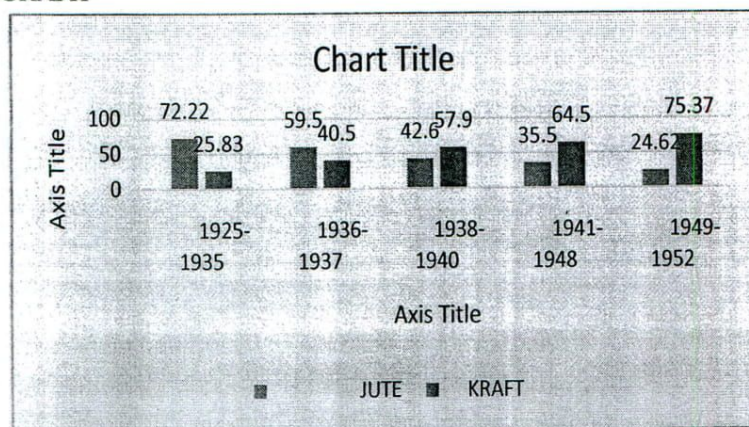
The following table will reveal the tremendously revolutionary role of Kraft paper boxes as against jute containers

Table		
Increase in percentage		
	JUTE	KRAFT
1925-1935	72.22	25.83
1936-1937	59.5	40.5
1938-1940	42.6	57.9
1941-1948	35.5	64.5
1949-1952	24.62	75.37

It is very interesting to note that during the period from 1925 the traditionally preferred pack of jute but Kraft emerged as a very formidable competitor to it since World War I that is 1914 and it made tremendously fast progress by improving its share in the total cargo package from 25.8% in 1925-35 to 75.3% in the year 1952. It captured the same position of its market share which belong to Jute cargo package which was 72.2% over the period from 1925 to 1952 the share of jute package dropped to 24.6% only.

Thus jute was outnumbered by kraft because of its superior advantage. The market percentage of Jute suddenly collapsed to 42.6% when even during the 2nd world war whereas during the same period the market share of kraft package short up to 58% from 26% ,almost two times.

GRAPH



To sum up jute market share continuously declined and can be shown by the descending curve and Kraft market share continuously increased from 25% to 75% which can be shown by the ascending curve.

The present profile of the growth and progress of Corrugated Box Industry

According to corrugated journal (issue of July to September 2009) world demand for Corrugated boxes is forecast to increase by about 4% per year to 2013 Billion square meter in 2013.

Factors contributing to rising box demand include growth in Industrial activity particularly the manufacturing sector which often requires Corrugated Packaging to protect and transport goods in addition , ongoing developments in small flute and high quality graphic board will also increase its Retail applications so relatively the rapid prospective growth of this Industry will happen in all the developing countries of the world together on the hand Vis-à-vis the developed world; because the industry in the developed world wide profusion of high tech growth as strong as that of the developed countries has become quite efficient obviously because of the comparative cost advantage of developing countries as against developed countries to import from developing countries whose production quality is world class and will obtain the gain of trade just like software Industry which is blooming in the third world. At present US, Western Europe and Japan happened to be Top leader country in the fields of Innovations and R & D due to growing concern for environmental protection the enlightened world rejects the use of plastic packaging. Corrugated Boxes will obviously benefit from their environment friendly image and there is one more advantage that old corrugated boxes can often be used to recycling companies. Since corrugated boxes are made of hard board or wooden dust

They are organic and they do not create toxic effects even at the time of their disposal.

Taking into consideration the comparative cost benefit advantage China & India in the near future are going to emerge as the fastest growing Countries in the global Corrugated Industry because of their comparatively less cost of capital, Raw materials and Labour. After 2020 Asia Pacific region, Eastern Europe, Africa and mid-East & Latin America are likely to outpace the present global average growth. With a year or two that is by 2015 China will certainly surpass the position of US as the world's largest Corrugated Box Industry. Indian Corrugated Box Industry which has adopted the latest technology and state of the art manufacturing equipment resulting in improved production quality will also gain the second best competitor position next to China.

Tony Pennington the renowned expert of Corrugated Box Industry visited India in the year 2009 on the invitation of The Western India Corrugated Manufacturers Association (WICMA) in Mumbai. According to his assessment, India has 70% of business activity being domestic and only about 30% of Exports this means any diminution of export trade has a diluted effect on the general economy and conversely International trading picks up. India has more than 300 million population of the world and with the growing demand for package branded consumption goods instead of unpacked and openly loose consumption goods therefore there will be a very rapid growth demand for packaging. He also noticed the rapidly growing awareness and sensitivity about conservation of ecology when he found hundreds and thousands of wind turbine pylons in the field after field stretching along with solar photo voltaic panels too and there is a growing movement which is becoming popular to make the entire India plastic free. Interesting thing is that it is not forced by government or law in India but people are adopting this own culture by voluntary initiative. Taking into consideration the vast production of fruits and vegetables, food grains, pulses milk and milk products (India Worlds no 1) flowers, processed food, soft drinks and manufactured goods etc. The present production of corrugated boxes seems to be far adequate and in comparison to other developed countries India's production seems to be very low both in million tones and consumption of 1kg per capita. Obviously, there is every infinite scope for emergence and expansion of CB industry in India in next 50 years.

Artificial Intelligence in Education of Learning Special want Children

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Abstract

As computer science and technology make gigantic technological advancements in the past decades. As well as educational institutions are taking advantage of this available technology and incorporating individualized programs and software into student's learning activities. This paper provides a summary of what had been accomplished by A.I researchers in educational sector.

1) Introduction

A.I. research and study empowers and enables many areas where machine have an obvious advantage. Education is one of those areas, where traditional teaching of students is not always effective. In some cases, individualized applications and programs outperform traditional class room learning experience in its effectiveness in student's progress.

Due to high rises of the number of kids affected by autism spectrum disorder (ASD), the purpose of this research is to find out what are researches had been done in this area to help these kids with learning process. As well as how AI techniques involved in tool development for kids with learning disabilities.

2) Identifying Learning Disabilities (LD)

Before perusing research on how AI and machine learning can enrich and fulfill the needs of individuals with learning disabilities (LD), lets look at what had been done to improve diagnosis process of such individuals where the delays in therapies and educational plan adjustments would be undesirable.

First of all, identifying individual's weaknesses in different areas as well as establishing correct diagnosis and educational plan had been always a difficult [9] area as some disabilities are more settled and with possibly some other disabilities and disorders overpowering and interfering capabilities of individual that may appear to have certain learning disabilities. For instance, attention deficit disorder (ADD) without hyperactivity component is the major overcoming factor for an individual to appear to be suffering learning disabilities. However, in most cases this disorder is easily corrected with the right combination and dosage of medication.

Up to this date, diagnosing various learning disabilities relies heavily on ones understanding of scholar research and actual findings from individual interactions with patient. Not only this process is costly in terms of manpower, but also can be highly delayed due to the fact that not all individuals exhibiting certain learning disabilities are capable of demonstrating early signs of it to their educators. As well as not always educators are capable of seeing those early signs.

Even though the problem of early diagnosis of LD present in US, concentrates mainly on this outstanding issue in Taiwan as diagnosis of LD appear to be more underestimated in contrast with US. A lots of expert systems were developed and used. Their performance considered to identify LD of an individual as well as by human expert in the field. However, thus systems didn't show any impact on the number of diagnosed kids with LDs.

Artificial neural network (ANN) and support vector machine (SVM) classification techniques gained lots of attention within AI world, but never appeared to be used for diagnosis of kids with LDs. Several experimental runs demonstrated that SVN results were consistent independently of the size of the training data set. ANN by itself wasn't giving high accuracy in general. Hybrid techniques yield better results, but still were lacking some accuracy in diagnosing kids with LDs.. Thus more research is needed to be done in this area to increase accuracy.

Another expert system was designed to help with diagnosis of children with various developmental disorders , as well as provide families with early intervention at the luxury of their home. It is a web based solution uses agent based neural nets to diagnose child with ASD. The detailed report mailed out to the child's parents and medical staff for future evaluation. Future evaluation by medical staff is necessary as common characteristics of ASD can be also associated with other types of disorders.

This knowledge based system uses learned knowledge and heuristics to evaluate child in its process using gaming strategies. Once deficiencies determined by the system, the child can start using the system to improve autistic child's vocabulary and interaction with family and peers. The learning/tutoring portion of the system is also web based solution that is also supports various language options. As an overall, the main purpose of this system is to help diagnosis of children with ASD and provide families with early intervention.

3) Tutoring Software for Special Need Children with Learning Disabilities

Highly important factor in learning is the motivation to learn. How can the software know if the student is motivated to learn? How can it keep its interest? Because of the challenges of this type of identification, a cognitive science studies emerged in this area]. Cognitive approach recognizes human strengths and weaknesses and uses this knowledge to emphasize on a thinking process/ability rather than on learning by example traditional teaching method. Such systems require external sensors to monitor learner's posture, expressions, heart rate, breathing, etc.

In organizing framework analyzed as a base for cognitive learning. Framework contains three main roles: tool, tutor, and tutee. According to computers are still mostly used in the tool role. With the lesser frequency they are used as tutor or tutee, of which K. Vimala is hoping to change in the near future.

Assistive Technologies Laboratory (ATL) team proposed a model for the effective tool development process, as a result of which they had successfully developed and deployed 25 tools in three Ecuador's centers for special education. Their proposed model combines the knowledge from school staff (which includes involvement of teachers and other students without disabilities) with experience of special education professionals

The involvement of students at universities gives them an opportunity to help children with disabilities by interacting with developed tools and providing feedback on improvements, development, and even implementation. These students, as well as teachers, would have a base knowledge and understanding the needs about specific disability the tool is made for by interacting with special education experts and psychologists through out the process. The main goal of the entire model is to create a tool where children with disabilities would be motivated to learn. Since the Ecuador's highest toll on disabilities in kids in intellectual, physical, and visual/hearing areas, ATL team concentrates mainly on this top three disabilities.

On the other hand, learning experience with software applications had shown large benefits for kids on autistic spectrum disorder (ASD). Kids with ASD typically thrive better in stable, predictable environment that computers are good at providing it to them. On the other hand, human instructors have a lot of inconsistencies that imposes undesired impacts on the learning progress of individuals with ASD.

Each individual child on ASD is very different, each one of them have its own set of disabilities/abilities, visual/auditory preferences, and different preferred learning techniques. Thus the learning software have to be highly flexible and capable of using different /combined techniques and approaches. With that in mind, Smart Tutoring model was proposed by Centre for Development of Advanced Computing [12]. Centre for Development of Advanced Computing developed Smart Tutor expert system that was composed from two main sessions available to its end-user: assessment and e-Learning sessions. At the beginning of each e-Learning session, expert system performs assessment session to determine mood levels, interests, and concentration levels of the child. Then expert system proceeds into e-Learning session by working on two main levels: conscious and sub-conscious levels. On the conscious levels expert system actively interacts with the child and captures information on child's responses in order to adjust its session accordingly. On the sub-conscious level, system updating child's profile and builds its own domain expertise. As a result Smart Tutor expert system provided children with highly adjustable interface as well enabled capabilities of evaluating learning progress over time.

4) Use of Robots and Humanoids

Study had shown that both autistic kids and normal kids tend to be drawn to the autonomous agents. However, normally developed child relates better with humanoid type of agents and perceives them as peer. In fact, during interaction with the artificial agent that resembles a human (humanoid), the same regions of the brain were activated in a normally developed child that respond to human faces.

In order to determine if there is a preference of autistic kids to artificial agents vs. human agents, relation needed to be performed on which areas of the brain activated during interaction with human agents vs. artificial agents in typical kids and how these regions compare with regions activated in autistic kids. The results of preformed experiment had demonstrated that ASD kids don't tend to see the difference between artificial agents and human agents. Also the study suggests that ASD kids use same resources with human agents as they used in interaction with artificial agents, while typical kids had demonstrated noticeable difference between the two.

However, since artificial agents tend to be more emotionally stable and predictable, another study suggest use of robotic toys with ASD kids as an intervention tool is highly effective that engages them better in forming social interactions.

A successful design of an interactive robot, Keepon, that prompts kids and adults to the group play and interactions was demonstrated in. The goal of this robot to involve child with ASD in playful interaction. Simple appearance and predictable built in interactions provided children with a relaxed mood, which yield better results in engaging child in a group play.

Keepon provides two operation modes: automatic and manual modes. In automatic mode, software provides face detection location, toy of predetermined color, and/or movement. These three factors provide likelihood of the child in play. In manual mode, human operator fully controls robot.

To oppose usage of non-human like robots as well as pictures and DVDs as a primarily technique in teaching social interactions and interpreting facial expressions, Italian team of researchers created humanoid robot FACE (Facial Automaton for Conveying Emotions) (See Figure 2). Their argument is that most other robots concentrate on promoting interaction skills which are also highly critical for kids with ASD. Picture and DVD therapies provide effective preparedness of the ASD person to certain life scenarios, but very limited to these situations. While FACE is more advanced learning tool for ASD kids and adults.

FACE facial expression recognition system is built on a neural approach, which is more efficient than a human therapist, as it captures and processes all of the data. The preliminary experiment was run successfully on the high functioning child with autism, who typically learn social skills well through a therapy. However, the system was not tested with less functional autistic kids, so the results seems to be very inconclusive. Still the benefits of processing facial responses to the displayed facial expressions are highly beneficial

data for further research in this area.

However, the cost of such robots runs generally high, so authors of had proposed a piloting the use of robotics as an affordable aid for home use. In , a prototype of a cartoonish looking penguin robot was developed and named PABI (Penguin for Autism Behavioral Intervention) . Besides the ability to demonstrate human-like emotions, robot was build with high tolerance to all possible abuse on it as a stuffed animal would withhold from a child.

With the purpose of extended therapy of ASD child at home, PABI has two main modes. One of which is to interact with the child independently, and another one is to interact with the child with guidance of the therapist remotely controlling robot and observing child's behavior and interactions. Facial recognition algorithms are used to observe child's behavior.

5) Use of Virtual Characters

As demonstrated in Section 4, artificial agents that closely resemble human facial features benefit the learning of social skills and interpretation of facial expressions in ASD kids. In this section a closed look will be taken on a virtual characters used with the same purpose.

Portuguese team of developers, researchers, and experts developed LIFEisGAME [1] interactive game for ASD kids teaching kids to recognize facial expression by a playing this game with a virtual character

Currently, LIFEisGAME has four main activities: recognize facial expression, build facial expression, play with avatar (avatar on the screen mimics child's facial expressions), and identify appropriate facial expression for presented real life story/situation. Although the modes presented to the player in a sequential matter, but in the future mode selection will be available. A small camera allows monitoring and analyzing child's expressions during the game.

Incorporated game techniques into this learning product (LIFEisGAME) created higher interest of the child with ASD to participate. That by itself makes this application to stand out from many other applications that are used to teach kids with ASD about facial expression recognition.

However, LIFEisGAME still needs work on individualizing learning process for each of its user, as well as allow more customizations on avatar features, colors, and sounds. An additional interest was shown by experimental run on several kids with ASD about using different types of avatars in addition to human faces.

6) Other Educational Applications and Computer Aided Instruction

With involvement of technology in educational areas, more and more application had been developed to aid and improve educational process, as well as provide better and more effective learning experience for distance learners.

process of learning algebra requires student's continues and constant training. Many solution had been developed in this area. However, most of them have a basic instructional guide with practice exercises. None of the looked solutions by have had any tracking systems of individual student to measure their progress and dynamically adjust the system to it. Thus Research Center for Information Technology and Systems Autonomous University of Hidalgo State had developed a tutoring system to aid algebra education that is dynamically adjusts itself to the student's progress and have a tracking system.

Its knowledge based system was developed with the knowledge provided by professors teaching experience. As a result of this coordinated work, the system is capable of adaptation to the student's progress, as well as teachers have a capability monitoring the progress as well as direct/assign certain topic to the students. The successful use by private and public schools in Mexico had demonstrated great results. A more generalized research was done on application of AI to computer aided instruction by H. Li from Lonyan University. With rigorous details, Li researched successful applications and techniques used in educational systems using AI techniques.

7) Conclusion

With the number of autistic kids on the rise and proven benefits of stable and predictable computer behavior on autistic kids, more applications and systems are built to aid and improve autistic deficiencies caused by the disorder.

Several robots and humanoids were discussed here that education of social interaction and facial recognition for individuals with ASD. In addition, other systems were discussed that help with general stream education. As an overall, this research had highlighted the work had been done to improve and increase efficiency of educational process for kids and individuals with ASD as well as without.

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THE ROLE OF INFORMATION TECHNOLOGY IN ACCOUNTING CHANGE

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Abstract : In today's era IT (Information Technology) is vital in every aspect. Introduction of IT and its various features had made the enormous changes in operation and related decision making in Financial Accounting and Management accounting. It had increased speed accuracy and also the more trust and better presentable formats. This paper is an effort of study relationship between IT and accounting system. This paper is historical review of how IT had played a key role in Accounting Change. In the convergence manifestations and outcomes presented in this paper, IT's facilitator role is dominating. While the integration of information systems has extensively been adopted by companies, also a general trend of convergence becomes more obvious phenomenon, due to increasingly advanced technological platform.

Key Words: Information technology, Management accounting, Financial Accounting, MNC, Technology, Fair Value

Introduction:

Information technology (IT) plays a major role in the development of accounting information systems (AIS). Although, the role of IT within the field of Management Accounting and Financial Accounting is acknowledged with the clear message that accounting and control cannot be studied apart from IT, (Dechow and Mouritsen, 2005; Granlund, 2011), the role of IT in the relationship between Management Accounting and Financial Accounting has not yet been analyzed particularly on the behavioural and organizational levels. Similarly the academic research has directed the discussion to integration which takes place within information. Accounting is a changing phenomenon, where both management accounting (Management Accounting) and financial accounting (Financial Accounting) activities, technologies and concepts are continuously evolving and redefining themselves, and they are becoming increasingly intertwined, converging realities. According to prior studies the integrated information platform facilitated by information technology innovations such as ERP systems and Internet solutions drives changes in corporate management (Davenport, 1998; Granlund and Malmi, 2002). Also in the cases where ERPs are not adopted, systems can be integrated using conventional best of breed solutions where each function may have its own independent system or standalone system components of standard package and/or custom software.

Objectives of Study :

- To explain why the recent development in Management Accounting and Financial Accounting aligned with the advancements of information technology (IT) have lead to their convergence
- To explicate how this convergence of Management Accounting and Financial Accounting is manifested not only in the technical and technological domain
- To offer a rich basis for future accounting research where the convergence of Management Accounting and Financial Accounting is considered.

Observations

The ultimate purpose of accounting can be classified into two categories, control and decision-making (Zimmerman, 2000). Within the field Management Accounting, control contains planning, cybernetic, administrative and cultural controls as well as compensation systems, and decision making comprises of strategic and operational decisions (Malmi and Ikaheimo, 2003; Malmi and Brown, 2008). Within the field of Financial Accounting, control refers to the stewardship accounting where management is accountable to the stakeholders, especially to investors, on the resources given to them, and decision-making refers to the valuation focus where information is provided to investors for making informed decisions (Hemmer and Labro, 2008). Although the institutions and

practices of Management Accounting and Financial Accounting seem to be very different from each other, the ultimate purpose of existence are similar as suggested above – decision-making (Management Accounting) / valuation (Financial Accounting) and control (Management Accounting) / stewardship (Financial Accounting).

Management Accounting has traditionally focused in annual controls in stable and restricted competitive operating environment due to the managers' need for the historical information in order to understand the performance and to control the accountability in their organization (Granlund and Lukka, 1998a, 1998b; Granlund and Malmi, 2002; Ikäheimo and Taipaleenmäki, 2010). However, certain forward elements, such as those of budgeting and capital investment calculations have been part of the Management Accounting information, already before the most recent changes in the field of accounting.

Traditionally, Financial Accounting information and especially financial statements have served the stewardship role of accounting, where management is accountable to the shareholders and other stakeholders on the past performance. For stewardship purposes, the management uses backward-looking annual and quarterly financial reports to discharge accountability pressures (Zeff, 2005; Ikäheimo and Taipaleenmäki, 2010).

The trend in Financial Accounting from the stewardship approach towards decision-making approach, which emphasizes fair values and transparency, is recent and dramatic. The evolution of standard setting towards fair value accounting started in the U.S. in early 1990s (Landsman, 2007) and similar trend, from 2003, took place also in IAS/IFRS standards (Troberg, 2007).

Fair value accounting would in principle fill the information asymmetry gap among investors and financial analysts on the corporate level strategic choices and the company management's ability to mobilize these choices into the future business success. These fair value requirements pose major challenges to the quality of Management Accounting, which is the main source of forward-looking information for this fair value accounting (Hemmer and Labro, 2008). As IT creates an information environment which may facilitate integrated and flexible operations (Orlikowski, 1991) and as IT has become an essential, inescapable carrier of accounting information (Granlund and Mouritsen, 2003; Hyvönen et al., 2006; Granlund, 2011), we search the answer to this question from the advanced information technology and systems, which have enabled and facilitated the materialization of these needs. The contemporary analysis-oriented accounting information systems and management reporting software packages can be used by both various managerial levels up to the top executives in the management team and the accounting professionals, similarly as integrated information systems (van der Veeken and Wouters, 2002; Rom and Rohde, 2007). Their competencies in Financial Accounting principles and standards as well as on Management Accounting techniques are of different levels. These decisions concern the architecture, accounting rules and logics, and the interface of the accounting information systems, and the design and the configuration of accounting models within these applications as well as the configuration of the functionalities in accounting software packages and the accounting modules in ERP systems (see Dechow et al., 2007b; Wagner et al., 2011).

To conceptualize the role of information technology in the convergence of Management Accounting and Financial Accounting, we adopt and simultaneously refine for analysis purposes of this study the terminology from the theory of change by Innes and Mitchell (1990), who identify facilitators, motivators and catalysts for the accounting change (see also Cobb et al., 1995). When IT acts as the facilitator for the convergence, the role of IT, in our view, is necessary but not solely sufficient for the convergence to occur. When IT plays the catalyst role in the convergence phenomenon, the impact of information technology is directly associated with the timing of change, in other words IT increases the pace of the convergence making it earlier than it otherwise would occur, or predates it. Finally, the motivating role of IT means influence of general nature in the convergence. In these cases IT establishes the ground for change and justifies or necessitates it in a general manner. In its strongest occurrence, when IT per se initiates the convergence, it takes the form of enabler for the convergence. Although the above described roles of IT seem to be quite clear, in reality these

roles are not as straightforward or easy to identify, since IT may simultaneously have various roles or characteristics from several roles. In addition, IT has divergent roles in different organizations. The role of IT in Management Accounting and management control change has earlier been studied by Burns and Vaivio (2001) and Granlund (2001), yet it has remained fully unexplored in the relationship of Management Accounting and Financial Accounting, and especially regarding the change within this relationship.

In the goodwill impairment test the ultimate purpose of Financial Accounting is to assist shareholders in decision making by providing fair values of goodwill. The manifestation of convergence, i.e. the process of generating fair values for financial reporting from Management Accounting, is facilitated by IT, making calculations and information transfer easier and faster. The ultimate purpose of segment reporting stems from the purpose of shareholders' need to value companies for their investment decisions. Segment reports increase transparency of managerial activities assisting shareholders in evaluating the origin of growth and profitability. IT facilitates this manifestation of convergence by making segment reporting easier and faster in all stages, from gathering and combining the data to reporting the information. From the research perspective, the connection between Management Accounting and Financial Accounting in the field of intellectual capital and earnings forecasts is of great importance.

In the performance measurement system, Management Accounting ultimately plays a controlling role, where performance is evaluated and managers rewarded. IT has the role of motivator, facilitator or catalyst role, in the manifestation of convergence. Actually there is evidence that information system integration is directly associated to perceived performance measurement system success (Chapman and Kihn, 2009). Currently, the major valuation method, i.e. arm's length principle, for transfer pricing is based on market values, i.e. the value which is expected to be received from the product or service while sold on the market. This is defined in the OECD (1995) Guidelines for Multinational Enterprises and Tax Administrations, ensuring that taxes are allocated fairly between countries. The market-based method typically requires benchmark information from the markets. For the researchers, it would be important to examine, how the benchmark for the market-based transfer prices are determined – are they purposefully determined to avoid taxes, and how they interrelate with other control related motives.

Profit warnings indicate that previously published earnings guidance based on earlier profit expectations are not valid any more. Management Accounting provides the crucial input for generating profit warnings. It may be argued, that the recent developments in the future-oriented accounting methods, such as budgeting and especially rolling forecasting, are partly consequences from the need of these profit warnings. Many companies have outsourced their Financial Accounting processes, particularly those involved in managing the business transactions (bookkeeping, payment processing, etc.), even to remote offshore locations (Nicholson et al., 2006). Recently also the Management Accounting information can be generated by the accounting service providers, and this development has been enabled and facilitated by the advancements in the information technology. It can be also argued that certain software applications and IT solutions have not only provided the integration of Management Accounting and Financial Accounting but also increased the standardization of Management Accounting, contributing to its global homogenization (Granlund and Lukka, 1998). The adoption of ERP systems may lead to a faster financial reporting and tighter financial reporting schedule can indicate higher quality of Management Accounting and control.

In the case of profit warning, the needs in the financial markets may have had a substantial influence on the development of rolling forecasting and variance analysis. Empirical findings have indicated that information technology changes the accounting work (see e.g. Quattrone and Hopper, 2001). Based on empirical findings by Caglio (2003) on the role of IT in the accounting convergence, also the boundaries between Management Accounting and Financial Accounting may undergo considerable changes, in connection with the introduction of integrated information systems, ERP systems in particular. The line between Management Accounting and Financial Accounting becomes

blurred and the hybridization between the traditional professional profiles of the Management Accounting and Financial Accounting becomes possible (Caglio, 2003). According to Caglio (2003: 143): "This implies, for these 'hybrid' positions, the construction of a broader vision of the firm as a whole, as well as of an understanding of all processes and events from a double perspective, from a financial accounting view and from a management accounting point of view."

More business-oriented accounting staff, business controllers, have taken key roles in the business processes of plethora of companies (Friedman and Lyne; 1997; Granlund and Lukka, 1998a). These business controllers representing the Management Accounting profession are frequently required to participate in purely Financial Accounting processes. The reason for this can be very simple – typically finance department as a corporate support function with its administrative origins has to operate with scarce resources, particularly in SMEs (see e.g. Granlund and Taipaleenmäki, 2005). There is already research evidence on the fact, that even the management accountants do have their role in the statutory accounting, and thus the role change does not refer to role replacement, but role expansion (see e.g. Granlund and Lukka, 1998a; Granlund and Taipaleenmäki, 2005).

Most of the observed manifestations and outcomes of the accounting convergence had major element of forward-looking information. Typically, the first manifestations of the accounting convergence are technical or technological, not least due to the fact that IT is the major facilitator, catalyst, motivator, or even the enabler for the phenomenon. As the convergence proceeds the manifestations seem to become more behavioural and organizational in nature (Orlikowski, 1991, 1992). Based on these observations, the convergence has really occurred, and its consequences are still mainly unresolved.

Furthermore, modern information technology may increasingly transfer some accounting work to non-accountants (e.g. transaction registration to the logistics function or shop floor workers (Quattrone and Hopper, 2001; Rom and Rohde, 2007), or reporting and analyzing to the accounting information end-users' "self-service") and hence blur the cross-functional borders and the transform the entire accounting as it may converge and integrate tightly with other business processes. Although technological innovations constantly emerge and fade away, as Granlund (2011) quite plausibly suggests, in view, there will always be important general lessons to be learned from analyses of contemporary technologies. Therefore, we do not rule out the possibility that the technological development and its implications to corporate practices in the long term may change or even reverse this Management Accounting and Financial Accounting convergence development which we currently foresee.

Conclusions:

The accounting and its major fields, Management Accounting and Financial Accounting, are under a process of major changes, one of which seems to shift towards convergence of Management Accounting and Financial Accounting, which is the focus in this paper. The basic ideological basis of Management Accounting and Financial Accounting is very same. Based on these studies the convergence of Management Accounting and Financial Accounting would be facilitated or even enabled by modern accounting information systems, where architecture and design are based on integration. These digitalized systems may lower the costs of maintenance, although implementation is typically costly. Information technology may reduce time needed for processing transactions and integrating accounting information. The manifestations and outcomes of these changes could be detected both in the technical and technological as well as in the behavioural and organizational domains. Within technical and technological domain, recent development e.g. in financial reporting and stock market regulation, voluntary disclosures, performance measurement, transfer pricing, competitor, customer and contractor analysis as well as due diligence in M&A activities all contain major converging elements where IT plays an important even pivotal role.

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A STUDY OF CHANGING SCENARIO IN EDUCATION SECTOR WITH REFERENCE TO FDI IN INDIA

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ABSTRACT

Indian education sector is one of the pillars of Indian Economy and many global players are willing to enter into it. It has been started growing after implementation of 1991 New Economic policy, as the policy focused on development in education sector. In achievement of Human development education plays vital role in this context. Contribution of capital has increased in this regards and opened the sources of capital investment from foreign countries. Education sector is now globalised and FDI has been motivated by the government. According to Deloitte, a global consultancy firm's report, India which ranks third after china and united states in terms of higher education enrollment requires more FDI in this sector in order to meet its target of doubling its gross enrollment ratio by 2020. The government has set an aggressive target of achieving 30 percent in higher education by 2020 from the current level of 15 percent. The role of private sector in higher education has significantly increased in the last decade along with public sector. This paper studies the need and importance of FDI in education sector .It also deals with the impact and prospects of FDI in education sector in Indian economy. This paper has major implications for educationists who intend to reap the benefits of FDI as well as Government who need to frame suitable policies.

Key words: Foreign Direct Investment, Higher Education, Foreign Educational Institutions,

INTRODUCTION

“Live as if you were to die tomorrow. Learn as if you were to live forever.”

Mahatma Gandhi.

Education in its general sense is a form of learning in which the knowledge, skill, values, beliefs and habits of a group of people are transferred from one generation to the next through

storytelling, discussion, teaching, training, and or research. Education refers to the systematic process of gaining knowledge and skills through study and instructions. Education has many benefits and has positive impact in our life. An educated person is an asset for any country. In today's world, human capital is considered the best national resource.

India as the developing nation essentially targeting the education sector to mould the shape the society. According to the 2011 census, India has a literacy rate of around 74%.. The central and most state boards uniformly follow the "10+2+3" pattern of education.

In today's global era education sector is facing rapid competition from foreign countries and became important to improve mean of technical knowledge, modern method of teaching and new modern aids in education. This needs assistance of finance, technology and innovative ideas of teaching from other foreign countries.

FDI is the alternative to current situation of education. Foreign direct investment in the field of education improves the state of primary, secondary and higher secondary schools in India. India is a nation that has to meet challenges in key sectors such as manufacturing and services. Investment by the government has to be divided among a huge set of sectors. Foreign direct investment leads to increase in profits within different industries as well as tax cuts and expanded marketability for singularly differing industries.

FDI helps in supplying the material within the country with available resources for the benefits of educationist. It creates the international standards and reduce the number of students migration. Getting education closer to home will be better for the students emotionally as well financially. Number of students take loans to pursue higher education in abroad. Getting the same kind of education in India may show a tremendous increase in performance.

OBJECTIVES -

- To Study the need and importance of FDI in education in India.
- To analyze the flow of FDI in education sector.
- To analyze the current scenario of FDI in Indian higher education system
- To examine the opportunities& challenges of FDI in education sector in India.
- To find out the barriers for FDI in Indian education.
- To suggest the removal of various barriers for FDI in Indian education system.

METHODOLOGY OF THE STUDY –

This study is exploratory for which Information is collected from various secondary sources to explore the inflow of FDI in education sector in India and its impact on Indian Economy. Data collected from different sources such as books ,journal, news papers and web site.

SCOPE OF STUDY-

The education sector in India is divided into two sub segments; the key segment comprises of schools and higher education, while the other segment comprises of coaching classes, pre-schools and vocational trainings. Educational sector is sustainably improving in recent days led to make the people to face competition. There is enormous need for the up-liftment of education as India is expected to have a surplus of 47 million people in the working age group by 2020. As a result, both the formal education sector (including K-12 and higher education) as well as informal sector (including coaching institutions, pre-schools and vocational institutions) are observing rapid growth.

Today, the Indian education sector is one of the biggest education systems in the world. The education sector in India is evolving and has emerged as a strong potential market for investments in training and education sector, due to its favorable demographics (young population) and being a services driven economy. Further, India's expanding role in sectors such as software development, generic pharmaceuticals and healthcare, would require the country to invest into learning and training segment as well. The education sector in India is also considered as one of the major areas for investments as the entire education system is going through a process of overhaul.

LITERATURE REVIEW-

R K Sharma in his article "FDI in Higher Education: Official Vision Needs Corrections", raised four issues which need critical attention: the objectives of higher education, its contextual relevance, the prevailing financial situation and the viability of alternatives to FDI. The conclusion of the article is that higher education needs long – term objectives and a broad vision in tune with the projected future of the country and the world.

Shilpa Kaura in her article "foreign direct investment in higher education "raised the impact of FDI in higher education in India .She concluded that Government must consider seriously corporatization of higher education so as to allow corporate houses to enter higher education and deliver education of global standards.

FDI IN INDIAN EDUCATION SECTOR-

Foreign Direct Investment has always been a matter of concern for India, when it comes to education sector 100% FDI is allowed by the Government Education Industry is likely to

grow by the size of the public education sector is \$40 billion and the private sector amounted to \$60 billion in 2011-2012.

Foreign direct investment is a passive investment in the securities of another country such as stocks and bonds and also known as portfolio investment. India has one of the world's largest education systems, which includes 1.3 million schools, 30,000 colleges and 542 universities. In last year's budget (2011-2012), Finance Minister Pranab Mukherjee allocated Rs 52,057 crore for the sector. The size of the public education sector is \$40 billion and the private sector amounted to \$60 billion in 2011. Current law allows 100 per cent FDI in education. According to the Confederation of Indian Industry (CII), another simple and best way to attract private investment in higher education is possible through foreign direct investment

Foreign investment considered in several types such as Portfolio investment, foreign loans and foreign direct investment are the three important classifications. Out of these foreign direct investments in industry and services are the most useful.

India's education sector has witnessed significant expansion since the government approved FDI in April 2000, thus providing a huge opportunity for investment. Yet FDI remained zero in the first three years, increased till 2008-09 and then kept falling again. In the past 11 years, the total FDI in education has stood at Rs 2,051 crore, the yearly average of Rs 186 crore being one-tenth of one per cent of what the Centre and state governments annually spends in this sector. Currently, the Government spends around 3.8% of its GDP on education

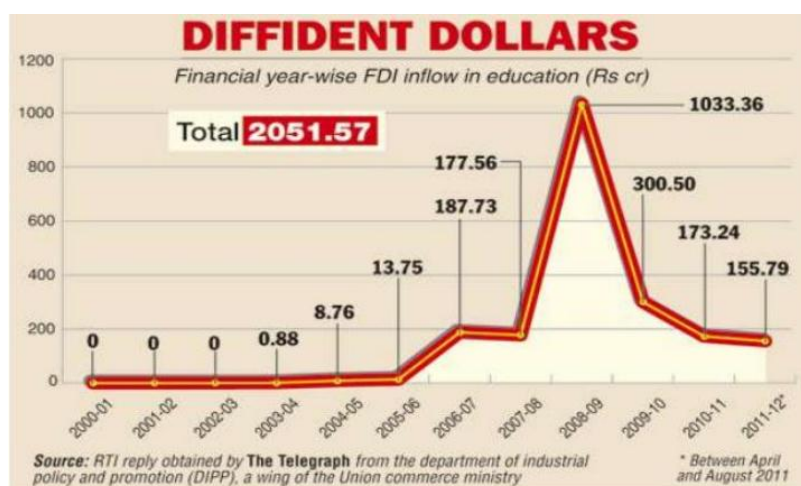
Factors favoring promotion of FDI-

- Increased Investment in higher education will lead to: Increased Institutions
- Enhanced Access to the best universities of the world.
- Opportunities of International Qualification.
- World class labs and libraries.
- Competition leading to quality improvements.
- Curriculum and Technological innovation.
- Research & development.

CURRENT STATUS OF FDI INFLOW IN EDUCATION SECTOR IN INDIA –

FDI in education sector stood at Rs 1170.09 Crore (US\$ 221.71 million) in the month of May 2012 and Rs. 4,597.39 Crore (US\$ 901.46 million) in October 2013. The country's fast-growing education sector holds a potential to attract a US\$ 100 billion investment over the next five years, driven by demand for skilled professionals and need for infrastructure development.

India, which has the third largest higher education system in the world in terms of enrolments, after China and the US, needs more FDI to meet its target of doubling the gross enrolment ratio (GER) by 2020. Under the Foreign Direct Investments (FDI) Scheme, investments can be made in shares, mandatorily and fully convertible debentures and mandatorily and fully convertible preference shares¹ of an Indian company by non-residents through two routes:



SOME OF THE MAJOR INITIATIVES IN EDUCATION IN INDIA -

The UK-based University of Northampton has tied up with Madras University to offer a Master's degree in International Environment Management. The course will allow students access to online courseware put up by the University of Northampton

- Ecole Hoteliere de Lausanne has opened a 67,000 square feet campus in India to tap into the growing demand for skilled hospitality professionals in the country. Located in the newly developed Lavasa township near Pune, Ecole Hoteliere Lavasa will offer a four-year programme
- Narsee Monjee Institute of Management Studies (NMIMS) has set up a centre for manufacturing excellence in collaboration with UK's Warwick University. The centre will offer specially designed Master's and Doctoral programmes .
- CFA Institute, the global association of investment professionals, plans to set up office in India for its CFA and Claritas programmes .
- Tech Mahindra has established an engineering college in association with the French university,
- Ecole Centrale and Jawaharlal Nehru Technological University (JNTU) EuroKids, education service provider in the pre-school segment, launched 'EuroVarsity', a virtual university aimed at providing programs to develop teaching skill sets. The first

course to be offered is a certified teacher training course, 'diploma in early childhood care and education'.

- India and Republic of Korea have signed a memorandum of understanding (MoU) for cooperation in the field of education.
- Manipal University signed a memorandum of understanding (MoU) with Beijing Institute of Technology.
- The Ministry of Human Resource Development plans to set up ten community colleges in collaboration with the Government of Canada in 2012. The Government of Gujarat plans to set up a farming educational institute in collaboration with Israel, offering post graduation and Ph.D programme with practical training and degree from Israeli universities.

CONCLUSION-

Corporate need well trained professional to take on global challenges and capture overseas markets. It is understandable to keep primary and secondary school education as charity or social objectives to enhance literacy rate to 100 % level but higher education has to be freed from this tag. Government must consider seriously corporatization of higher education so as to allow corporate houses to enter higher education and deliver education of global standards. This will also facilitate several private universities, research houses, large corporate to consider foreign direct investment in India's higher education.

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ROLE OF HUMAN RESOURCE MANAGEMENT IN RECESSION

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ABSTRACT

This paper deals with human resource management (HRM) main function in period of recession, which is today's reality. The global recession is demanding a great deal of workers worldwide. How HR organizations are navigating this grueling business climate, the obstacles and challenges they face and the areas in which they might find opportunities to develop and be more widely recognized as business - critical partner is the subject of studying. Human resources leaders in most firms – even those who are not adversely affected by the global financial crisis – are facing unprecedented challenges, ranging from an unstable market to unexpected mergers and acquisitions. These dramatic shifts put pressure on firms; even those aren't facing steep declines, making it imperative for HR professionals to be in lockstep with the business. Study says the greatest obstacle HR faces is a certain dissonance with the business. The HRM function has to be able to identify the top potential in the organization quickly as the company needs to make the cuts in the human capital of the organization. The HRM function needs to provide the tools to managers to inform their key employees about the security, the company wants to offer key employees.

Keywords: Management Education, Business world, Competition, Knowledge

INTRODUCTION:

Today we cannot ignore the fact that we are facing the economic downturn and this leads to many extreme situations. The price of oil on day has risen to record levels and then fallen again. The stock markets are up one day and down next day. The currency markets are extremely volatile the unemployment has risen and many firms are struggling to survive the downturn. In fact, the economist intelligence unit's role of Human Resource Management in global recession forecasting the global contraction of 1.9 % in GDP growth for 2009. Businesses are facing dramatically reduced sales and profits. Times are indeed tough, and with so much at stake, managing the business of people – as HR divisions do – is a daunting proposition. Human Resource is expected to play a leading role in this environment by continuing to be more engaged ever in developing and retaining talent, containing and reducing costs, and aligning its activities with the overall business strategy. However, according to a survey conducted by the economist intelligence unit in 2009 march, HR faces numerous organizational, financial and technological obstacles, particularly during these trying times. The HR vision for the recession can play a significant role in the success of HRM function in the recession. The HRM management team has to set it as a priority and the vision has to be transformed into actions quickly.

1) CHALLENGES AND STRATEGIES TO HUMAN RESOURCE MANAGEMENT IN RECESSION

The HR function has to conduct several HR recession initiatives as soon as the recession is recognized in the organization. The organization can grow rapidly, when the recession ruins companies around your organization. But, when the organization feels the pain from the recession, the HRM function has to start several HR recession initiatives. The HR recession initiatives have to be focused on the analysis of the current situation and unlocking the potential for the future growth. The HR Recession Initiatives are not just about the cost cutting, the recession initiatives have to be focused in more areas:

I. Reduction in manpower

Downsizing is extremely difficult. It takes all of the management team's resources, including both business acumen and humanity. No one looks forward to downsizing. Perhaps this is why so many otherwise first-rate executives downsize so poorly. Termination with dignity presumes that the package will include severance pay (when possible), ongoing career coaching, and in-house counseling to help separated employees come to an understanding what combination of severance pay and support services is appropriate. A full explanation of these benefits should be handed to the employee in writing at the beginning of the meeting. The extremely difficult decisions who must be laid off, how much notice they will be given, the amount of severance pay, and how far the company will go to help the laid off employee find another job are given less than adequate attention. These are critical decisions that have as much to do with the future of the organization as they do with the future of laid off employees. So what happens? These decisions are handed to the legal department, those primary objective it's to reduce the risk of litigation, not to protect the moral and intellectual capital of the organization. Consequently downsizing is often executed with a brisk, compassionless efficiency that leaves laid off employees angry and surviving employees feeling helpless and demotivated.

II. Survivors

Survivors are the employees remaining in the organization after work force downsizing. They, though stay employed, sit next to empty desk and are grappling with the guilt that psychologist label "survivor syndrome". Symptom of sickness include job uncertainty, perception of unfairness stress from increased work and loss of loyalty and commitment. Survivor syndrome refers to a marked decreasing motivation engagement, and productivity of employees that remain at the company as a result of downsizing and workforce reduction. It entails a series of complex psychological processes and subsequent behavioral responses. The cycles involve a chain of consequences beginning with employed dissatisfaction and ending with organizational inefficiency.

2) STRATEGY TO IMPROVE PRODUCTIVITY AND EFFICIENCY

Economic recession is not a good sign to economic development or development of any industry. Internal and external customers of organization is affecting with these economic turmoil. In order to save the interest of both we have to integrate all level potential and till date hidden potential resources to face such unwanted event. We can use modernization to, automation tool, computerization, introduction of quality control tool, total quality management etc.

As we know we are in age of information technology, enterprise resource planning software like SAP, Oracle, etc. these software will help you reduce the manufacturing cost per unit of product or services. The application of ERP software will help to increase productivity and efficiency in below domain of an organization.

I. Compensation and benefit plans

Compensation is payment to an employee in return for their contribution to organization, that is, for doing their job. The most common form of compensation are wages, salaries and tips. For e.g., salary ranges for job description, merit based programs, bonus based programs, commission based programs, employees benefit typically refers to retire plans, health life insurance, life insurance, disability insurance, vacation, employee stock

ownership plan, etc. benefits are increasingly expensive for business to provide to employees, so the range and options of benefits are changing rapidly to include, for example, flexible benefit plans. Benefits are forms of value, other than payment, that are provided to the employee in return for their contribution to the organization, that is, for doing their job.

- Cutting pay may be an option to consider saving on today's cost. Is this really an option for your organization? How you pay scales are related to market? Are you willing to take risk of losing key employees whose talent may be needed by other organization because you choose to reduce their pay at this time? Remember, you should not cut pay without a recovering strategy of how you will re-adjust when the economy has turn.
- Having a mandatory holiday shutdown.
- Raising employee contribution to health care premiums.
- Reducing the number of working shift
- Reducing over time working hour in order to save overtime wages.
- Allow employee to take temporary leave. Training and development program cutting the focus of organization will be great on reducing cost, and training may be one of the function where budgets may get impacted majorly. Gone will be days when few days of training mean a nice vacation in a hill station. The training function also needs to look at this aspect seriously and as sit the organization to reduce costs significantly wherever possible by cutting down on the frills associated with training. Thus training and development expenditure we can reduce to certain level by adopting innovative sources as below
- Internal arrangement of trainer for training and development program.
- Arrangement of product training at material suppliers manufacturing plant.
- Sponsoring potential employee for short term higher education courses.
- Tie up with government training institutions.
- Arrangement of In house training.
- Tie up with NGO's for In house employee developmental program.

II. Employees recruitment

Simply spoken, HRM has to provide organization with right people in needed quantity and qualification structures, to adjust the behavior of the employees with the need of organization. HRM department has the task to create and maintain the balance between employee needs and needs of organization in period of crisis new employee recruitment must be stopped. It must be elaborated by HRM department with new recruitment strategy. First of all must be made a file of vacant work places. The vacancies should be stopped and redesigned of workplaces should be made. Organization will need other set of jobs to survive on market. Many jobs will be put together and it will require job redesigns on the other hand in the period of recession other similar organizations make force reduction, it is a possibility to hire a new set of skills and competencies to strengthen the position of the organization on the market. HRM should elaborate a list of employees which have to remain in every cases in the organization. They are so called "knowledge workers" and leaving of that people will damage the organization.

III. Communication among employees

Communication during recession and layoff is critical activity. The right information should give in right type to all affected employees. Especially survivors should obtain information about future of organization and should have employment certainty. It is very important, because during the period of recession physiological contract was distracted. It takes a time and effort to revenue the trust and new psychological contract. The beliefs, that employees can link their own futures with the future of the company are gone. Survivors as witnesses to layoffs. They monitor processes during the lay off and they are monitoring managers'

behaviors. The revenue of psychological contract will depend on procedural fairness of layoffs. Carefully prepared (though flexible), positive scripts are indispensable to the separation process. Enabling people to pick up the pieces and move on should be the goal.

IV. Career planning for the employee

Many employees feel that the economic situation should not be a deterrent to the performance management system of any organization. A performance appraisal is a critical aspect of any employee's career growth. As an HR manager you should take it very seriously and it's an effective tool for a career planning. An appraisal process should provide a clear understanding of the employees and companies' expectations for the human resource department, tasks that the HR is doing well in areas where it needs some improvement and a clear path for growth in the current assignments and beyond.

V. Developing an environment of faith and trust

It is very essential for employees to have faith in their respective managers. Since employees lead the shop floor, their inputs on improvement in processes, suggestions on better cost management, increasing productivity and understanding their frustrations and personal challenges can all help the HR to keep their morale high and increased profitability. The employee by being honest about their aspirations and asking questions about what more they need to do at this critical juncture, can contribute to the appraisal process and make it more valuable. There is a lot of pressure on the HRD and organizations to conduct effective appraisals that keep employees motivated when times are tough. But, with a little effort from the employee's side, the whole process can make it more valuable and great results could be expected. Proper communication must be ensured by the HR managers so that employees are aware of the situation and they have faith in the management.

3) CONCLUSION –PREPARING FOR RECOVERY

Recession has not only negative, but also positive side. Recession is time to get rid of the bad performed employees. Organization should elaborate new strategy. HRM has to market position can be replaced in new market segment with aim to obtain competitive advantage. This new position shall be explaining to all internal and external partners. Organizational redesign strategies eliminate functions, division and product focusing on work force reduction rather than employed reduction. Train survivors as far as many jobs were put together and employee is not able to perform this new created job without additional training. Also work load is higher than previously. Try to restore the trust and loyalty of survivors as soon as possible.

New psychological contract shall be constituted. Organization needs to implement a new systematic strategies – focused on changing the organizational culture, the attitudes and the value of employees, to continuously the functioning of the organizations performance based pay shall be a norm. People costs should be used more efficiently. This would be including better absence management. New recruitment policy should be elaborated with aim to attract the leaders who have a quality for new environment new organization climate shall be created. Try to engage people employee to new company's vision gives them security of employment and certainty of future of company defines company's vision after recession. Companies know the contingency plans. Do the brain stroking managing human resources in a difficult session with your top management and contributing economic environment is even more demanding than their strategic planning.

A complete or partial job freeze, working in times of rapid growth therefore the task however communicate to the work force that the of HR is very important to maintain equilibrium company may continue to recruit key individuals even throughout the hierarchy. Top management should in difficult times. Review the employee's performance evaluation to determine the key people that company cannot afford to lose. Flow communication should be from top to down that will help and making conducive atmosphere within the organization. Make prepare yourself for individual and group concerns therefore there should be a proper counseling session.

Try to maintain a calm atmosphere review all HR policies, processes and procedures to ensure that they are purposeful and contribute directly to the success of the company. Suppose the company has

to lay off staffs ensure that there are no other opportunities for them in other functions or divisions of the organization. Advice mergers to deal the process of managing change.

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CORPORATE SOCIAL RESPONSIBILITY AND ACCOUNTABILITY

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ABSTRACT

The Corporate Social Responsibilities of business are those responsibilities that arise in the perspective of corporate-stakeholder relationships. Stakeholders have expectations about the behaviour and responsibilities and duties of the business that go beyond the donation of jobs and products or services. Two companies do not have the exact same set of responsibilities, because they have different products, services and strategies and therefore, different groupings of stakeholders and stakeholder interests and issues.

Introduction

In India Corporate Social Responsibilities had been implemented as a charitable activity. And in keeping with the Indian tradition, it was an activity that was performed but not reflected in accounts. As a result, there is limited certification on specific activities related to this concept. However, what was clearly marked that much of a national character summarized within it, whether it was providing institutions to actively participating in India's freedom movement, and implanted in the idea of trusteeship. As some observers have pointed out, the practice of CSR in India still remains within the charitable space, but has moved from institutional building (educational, research and cultural) to community development through various projects. Also, with global influences and with communities becoming more active and demanding, there appears to be a discernible trend, that while CSR remains largely restricted to community development, it is getting more strategic in nature (that is, getting linked with business) than philanthropic, and a large number of companies are reporting the activities they are undertaking in this space in their official websites, annual reports, sustainability reports and even publishing CSR reports. The Companies Act, 2013 has introduced the idea of CSR to the forefront and through its disclose-or-explain mandate, is promoting greater transparency and disclosure. Schedule VII of the Act, which lists out the CSR activities, suggests communities to be the focal point. On the other hand, by discussing a company's relationship to its stakeholders and integrating CSR into its core operations, the draft rules suggest that CSR needs to go beyond communities and beyond the concept of

philanthropy. It will be interesting to observe the ways in which this will translate into action at the ground level, and how the understanding of CSR is set to undergo a change.

Definition:-

"Corporate Social Responsibility is the continuing assurance by business to subsidize to economic development while improving the quality of life of the people and their families as well as of the community and society at large."

Social responsibility means that individuals and companies have a duty to act in the best interests of their environments and of society as a whole. Social responsibility as it applies to businesses is known as corporate social responsibility, or CSR.

Corporate social responsibility (CSR) refers to business practices involving initiatives that benefit society. A business's CSR can encompass a wide variety of tactics, from giving away a portion of a company's proceeds to charity, to implementing "greener" business operations.

There are some core areas where the corporate social responsibility has to be made practicing:

1. **Environmental issue:** One primary focus of corporate social responsibility is the environment. Businesses irrespective of their size and productions discharging a large quantity of carbon in the form of their waste. Any steps they can take to reduce those carbonization are considered both good for the company and society as a whole.
2. **Charity issue:** Businesses also practice social responsibility by donating to national and local charities. Businesses have a lot of resources that can benefit charities and local community programs, i.e. charities to local school, NGO'S, social welfare work, etc.
3. **Ethical labor practices:** To consider employee as human being and ethically, companies can also demonstrate their corporate social responsibility. This is especially true of businesses that operate in international locations with labor laws that differ from those in the United States and other part of the world.
4. **Undertaking:** Appearing volunteer events says a lot about a company's honesty. By doing good deeds without expecting anything in return, companies are able to express their concern for specific issues and support for certain organizations.

Objectives of the study:

1. To know the Corporate Social Responsibilities of the Business in India.

2. To know direct or indirect CSR benefits to the Communities.

Research methodology

Secondary data :Data is collected from the various secondary sources such as Journals, Periodicals , Reference Books, E-News Papers, Articles , Published Research Compendiums ,Government Reports , Authentic Websites etc.

Some of the positive outcomes that can arise when businesses adopt a policy of social responsibility include:

1. Company benefits:

- Improved financial performance;
- Lower operating costs;
- Enhanced brand image and reputation;
- Increased sales and customer loyalty;
- Greater productivity and quality;
- More ability to attract and retain employees;
- Reduced regulatory oversight;
- Access to capital;
- Workforce diversity;
- Product safety and decreased liability.

2. Benefits to the community and the general public:

- Charitable contributions;
- Employee volunteer programmes;
- Corporate involvement in community education, employment and homelessness programmes;
- Product safety and quality.

3. Environmental benefits:

- Greater material recyclability;
- Better product durability and functionality;
- Greater use of renewable resources;
- Integration of environmental management tools into business plans, including life-cycle assessment and costing, environmental management standards, and eco-labelling.

However, various companies continue to supervise CSR in the supply chain - for example by importing and retailing wooden that has been illegally cut the forest. While governments can impose restrictions and penalties on offending companies, the organizations themselves can make a commitment to sustainability by being more discerning in their choice of suppliers. Different stakeholders have different CSR issues and expectations with different implications, which can be summarised as follows:

Employees CSR issues.

Employees are concerned with traditional human resources management issues such as personnel policies and practices, pay, benefits, recruitment, etc. However, new HR issues are driving increased social responsiveness by corporations. These issues include work-life balance, care of dependent relatives, diversity, sexuality in the workplace, religion/spirituality in the workplace, minority hiring practices, responsible redundancy, use of temporary workers and workplace culture. Corporations that effectively respond to these issues are generally considered to be “employers of choice”. The benefits of socially responsible behaviour on these issues include improved workplace morale, higher productivity, reduced employee turnover costs and greater identification with employers. This last is thought to be a particularly important benefit as high employee identification increases the likelihood that employees will act in employers’ best interests, thus reducing risks of fraud and unethical behaviour.

Suppliers CSR issues

Supply chain CSR issues include human rights of outsourced workers, ethical sourcing, prompt payment, use of migrant workers, doing business with oppressive regimes, treatment of animals and environmental impacts in the supply chain. Supply chain issues have been at the heart of CSR crises experienced by some prominent US-based companies such as Nike and Gap, which rely on outsourced labour in third world countries. Consumer boycotts and demonstrations posed a threat to business continuity. Nike has in response increased its monitoring of human rights and labour relations practices and substantially increased disclosure of its suppliers. As Australian firms become increasingly globalised, supply chain CSR issues have become more prominent.

Customers CSR issues

Many studies suggest that consumers are more likely to purchase from socially responsible firms or avoid purchases from socially irresponsible firms, and consumer preferences for products that are good for the environment (organic, or not tested on animals) are well documented. CSR issues for consumers include product manufacturing (e.g. human rights of workers, product safety), labelling and packaging (disclosure and completeness), marketing

and advertising practices, selling practices (redress) and pricing. Australia's tough regulatory environment does not necessarily protect corporations from rising CSR-related expectations of consumers.

Communities CSR issues

Communities can include local communities around a business or a company site, as well as civil society organisations. Corporations often pursue community relations strategies that include corporate community investment, partnerships between employees and communities or traditional philanthropy. Objectives can include commercial advantage (brand, cause related marketing), legitimacy (relationships, political positioning) and workforce development. Benefits of attending to CSR issues in communities include improved reputation and reduced conflict with activist groups which is often conducted through the media.

Investors CSR issues

CSR issues for investors can relate specifically to socially responsible investment strategies, or more broadly to understanding and identifying material sources of social risk. More recently, investors have become more active in engaging directly with companies about their social, environmental and governance risks, often through industry associations like the Australian Council of Superannuation Investors. Investors are also increasingly the object of activist campaigns on climate change or human rights issues. In some cases, investors have sold out of (divested) companies based on their assessments of climate change or human rights risks.

Conclusion:

Corporate social responsibility (CSR) promotes a vision of business accountability to a wide range of stakeholders, besides shareholders and investors. Key areas of concern are environmental protection and the welfare of employees, the community and civil society in general, both now and in the future. The concept of CSR is supported by the idea that corporations can no longer act as isolated economic entities operating in objectivity from broader society. Traditional views about competitiveness, survival and profitability are being swept away.

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MAKE IN INDIA: NEW PARADIGM FOR SOCIO-ECONOMIC GROWTH IN INDIA

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ABSTRACT

"Make In India" is a campaign launched by Narendra Modi to encourage industrialists to set up their manufacturing units in India: So, "Make in India" leads to "Made in India"! The campaign has been concentrated to fulfill the purpose of Job Creation, Enforcement to Secondary and Tertiary sector, Boosting national economy, converting the India to a self-reliant country and to give the Indian economy global recognition. The idea of utilizing cheap labor to produce for the world is not new. It's been implemented rather successfully in East Asia and gave phenomenal results for three decades popularly called the East Asian growth miracle. Countries such as South Korea, Malaysia, Thailand, Indonesia saw a rapid fall in the poverty and unemployment numbers between late 1960's and mid 1990's. The Indian government through this initiative aims to put to use its rapidly increasing workforce to productive use, realizing that service sector though contributing about 55-60% of the GDP cannot be the sole driver of the economy. The campaign has been concentrated to fulfill the purpose of Job Creation, Enforcement to Secondary and Tertiary sector, Boosting national economy, converting the India to a self-reliant country and to give the Indian economy global recognition.

In the present paper an attempt has been made to throw some light on the concept of 'Make in India'. Further, an attempt has also been made to review the advantages of this concept and the areas which are going to gain benefit specially Socio-Economic Growth and Entrepreneurship.

INTRODUCTION

'Make in India' is the initiative taken by the present government and our Prime Minister Mr. Narendra Modi had formally declared the policy pertaining to Make in India on September 25th, 2014 and within a very short span large number of countries are supporting this concept

and started investing in different areas. The results till now have been mixed. It takes time to set up factories and thus capabilities and only then the returns can be judged. To give a good example, Foxconn (Apple iPhone maker) has signed an MOU with Maharashtra government which will bring investment worth \$5 billion to the country and create thousands direct and indirect jobs but this won't start before 2017. Ford has also decided to set up an automobile factory in Gujarat which is going to employ thousands again. Even Asus has decided to set up a handset manufacturing unit in India in Andhra Pradesh. Considering the above stories, the direct benefits would be in terms of inflow of foreign exchange, job creation leading to lower unemployment and also technological up-gradation. India since 1990's has particularly seen a rapid growth in service sector.

Role of higher education institutions in promoting entrepreneurship and Socio-Economic Growth in India

Encouraging entrepreneurs to start new businesses is a priority for any government and is only increasing in importance as nations look to grow, become self-reliant, and overcome economic uncertainty. These are multi-dimensional objectives that can be fulfilled by promoting entrepreneurship in any economy, but in India, they take on added significance because of the size and age of the population. India's total population of 1.3 billion people ranks second only to China, and with 28% of those people aged 10 to 24 (28%), the country has 367 million young people that are either at the start of their careers or soon will be (UNFPA, 2015). Hence, it is the national interest to provide education, support, and facilities that can help guide this large and young segment of the population towards careers in entrepreneurship and to help them build and grow their businesses.

Concept of Make in India

The 'Make in India' program is an initiative launched to encourage companies to increase manufacturing in India. This not only includes attracting overseas companies to set up shop in India, but also encouraging domestic companies to increase production with the country.

Make in India is intended to make India a manufacturing hub of the world (at least Asia, for that matter). The idea was to increase the contribution of the manufacturing sector to India's GDP. Make in India aims at increasing the GDP and tax revenues in the country, by producing products that meet high quality standards and minimizing the impact on the environment.

Following are the major focused areas on which the Make in India is concentrating:-

- Automobiles
- Biotechnology

- Aviation
- Oil and Gases
- Tourism and Hospitality
- Chemicals
- Railways and many more

Government of India has allowed 100 % FDI (Foreign Direct Investment) in all sectors except Spare (74%), Defense (49%) and News Media (26%) and had launched four major policies under the 'Make in India' program.

Policy for New Initiatives:

This initiative is to improve the ease of doing business in India, which includes increasing the speed with which protocols are met with, and increasing transparency in Administration. Under this policy, the Government has already rolled out:

- Validity of industrial license is extended up to three years
- Approval of the head of the department is necessary to undertake an inspection.
- Environment clearances can be sought online.
- All income tax returns can be filled online

Policy for Foreign Direct Investment

Government of India has allowed 100 % FDI (Foreign Direct Investment) in all sectors except Spare (74%), Defense 49%) and News Media 26%). FDI restrictions in tea plantation has been removed, while the FDI limit in defense sector has been raised from the earlier 26% to 49% currently.

Policy for Intellectual Property Facts

The Government has decided to improve and protect the intellectual property rights of innovators and creators by upgrading infrastructure, and using state of the art technology. The main aim of intellectual property rights is to establish a vibrant intellectual property regime in the country.

Policy for National Manufacturing

The vision of Make in India is to increase manufacturing sector growth to 12-14% p.a. over the medium term and to increase the share of manufacturing in the country's GDP from 16% to 25% by the year 2022. Further, the vision is to create appropriate skill sets among rural

migrants and the urban poor for inclusive growth and to ensure the sustainability of growth, particularly with regard to environment.

Initiatives for the success of Make in India

Make in India initiative is a good move and it will boost up the economy of our nation and help in sharing the burden of deficit financing. As India is very rich in resources both natural and human. The problem being faced in India is the direction and financial investment in different areas, because of which our economic growth is very slow and restricts us to compete with the developed nations. But, before getting the fruitful results of 'Make in India' we have taken following initiatives:

- We can make use of all the resources to the best possible extent
- We can stop youngsters running abroad hence their talents can be best utilized within the country
- We can also increase exports thereby increasing foreign exchange reserves
- We can have better position in international market

All this is possible only if good number of talented youngsters come forward to take initiative in setting up enterprises. For this the govt. should identify their talents give them scholarships extend all financial support. The govt. can also fix some time bound targets and encourage healthy competition among the youngsters

Business Reaction to the Make in India Initiatives

As per the data available from the government, that it has so far received Rs.1.10 lakh crore worth of proposal from the various companies that are interested in manufacturing electronics in India. Recently Lenovo also announced that it has started manufacturing Motorola smart phones in plant near Chennai. Also a large number of multi-national companies are tying up with the concerned departments and ministries to start-up their projects and forwarding these proposals. In response the Government of India is also showing very liberal approach in welcoming their proposals.

Advantages of Make in India

The concept of Make in India is a good initiative taken by the NDA Government and it is definitely going to effect the socio-economic growth of our country, especially in providing employment opportunities and industrial growth. To accommodate the 300 million people who will join India's workforce between 2010 and 2040, each year 10 million jobs are needed. It is expected that the manufacturing sector will create about 100 million jobs by 2022. In addition to this the other advantages of Make in India are as under:

Manufacturing sector led growth of nominal and per capita GDP. While India ranks 7th in terms of nominal GDP, it ranks a dismal 131st in terms of per capita GDP. Employment will increase manifold. This will augment the purchasing power of the common Indian, mitigate poverty and expand the consumer base for companies. Besides, it will help in reducing brain drain.

Export-oriented growth model will improve India's Balance of Payments and help in accumulating foreign exchange reserves (which is very important given the volatility in the global economy with multiple rounds of Quantitative Easing announced by major economies). Foreign investment will bring technical expertise and creative skills along with foreign capital. The concomitant credit rating upgrade will further woo investors. FIIs play a dominant role (relative to FDI) in the Indian markets. However, FIIs are highly volatile in nature. Make in India will give an unprecedented boost to FDI flows, bringing India back to the global investment radar.

The urge to attract investors will actuate substantial policies towards improving the Ease of Doing Business in India. The Government of the day will have to keep its house in order (by undertaking groundbreaking economic, political and social reforms) to market Brand India to the world at large.

Challenges in Implementation of 'Make in India'

No doubt the above discussed advantages of Make in India concept will boost up our economic growth and the initiatives taken by the present government is being welcome by every corner of the world. It is very clear that countries and private sector players are showing their keen interest in this concept and are willing to invest in manufacturing sector, but, following are certain grey area's which needs immediate attention of the government for smooth implementation and success of this concept.

High level of corruption in India at all levels in the bureaucracy. China even though on the basis of data provided by transparency international is more corrupt than India, India's '70's hangover of permit and license raj (which leads to red-tapism and hence corruption) and weak redress system makes doing business a very difficult task. This is the main reason the country has fared poorly in ease of doing business indices. According to World Bank data, it's at a distant 130 compared to China which is 83 (2015 data).

India's investment in health and education leaves a lot to be desired. India spends less than 3% of GDP for both health and education. China, on the other hand, spends more than 3% of a much larger GDP in favor of both. Political instability, law and order problem, social

unrest, increasing crime rate are another challenges which restricts the countries to invest in India.

Conclusion

Make in India is an ambitious project, but it is one that India desperately needs to kick start and sustain its growth momentum. With relentless policies towards this end and Educational Institutes contributing their part, it is possible to make India the powerhouse of manufacturing sector in the world. India has the opportunity to take some share of global manufacturing away from China. All we have to do to improve the ease of doing business in India are these stop tax terrorism, improve our infrastructure, reform labor laws, investment in skills development, easy land acquire laws, transparency in administration, liberalized government policies, good governance, Restore broken trust between industry and government, Implementation of Goods and Services Tax (GST) and fast tract approval. At the end it can be concluded that the role of Educational Institutes to promote the concept of Make in India will definitely going to boost up the Indian economy and will help in meeting the major challenges of poverty, unemployment, low per capita income and help in sharing the burden of government.

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IMPACT OF DIGITALIZATION ON ADMISSION PROCESS OF UNIVERSITY

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ABSTRACT

Digitalization is the incorporation of digital technologies into everyday life. Digitalization brings innovations and advances in technologies. The 'Digital India' programme, launched by honorable Prime Minister of India Mr. Narendra Modi, will digitally empowered society and knowledge economy. As everything is going for digitalization, Savitribai Phule Pune University has also taken decision to go for digitalization of Admission Process. The objective of this paper is to look impact of digitalization on admission process of Savitribai Phule Pune University and its affiliated colleges.

Keywords: Digitalization, Digital India, Savitribai Phule Pune University, SPPU, Online Admission System, Admission Process, Centralize Admission Process

Introduction:

Digital India is an umbrella programme that covers multiple Government Ministries and Departments. The vision of digital India is to transform India into a digitally empowered society and knowledge economy. Digital India aims to provide the much needed thrust to the nine pillars of growth areas, namely Broadband Highways, Universal Access to Mobile Connectivity, Public Internet Access Programme, e-Governance: Reforming Government through Technology, e-Kranti - Electronic Delivery of Services, Information for All, Electronics Manufacturing, IT for Jobs and Early Harvest Programmes. [1] Digital India programme was launched by Prime Minister of India Narendra Modi on July 1, 2015.

Digitalization of Savitribai Phule Pune University (SPPU):

Online Admission System is defined as a service available and performed using the Internet where computer and other devices are connected with network. [4] Admissions of many universities and colleges are now operate nearly in paperless environment. [5] It will not only ensure greater efficiency but also promote transparency in the functioning of institutions. It also facilitates the students and parents to make informed choices.

Technologies and connectivity will come together in Digital India campaign to make an impact on all aspects of governance and improve the quality of life of citizens. [6] Savitribai Phule Pune University (SPPU) as well as affiliated colleges of SPPU has also taken initiative to go for digitalization in Admission Process.

There are 548 colleges and 18 faculties in SPPU. Fig.1 shows the percentage of colleges of SPPU Faculty wise.

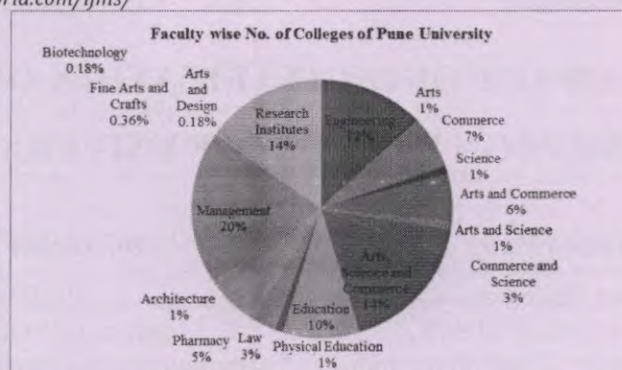


Fig.1

Since Savitribai Phule Pune University has given circular, from the year 2016-17 admission of University and all its affiliated colleges for all the courses will be done using Online Admission Process. It is mentioned in DO. No. F.1-12/2015 (CM) dated 28th December 2015. [2] Table: 1 shows the current status of Admission Process of Savitribai Phule Pune University (SPPU).

Admission Process	No. of Colleges
Online Admission	73
Offline Admission	235
Online and Offline	02
Centralize Admission	238

Table: 1

Fig. 2 shows the representation of Admission System of Table: 1 in chart

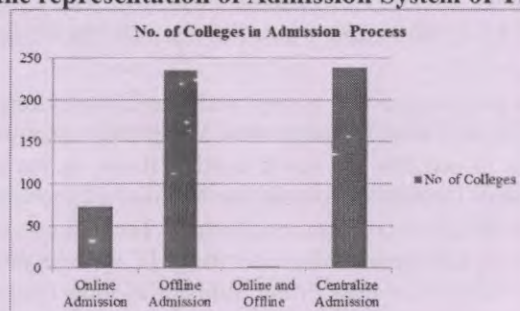


Fig. 2

As shown in Fig. 2, Out of 548 colleges, 73 colleges offers Online Admission, 235 colleges offers Offline Admission, 02 colleges offers Online and Offline Admission and 238 colleges offers Centralize Admission.

As mentioned in Fig. 2 and Table: 1, there are 238 colleges which follows Centralize Admission Process. Table: 2 show the details of Centralize Admission Process of Savitribai Phule Pune University.

Table: 2

Centralize Admission Process	Number of Admissions
Total Centralize Admission	238
Centralize Admission+ College wise Offline	226
Centralize Admission + College wise Online	7
Centralize Admission + College wise Offline & Online	5

As shown in Table: 2 and Fig. 3, total colleges which offers Centralize Admission are 238. Out of that 226 colleges offers Online Centralize Admission but College wise Offline, 7 colleges offers Online Centralize Admission and College wise also Online, 5 colleges offers Online Centralize Admission and College wise offers Online as well as Offline Admission.[2][3]

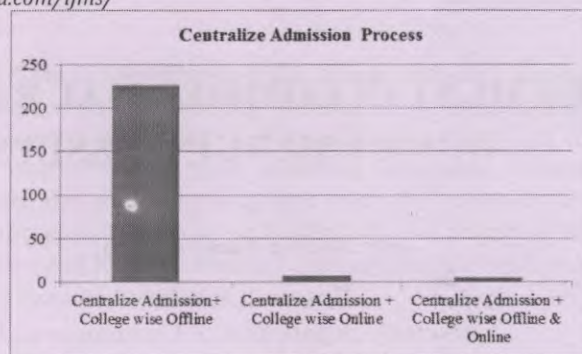


Fig. 3

Conclusion:

All educational institutions will soon go for digitalization. It will not only ensure greater efficiency but also promote transparency in the functioning of institutions. It also facilitates the students and parents to make informed choices. Since SPPU has lower number of colleges which gone for complete online admission process in the year 2016-17. But university has taken initiative, let us all look forward for the successful implementation of digitalization in SPPU

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Vulnerabilities, Threats and Countermeasures for Information Systems of Education Sector

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Abstract— Implementation of technologies is the usual respond to information systems security. Information Systems security is the top concern for everyone. Education sector is not an exception for the same. Educational institutes/universities consists critical information about stakeholders around it. Presented research revealed a framework for stakeholders of Online Admission Process of Education Sector to understand and assess the threats associated with their Information Systems. This framework also provides available countermeasures for the security threats and vulnerabilities of information system.

Keywords— Online Admission System, Confidentiality, Availability, Integrity, Threats, Vulnerability, Countermeasures, Hardware Devices, Software's, Network Devices, Data, Information Security, Information Systems.

I. INTRODUCTION

Innovation in Information Technology have lifted concerns about the risks to data related with weak IT security, comprising vulnerability to viruses, malware, attacks and compromise of network systems and services. Poor IT security may result in compromised confidentiality, integrity, and availability of the data due to unauthorized access.

Ensures that information is protected against unauthorized access or disclosure users (confidentiality), unauthorized or improper modification (integrity) and can be accessed when required (availability). [19]

Now every organization uses Internet and computer network so there is a need for new security countermeasures to reduce the threats and challenges inherent from these new technologies, software applications and network devices. [1]

Online Admission Systems Stakeholders

Stakeholder is a person or organization that can affect, be affected by, or perceive themselves to be affected by a risk eventuating. [19]

Following are the stakeholders who are involved in online admission systems:

Student, Teacher/Counselor, Administrator, Information Technology, CET Head, Assistance of CET Head, Network Expert, Accountant/Cashier, Bank Personnel, Librarian, Director, Software Developer

Potential Threats with explanation

The study identified a dozen categories of threats by examining previous works and publications

Hardware Error/Failure- Failure of hardware because of dust, temperature variation, voltage variation, etc. [5]

Malfunction of Equipment- Malfunction of Equipment can be caused at any time by inherent errors in the control program. [4]

Deliberate Software Attacks- When an individual or group designs software to attack systems, they create malicious code/software called malware. [4][12][20]

Hacking- Hacking attack is prone to malicious attacks, system intrusion, break-ins and unauthorized system access from hackers and crackers. [20]

Deliberate Acts of Espionage or Trespass- Unauthorized accessing of information, Shoulder surfing, hidden camera, etc. [14][15]

Software Malfunction, Act of Human Error or Failure- [12]

Act of Human Error or Failure- It includes acts done without malicious intent. It is caused by: Inexperience, improper training, incorrect assumptions, etc. [12]

Denial of Service- Denial of Service is an attack when the system receiving too many requests and cannot return communicate with the requestors. [12][14]

Network eavesdropping- Interception of communications by an unauthorized party. [12][14]

Repudiation- Repudiation is the ability of users (legitimate or otherwise) to deny that they performed specific actions or transactions. [14]

Deliberate Acts of Theft- It means illegal taking of another's property -physical, electronic, or intellectual [15]

Deliberate Acts of Information Extortion- Information extortion is an attacker or formerly trusted insider stealing information from a computer system and demanding compensation for its return [15]

Phishing- Phishing is an attempt to obtain confidential information from an individual, group, or organization. [24]

Spoofing- Spoofing is attempting to gain access to a system by using a false identity. [2]

Vulnerabilities, Potential Threats and Possible Countermeasures

- 5. Keep an inventory of all equipments. Buy microcomputers with a lock that disables the keyboard and removal of the case. Introduce a system for logging equipments into and out of the building. Do spot checks to make sure that staff are not carrying computers, peripherals or consumables off the site without authorization. Position microcomputers so that they are not visible from public areas or not easily accessible. [6][7][8][13]
- 6. Verify UPS functions properly when electricity fails or voltage variations. UPS is free of the electricity load relating to the tube-lights, fans, etc. Power supply to computer equipment is through UPS system only. [6]
- 7. Keep frequent backups of critical data and essential software. Support staff should keep records of software authorized for use on each machine and undertake spot checks to ensure that staff is not using unauthorized software. [10][13]
- 8. Periodic review of security controls, System authorization should be done properly, Data cryptography, Do system audit. [21]

Common Vulnerabilities of Network Devices

- 1. Access to the network by unauthorized persons [14]
- 2. Inadequate Cabling Security [4]
- 3. Information can transfer outside of the organization
- 4. Open Physical Connections, IPs and Ports [14]
- 5. Anyone with a wireless device can connect to wireless network, if it is not secure
- 6. Routers with the encryption features turned off [17]
- 7. Default password of router is not changed [17]
- 8. Router is turned on when you don't use it [17]
- 9. Poorly configured wireless access points can compromise confidentiality [17]

Threats of Network Devices

- 1. Deliberate Acts of Espionage or Trespass [14][15]
- 2. Information Leakage [13]
- 3. Information Leakage [13]
- 4. Information Leakage [13]
- 5. Unsecured Wireless Access Points [16]
- 6. Information Leakage [13]
- 7. Misuse of Software, Data, and Services [6][7][8]
- 8. Hacking [17]
- 9. Deliberate Acts of Espionage or Trespass [15]

Countermeasures of Network Devices

- 1. Use Strong Authorization. Use tamper-resistant protocols across communication links. [14]

- Vulnerability: A weakness in an information system or service that can be exploited by a threat. [19]*
- Threat: The potential cause of a risk. [19]*
- Countermeasures: A risk treatment implemented to reduce the likelihood and/or impact of a risk. [19]*

Common Vulnerabilities of Hardware Devices

- 1. Susceptibility of equipment to humidity, dust[4]
- 2. Susceptibility of equipment to temperature variations[4]
- 3. Susceptibility of equipment to voltage variations [4]
- 4. Lack of care at disposal [4]
- 5. Lack of physical protection to equipment [12][13]
- 6. Inadequate or irregular backup [4]
- 7. Sensitive to Viruses and Trojan Horses [13]
- 8. Lack of Authorization could breaks into computer system [20]

Threats of Hardware Devices

- 1. Hardware Error/Failure[5]
- 2. Hardware Error/Failure[5]
- 3. Malfunction of Equipment [4]
- 4. Information Leakage [10]
- 5. Deliberate Acts of Theft [12][13]
- 6. Malfunction of Equipment [4]
- 7. Unauthorized installation of software [8]
- 8. Hacking [20]

Countermeasures of Hardware Devices

- 1. Ensure clean and dust free environment.
- Humidity measuring instruments like (Hygrometer) should be installed in the sensitive equipment room. Vacuuming is important where dust collects, such as under raised floors. Dust generating activities should be carried out well away from dust-sensitive equipment. [6][7][8]
- 2. Temperature readings should take throughout equipment areas. Heat measuring instruments like (Thermometer) should be installed in the sensitive equipment room.[6]
- 3. Verify UPS functions properly when voltage variant. Use voltage regulator to protect hardware against temporary increase in power. Use circuit breakers to protect hardware against sustained increases in power. To avoid discontinuity in work, two independent supply sources should be exist so that one can be used if the other fails. [6][7][8][9]
- 4. Use document shredder to chew up CDs, DVDs. Securely Wipe Magnetic Drives. Establish and implement organization-specific procedures and technologies for the disposal of materials. [10][11]

2. Do not route network cables through areas that are accessible to the public. Use locked cable trays [13]
3. Monitor the usage of lines to which modem is attached. Disable modem lines outside working hours. [13]
4. Disable unused protocols and unnecessary ports. [14]
5. Use Strong Authorization
6. Manufacturer often deliver wireless routers with encryption features turned off. You must turn it on. [17]
7. Change your router's pre-set password for administration. Change password according to your organization's policy. Enforce password management. [18]
8. Turn your router off when you are not using it. [17]
9. Eliminating rough access points. Properly configuring all authorized access points. [17]

Common Vulnerabilities of Software's

1. Unclear or incomplete specifications for software development [4] [12]
2. Poorly documented software [12]
3. No or insufficient software testing [4][12][14]
4. Lack of authentication & identification mechanism [4][12]
5. No 'logout' when leaving the work station [14]
6. Lack of audit trail [14]
7. Well known flaws in the software [12][20]
8. Wrong allocation of access rights [12]
9. Inadequate or irregular backup [4]
10. User rights are not reviewed regularly [4]
11. Lack of access control policy [4]

Threats of Software's

1. Software Malfunction, Act of Human Error or Failure [12]
2. Act of Human Error or Failure [12]
3. Denial of Service [12][14]
4. Network eavesdropping, Brute force attack, Dictionary attack, Cookie replay attack, Credential Theft, Forging of rights [12][14]
5. Cookie Replay Attack [14]
6. Repudiation [14]
7. Technical Software Failures or Errors, Deliberate Software Attacks [4][12][20]
8. Denial of actions [12][23]
9. Deviations in Quality of Service by Service Providers [15]
10. Elevation of privilege [14]
11. Exception Management (Denial of Service) [14]

Countermeasures of Software's

1. Specification for the development of software should be clear and complete. It should not contain ambiguity.
2. Ensure the documents of software are properly written. Document should describe the content and purpose of the document.
3. There should be a separate test plan. Use common testing problems as a checklist. Ensure the availability of testing experts. [14].
4. Use authentication mechanisms that do not transmit the password over the network such as Kerberos protocol or Windows authentication. Make sure passwords are encrypted (if you must transmit passwords over the network) or use an encrypted communication channel, for example with SSL. Use strong passwords that are complex, are not regular words, and contain a mixture of upper case, lower case, numeric, and special characters. Use an encrypted communication channel provided by SSL whenever an authentication cookie is transmitted. Use a cookie timeout to a value that forces authentication after a relatively short time interval. Enforce account lockout for end-user accounts after a set number of retry attempts. Allows the user to choose to not save credentials, or force this functionality as a default policy. [14]
5. Use a cookie timeout to a value that forces authentication after a relatively short time interval. System logs out automatically if the user is inactive for a specified time [14]
6. Create Secure Audit Trails. Use Digital Signature. [14][22]
7. Stay current with the latest operating system service packs and software patches. Block all unnecessary ports at the firewall and host. Disable unused functionality including protocols and services. Harden weak, default configuration settings [14]
8. An access control policy shall be established, documented, and reviewed based on business and security requirements. Ensure that users' access rights should review at regular interval using a formal process. [6][7][8]
9. There should be a regular contract for maintenance of the UPS and the preventive maintenance is carried as per contract. The record of the tests undertaken is maintained to verify the satisfactory functioning of the UPS. UPS is free of the electricity load relating to

the tube-lights, fans, etc. UPS functions properly when electricity fails. [6][24]

10. Enforce least privileged service account to run processes and access resources. Log Critical application level operations. Use platform-level auditing to audit login and logout events, access to the file system, and failed object access attempts. Back up log files and regularly analyze them for signs of suspicious activity.
11. Thoroughly validate all input data at the server. Use exception handling throughout your application's code base [14]

Common Vulnerabilities of Data

1. Disclosure of information either accidentally or deliberately either verbally or in writing to any unauthorized person or organization [25]
2. Writing down passwords and sensitive data [3]
3. Emails containing maliciously-crafted attachments [24]
4. Misappropriation of scanned photo and signature [2]

Threats of Data

1. Deliberate Acts of Espionage or Trespass, Deliberate Acts of Theft, Deliberate Acts of Information Extortion [15]
2. Spoofing user identity [14]
3. Phishing [24]
4. Spoofing [2]

Countermeasures of Data

1. Ensure that personal information is retained only for the period of time for which it is required. Ensure that access to personal data is restricted only to authorized persons. Ensure that all personal data is obtained for specified purposes and only processed for those purposes. Avoid giving personal data by telephone. Ensure that accurate, up-to-date personal details are provided to the University and notify the University immediately of any changes or errors. [25]
2. Do not store secrets in plaintext. Do not pass credentials in plaintext over the wire. Ensure that sensitive information is deleted or destroyed appropriately. [3][14]
3. Organization should install professional enterprise-level e-mail security software. Software should check both incoming and outgoing messages to ensure that spam messages are not being transmitted. Organizations should provide regular internet

security training to staff to ensure user- awareness about e-mail scams. Delete suspicious e-mails. Report any potential incidents. Look for digital signatures. Ensure anti-virus software and definitions are up to date. Configure Intrusion Detection Systems (IDS) to block malicious domains / IP addresses. Do not open suspicious e-mails. Do not click on suspicious links or attachments in e-mails. Do not call telephone numbers provided in suspicious e-mails. [18] [24]

4. The scanned photo and signature must be kept as a PDF file and stored in a restricted folder. Document must be protected where signature is saved. [2]

Conclusion

Information threat leads to great financial losses. Educational sectors are struggling against security attacks.. This paper shows the potential threats to information systems of online admission systems also presented countermeasures for the vulnerabilities and threats associated with online admission systems. Implementing the countermeasures in organizations help organization to protect their information's assets reduce security vulnerability and threats.

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Determinants of Child Labour – A Case Study Of Kothli Village In Shirol Taluka (Kolhapur District)

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INTRODUCTION:

The significance and the importance of the child lies in the fact that the child is universe in India the definition of the child varies with the purpose .the census of India treat person below the age of Fourteen years as “ No child below the age or mine or engaged in any other hazardous employment” Child labor refers to the employment of children at regular and sustained labor .this practice is considered exploitative by many international organizations & is illegal in many countries, it considered inappropriate or exploitative if a child below a certain age works .An employer is usually not permitted to hire a child below a certain minimum age

India accounts for the second highest number where child labor in the word is concerned .Africa accounts for the highest number of children employed & exploited .The fact is that across the length & breadth of the nation children are in pathetic condition

OBJECTIVES OF THE STUDY :

- 1) To study the reasons of child labor in Kothli
- 2) To study the behavior of the parents of child labors
- 3) To study the different programmers for elimination of child labor

METHODOLOGY OF THE STUDY:-

The Study is based on both primary & secondary data – At the primary level the data base has been constructed in kothli of Shirol Taluka from 10 male respondents of Bricks furnace using purposive sampling technique & pre- tested questionnaire. The secondary data collected by census, records at the Directorate of family welfare programmed websites & reports.

Here is a look at the various Labor activities involving children, across the length & breadth of India....

THE CENSUS DATA FOR CHILD LABOUR HAS TRADITIONALLY BEEN PRESENTED AS CHILDREN UP TO 14 YEARS .

Year	Child Labour as Reported by Census.
1971	10753985
1881	13640870
1991	11285349
2001	1266377

POPULATION OF CHILD WORKERS IN CENSUS 2010

All India Total Workforce	Male	Female	Total
5 – 9 Yrs.	997384	843136	1840520
10 – 14 Yrs	5781697	5004288	10785985
15 -- 19 Yrs .	20919212	11377995	32297207
% to total Work Force	10.08 %	13.55 %	11.18 %
Total work Force (all ages)	274783249	127083239	401866488

LITERACY LEVEL OF WORKFORCE IN 15 – 19 YRS.

	Male 15 – 19 Yrs.	Female 15 – 19Yrs.	Total 15 – 19 Yrs.
Urban			
Literate	738274	237927	976201
Illiterate	2769859	503389	3273248
Literate below matric / Secondary	2007812	344226	2352038
Total Urban	5515945	1085542	6601487
Rural			
Literate	3440715	2343107	5783822
Illiterate	8219134	2390011	10609145
Literate below metric / Secondary	6496471	1902774	8399245
Total Rural	18156320	6635892	24792212

The table shows that vast bulk of 15 – 19 Yrs. olds have not completed 10th. So they have been in the workforce before they turned 18.

CHILDLINE –(It is one of the working organization for needy children)

CHILDLINE is a project supported by the ministry of women and child development (GOI) in partnership with state govt., NGOs , International organizations , corporate sector, concerned individuals & children .it is a national , 24 hour free emergency helpline & outreach service for children in need of care & protection .

THE FOLLOWING SURVEY SHOWS THE DETERMINANTS OF CHILD LABOR :

BRICKS FURNACE OF KOTHLI IN SHIROL TALUKA

A) ECONOMIC , BACKGROUND OF CHILD LABOR FAMILIES: –

Sr. No.	Economic , Background of reported Families	No. of child Labor Families	Percentage to total
I)	Years family income (in Rs.)		
1.	20000	4	40%
2.	20000 – 30000	3	30%
3.	31000	3	30%
	Total	10	100%
II)	Years family Expenditure (in Rs.)		
1.	20000	4	40 %
2.	21000 – 30000	3	30 %
3.	31000	3	30 %
	Total	10	100%
III)	Outstanding Debt (in Rs.)		
1.	No debt	2	20%
2.	3000 or less	3	20%
3.	3000 – 4000	3	30%
4.	4000	3	30%
	Total	10	100 %
IV)	Present Savings (in Rs.)		
1.	No Savings	4	40%
2.	5000	3	30%
3.	5000	3	30%

	Total	10	100%
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B) MAJOR REASONS OF CHILD LABOR --

When the parent respondents were asked to specify major reasons for sending children for wage work & to rank the reasons according to their relative importance, seven reasons have been cited by a good proportion of the respondents.

REPORTED REASONS FOR CHILD LABOR

Reasons for child Labor		Orders of importance of reason		
Chances		I	II	III
1.	Poverty	4	3	3
2.	More Number of children	5	3	2
3.	Inadequate family income	6	2	2
4.	No. of earning members	3	2	5
5.	Not attending School	-	-	-

C) SHARE OF CHILD WAGE IN FAMILY INCOME --

Sr. No.	Share of child wage in family Income	No. of children.	Percentage to total
1	10 %	3	30%
2	20 %	2	20%
3	30 %	2	20%
4	40 – 50 %	2	20%
5	60 – 70 %	1	10%
	Total	10	100%

D) SCHOOL ATTENDANCE OF CHILD LABORERS --

Sr. No.	Particulars	No. of child Labors	Percentage to total
	Educational Status		
1.	Illiterate	3	30%
2.	Primary Level (1-5 class)	5	50%
3.	Secondary Higher	2	20%
	Secondary Level (6-12) class		
	Total	10	100%

E) DROP OUT & THEIR REASONS :-

Sr. No.	Date of withdrawal from regular Schooling	No. of child Labors	Percentage to total
1	Illiterate	3	30%
2	1 year ago	3	30%
3	2 year ago	2	20%
4	3 year ago	2	20%
	Total	10	100%

FINDINGS :-

Following are the findings

1. The number of dependents in the family for financial & other supports is a factor encouraging children to take up wage work.
2. In this study two major reasons namely poverty & inadequate family income encourage children to work largely due to their poor economic conditions.

3. Educational attainment of child laborers is not disappointing only 30 % are illiterate It is found that more number of children practiced child labor because of poverty & inadequate family Income.
4. Literacy level of workforce in India (15 – 19 years) shows that children have not completed 10th so they have been in the workforce before they turned 18.

SUGGESTIONS:-

1. Create awareness among the people about child Rights & protection through ---
Organizing awareness campaign – Like
Child line se Dosti , Cricket Matches , Kite Flying , Motorcycle Rally Suraksha Bandhan etc. for – “ **Child Friendly Nation** ”
2. State Government & NGOs should create awareness about the educations & Health through organizing welfare programmes workshops, Seminars, free health check up camp etc.
3. Population Education is to be made an important part of the Higher Secondary & College educations Programmes.
4. It is also important that regular & innovative income generating Programmes for parents should implemented by the Government to fight poverty & inadequate income induced child labor.
5. Create awareness of child labor laws among the employers.

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INDIAN DAIRY INDUSTRY: A CASE STUDY OF NANDNI VILLAGE IN KOLHAPUR DISTRICT

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INTRODUCTION:-

Which is India's no. 1 crop? Is it rice? Or wheat? Well, neither. The right answer the country's milk production is estimated to have touched 100 million tone higher than the estimated 92MT for rice & 75MT for wheat.

Dairy is a place where handling of milk & milk products is done and technology refers to the application of scientific knowledge of practical purposes. The dairy sector has developed through co-operatives in many parts of the state. During 1997-98, the state had 60 milk processing plants with an aggregate processing capacity of 5.8 million liters per day. In addition to these processing plants, 123 Govt. and 33 co-operatives milk chilling centers operate in the state. With the increase in milk production. Maharashtra now regularly exports milk to neighboring states. It has also imitated a free school feeding scheme, benefiting more than 3 million school children from 19000 schools all over the Maharashtra state.

OBJECTIVES OF THE STUDY:

The following objectives have been formulated for the present study.

1. To study the socio – economic impact of dairy industry on sample members.
2. To study the problems facing by the sample dairy members.

METHODOLOGY OF THE STUDY:

Sr. No.	Research components	Description
1.	Unit selected	60 sample dairy members selected from 9 dairy's of Nandni village in kop. Dist.
2.	Type of research	Descriptive research.
3.	Data source	Primary and secondary.
4.	Research instrument	Structured questionnaire.
5.	Research approach	Survey method.
6.	Sampling procedure	Convenience sampling.
7.	Sampling size	60
8.	Statistical techniques	Tables, percentages.

SCOPE OF THE STUDY:

1. Geographical scope: - Nandni village of Kolhapur District.
2. Analytical scope : - Fulfillment of objectives.

Dairy Industry in India:

More than 2445 million people economically active in agriculture in the world, probably 2/3 or even more ¾ of them are wholly or partly dependent on livestock farming. India is rich flora & fauna & continues to be vital avenue for employment and income generation, engaged in agriculture, derives 31% of gross domestic product from agriculture. The share of livestock product is estimated at 21% of total agriculture sector.

Milk Production:

1950 - 17 MT

1996 – 70.8 MT

1997 – 74.3 MT

(Projected) 2020 – 240 MT

India contributes to world milk production rise from 12-15 % & it will increase up to 30-35% (2020)

DATA ANALYSIS AND INTERPRETATION:

The following survey shows the impact of dairy industry on 60 dairy sample members of Nandni village in Kolhapur district.

Milk supply of dairy members

Table 4.1

Sr. No.	particulars	Total
	Weekly milk supply	
1.	Cows	48000
2.	Buffaloes	96000
	Total	144000

The table shows that weekly milk if we look at the source of milk supply by the categories of which animal, we find that the aggregate contribution of buffaloes milk is than of cow's milk.

Table 4.2 - Method followed by the sample members to boost milk production:

Sr. No.	Method followed to Boost Milk Production	No. of types of sample members		Total	% To Total
		Female	Farmer		
1.	Replacing the cattle	12	20	32	54
2.	Balanced diet	21	15	36	60
3.	Hybrid cattle	14	16	30	50
4.	Medical care	18	12	30	50
5.	Milk in time	22	15	37	62
6.	Others	10	14	24	40

The above table shows over 62% of all the members practices balanced diet & timely milking of the cattle. About 54% of the total members believe in use replacing milk cattle. 50% of the total members believe in use of Hybrid cattle & feel that medical care is some importance in maintaining the milch cattle. Other measures include cleaning the cattle shed, feeding & watering the cattle in time etc. 40% members follow this method.

Socio-economic impact of dairy industry on sample dairy members.

The important objective of the present study to enquire into the socio-economic changes brought about in the life of dairy members

Table 4.2 – Sample Dairy Member’s Opinion about the Economic Impact of Dairy Industry: -

Sr. No.	Items	No. of types of sample members		Total	% To Total
		Female	Farmer		
1.	Awareness of new plans & programmes.	21	27	48	80
2.	Higher milk yield	29	22	51	84
3.	Will to earn money	25	23	48	80
4.	Increase in employment opportunities	25	17	42	70
5.	Increase in productive investment	16	20	36	60
6.	Improvement in standard of living	21	16	37	62
7.	Increase in agriculture productivity	14	22	36	60

The above table shows top most impact on economic condition & outlook of members was recorded at 84% for higher milk yield. It creates awareness of new plans & programs among 80% members out of 27 farmers & 21 female members be aware of it. 65% female members will to earn money by self employment. 62% members had improved standard of living and 22% farmers increased agriculture productivity.

Table 4.4 – Sample Dairy Members Opinion about the Social Impact of Dairy Industry: -

Sr. No.	Items	No. of types of sample members		Total	% To Total
		Female	Farmer		
1.	Participation in social activities.	19	26	45	75
2.	Desire for education.	20	16	36	60
3.	Political recognition.	20	25	45	75
4.	Awareness of medical care of family.	18	22	40	66
5.	Increase in public relation.	20	27	47	78

The response of sample members to the social impact is shown in table no. 4.4. this table shows that 78% of the total members felt that their public relation have improved due to dairy operations. The female members had a lowest participation in social activities at 42.22% and farmer members pocketed 57.77 shares in social participation.

60% of total numbers felt that dairy operations have awakened their desire for education.

Problems of sample dairy members: -

The following Table No. reveals the problems which are facing by the members of Dairy Industry in the study area. If we consider the problems of all the members in aggregate the important measurement of milk had the highest incidence of 70%. Inadequate finance as a problem had the lowest incidence of 40%. Female members had the highest incidence of the problems of improper measurement of milk & transport, communication facilities. 51% of total members have a problem of non availability of proper cattle in local market.

An Enquiry of the Dairy Member Revealed a Number of Multiple Problems

Table 4.5

Sr. No.	Items	No. of types of sample members		Total	% To Total
		Female	Farmer		
1.	Inadequate price.	9	16	25	43
2.	Improper measurement of milk.	20	22	42	70

3.	Fodder & cattle feed cost.	17	16	33	55
4.	Collective testing of milk.	11	19	30	50
5.	Availability of proper cattle in local market.	19	12	31	51
6.	Fodder & water supply.	21	18	35	58
7.	Unsuitable Business premises	19	14	33	54
8.	Difficulties in transport & communication.	20	14	34	56
9.	Insufficient veterinary facilities.	18	16	34	57
10.	Inadequate finance.	13	11	24	40
11.	Spoilage of milk.	10	15	25	42

The Following Major Problems Are Facing By The Customers:-

- 1) Adulteration in milk: - it is like- by adding water, refined oil, chemicals, combining the separated milk etc.
- 2) Day by day increasing rate of milk.

CONCLUSION: -

Dairy industry in Nandni village is a major source of income during all the 12 months of the year. Dairy operations have given boost to the all round development of small land holders, land less labors & economically backward class in the village. Because of dairy farming there is radical change in the income of the members, their situations of famine, awareness of the new plans & programs, tendency to help each other, adoption of scientific methods of cattle breeding.

If the Govt. provides various schemes & programs such as - seminars on medical care of cattle's, financial subsidies for cattle purchasing, stable milk pricing system etc. then the problems facing by customers & milk suppliers can be avoided.

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A Comparative Study of marketing strategies and Consumer satisfaction of Ayurvedic medicinal products with allopathic medicinal products in Pune

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INTRODUCTION

Ayurveda is the ancient existing health care system. Ayurveda's growth graph in the past decade has been impressive. Middle and upper class people who had shifted their allegiance completely to allopathy, are again trying out ayurveda and other therapies, after bad experiences and side effects with allopathic medicines. The Indian government, with an eye on nationalistic legitimacy, is also promoting ayurveda. The commercial production and sale of Ayurvedic products as a modern industry is around 100 years old, and India's annual production of Ayurvedic medicines is estimated to be approximately US\$ 1 billion.

In Europe and America, new ayurveda hospitals are now focusing almost exclusively on *Panchkarma* and allied treatments, perhaps because getting medicines ratified by drug authorities is a time-consuming and expensive process.

Presently, India contributes less than 1% to the global herbal market; however, it is fast emerging as a key supplier of medicinal plants across the globe (more than 70 %). Ayurveda has a 70 per cent share in the formal medicine market in the country. There are around 6,000 licensed units and an equal number of unlicensed units manufacturing Ayurvedic drugs. The origin of most of these companies can be traced back to a *vaidya* (a practicing *Ayurvedic* expert) who used to prepare some formulations for dispensing. The manufacture and marketing of Ayurvedic medicine has been commercially successful for several pharmaceutical companies, including Arya Vaidya Sala and IMIS Pharmaceuticals, which have patented their own formulas. Ayurvedic medicine production in India is dominated for three companies that produce about 85% of the Indian domestic market: Dabur, Baidyanath, and Zandu. However, there are around 30 other companies that produce US\$1 million or more in Ayurvedic products each year, including small pharmacies and family-owned enterprises that compound their own ingredients and guard their remedy recipes closely. Also there are some strong local players in this ayurvedic medicines like Dr. Vinayak khadiwale, Pune, Dr. Balaji Tambe, Medicines from Baba Ramdev etc.

Keeping in mind all these factors and the position of Ayurvedic medicines in India, this research is trying to find out the different marketing strategies used by the various manufacturers to sustain in the market with the competition of allopathy medicines. This is a comparative analysis of the marketing strategies of ayurvedic medicinal product with other.

NEED & SIGNIFICANCE FOR THE STUDY:

In today's competitive world everyone is trying to sustain in the market. The same case with the Ayurvedic medicines, because of the cut through competition with different medicines like allopathic, homeopathic, acupuncture, and other medicinal techniques, Ayurvedic medicines are trying to sustain in the market with different marketing practices.

This comparative study will be useful to do analysis of marketing strategies used for ayurvedic, allopathic and other medicinal products. It's important to understand the emerging Industrial dynamics in this sector. What are the demands from the market? What is the response of customers to such medicines? What is customer perception about these products etc?

We observe most of the peoples prefer Ayurvedic, Homeopathic treatments rather than allopathic, especially in beauty treatments, joint pains, cough & cold
Ayurveda is ancient science and strongly supported by the various techniques for well-being of the patient, not just the ailment, under the primary tenet that health is not merely the absence of disease but the overall state of physical, mental, social and spiritual well-being.

Significance to Industry

1. It will be clear the current market conditions for the ayurvedic medicines
2. With the comparative study of marketing strategies one can easily recognize where one is lacking or leading in the market.
3. Consumer awareness about the ayurvedic medicines can be recognize
4. It will be easy to find out Customer satisfaction level with the current products
5. Loyal customers percentage can be recognize

STATEMENT OF THE PROBLEM

To find out the current situation of the marketing strategies with comparative analysis of the Ayurvedic medicines with the other medicinal products like allopathic, homeopathic etc. and what is the impact of these strategies on the consumers. What are the perceptions of the consumer and are they aware about such medicinal products or not. Are customers satisfied with the products and how many of them are loyal customers for the Ayurvedic medicines

OBJECTIVES:

1. To take an overview of Ayurvedic industry in India, especially in relation with awareness of the Ayurvedic medicines
2. To study the customer awareness (Brand awareness)
3. To study customer perception for the Ayurvedic medicines and also allopathy medicines

RESEARCH DESIGN

Descriptive research method is used in this research as it is well structured. **Cross-sectional** studies will be applied for the research as it is concerns with a sample of elements from given population, data on a number of characteristics from the sample elements are collected and analyzed. It includes **field studies and surveys** for detail information.

UNIVERSE & SAMPLE SIZE

This research is comparative study of the marketing strategies of ayurvedic medicinal products and other, also to find out the brand perception and awareness of the ayurvedic medicines. So data will be collected from customers and distributors, dealers and medical representatives.

Sample size:

Dealers & medical Representatives: 10 for each

Customers: 106

JUSTIFICATION OF SAMPLING METHOD

Convenience sampling method is used for the research.

SOURCES OF DATA COLLECTION

Data was collected by two main sources i.e. Primary data and Secondary data.

Secondary data

Secondary data was collected from internet, magazines, journals, medical journals, books etc.

Primary data

Data observed or collected directly from first-hand experience. Primary data will be collected by questionnaire method.

Primary data was collected from customers and distributors, dealers and medical representatives with the help of questionnaire.

Interviews were conducted of 20% of total sample size

METHOD OF DATA COLLECTION

Data is collected from **questionnaire** for the customers and questionnaire to dealers, distributors etc. As questionnaire is well organized and pre-arranged order so it is called as structured questionnaire and the object of enquiry is revealed to the respondent so it is non-disguised. So **Questionnaire is structured non disguised format**. Questions are of both the types close ended and open ended. To supplement the questionnaire, interviews of 20% of the respondents were conducted

ANALYSIS OF THE DATA

The data analysis is done in two parts. First set of questions and analysis is related with Demographic characteristics of the respondents and second part includes the question related with consumer buying behavior and perception about the different products of allopathy and Ayurveda products.

Data analysis is done by percentile method as sample size is limited and small and restricted to Pune city area.

Demographic Information:

Gender		
	Frequency	Percentage
Male	46	43
Female	60	57
Total	106	100

Sample size was 120 but after filtering the data only 106 samples are considered for further analysis. Gender wise tried to get data from equal percentage of male and female.

Age		
	Frequency	Percentage
Below 25 Years	20	18
25-35 Years	25	24
35-45 Years	23	23
45-55 Years	20	18
Above 55	18	17
Total	106	100

Age criteria is to check buying behavior of the consumers from every age group. How they are preferring the medicinal products.

Marital Status		
	Frequency	Percentage
Married	37	35
Unmarried	69	65
Total	106	100
Educational Status		
	Frequency	Percentage
School	20	18
Degree	51	48
Post Degree	27	26
Others	8	8
Total	106	100
Occupational Status		
	Frequency	Percentage
Business	28	27

Employed	17	16
Housewife	21	19
Professional	25	24
Other	15	14
Total	106	100

Demographic profile indicates the sample selected for the study is from all age groups and equally distributed over the occupational and educational backgrounds.

Second Set of analysis is for the Customer awareness and perception of the consumer for ayurvedic products.

Most of the customers are getting aware about ayurvedic products by advertising in Newspaper and references.

II. Source of awareness of the product		
	Frequency	Percentage
Reference	20	19
Advertisement	18	17
Magazine	15	14
Newspaper	14	13
Internet	20	19
Family members	11	10
Own interest	8	8
Total	106	100

Most of the consumers consume Ayurvedic medicine for treatment of common/prevalent diseases like common cold, cough, constipation, allergy etc. This concludes that Ayurvedic medicine was mostly consumed by consumers for prevalent diseases. Ayurveda is not just a treatment, rather a lifestyle; a lifestyle which has ascertain ways of eating habits, meditative practices and herbal medications when fallen sick.

Consumers taking Ayurvedic medicine for the treatment of major diseases like diabetes, arthritis, bronchial asthma, tuberculosis, migraine, depression etc. consumers refused to take Ayurvedic medicine because, they don't know about the diseases and the effect of Ayurvedic medicine on these diseases.

- Most of the consumer perceptions about Ayurvedic products are mentioned below.
- Ayurvedic Products are herbal and completely safe
- Eliminates the cause of the disease
- It gives emphasis in preventive medicine
- It is the most effective natural treatment to detoxify the body
- Highly perfected rejuvenation treatments
- Herbal cure for the diseases
- Preventive as well as curative treatments
- Diseases are caused due to improper eating and life style ignoring one's especial body type, age, and environment
- By establishing a perfect balance between inner and outer world mind, body, and spirit will be in perfect health

Findings & Conclusion

1. Most of the customers are aware about the Ayurveda as well as for allopathy medicinal products and treatments.
2. Consumers are preferring ayurvedic treatments because of their perception that those are herbal and eliminates the root cause for the disease.
3. For disease like diabetes, arthritis, bronchial asthma, tuberculosis, migraine, depression people are preferring ayurvedic treatments
4. After taking an overview of Ayurvedic industry in India, especially in relation with awareness of the Ayurvedic medicines people are preferring different brand and even all household products for these brands like Dabur, Patanjali, Himalaya, Bidyanath etc.
5. Most of the customers are satisfied for the results getting by ayurvedic medicines but most of them complain about the duration it was taking to cure disease
6. Most of the consumers are using some Ayurvedic health/food supplements or Rejuvenating Ayurvedic medicines
7. Overall people are satisfied with ayurvedic medicinal products in terms of performance, price, availability, results etc.

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Academic Collaboration and Co-operation To whomsoever it may Concern

This is to certify that *Mr. Arif Tamboli* from department of Electronic Sciences, Poona College of Arts, Science and Commerce, Camp Pune – 01 is in collaboration and association with our department from the date of signing this document for a period of FIVE (05) years.

The Collaboration is to utilise the expertise and sharing of knowledge between the entities. Dr. J M PATHAN had provided his consent to conduct the following activities with our department under the collaboration:

1. Participation in Faculty Exchange Programme
2. Participation in Student Training Programme
3. Participation in Summer Conferences / Workshops / Symposia etc.
4. Research Collaboration
5. Invited Talks

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Structural and Dielectric properties of Co^{+2} substituted Ni Cu Nanocrystalline Spinel Ferrite Material

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Abstract: In this research paper the dielectric properties such as Dielectric loss ($\tan \delta$), AC conductivity, Dielectric constant (real part ϵ' and imaginary part ϵ'') and dielectric loss tangent ($\tan \delta$) are reported for the series $[\text{Co}_x \text{Ni}(\text{constant}) \text{Cu}_{0.8-x} \text{Fe}_2\text{O}_4]$ where constant=0.2 with $x=0.2, 0.4$ and 0.6 of ferrites, prepared by Sol-Gel auto-combustion technique by using high purity metal nitrate, double distilled water and citric acid as a catalyst. The variation in the real part of dielectric constant (ϵ'), imaginary part of dielectric constant (ϵ''), dielectric loss tangent ($\tan \delta$) and AC conductivity are studied at room temperature in the frequency range of 100 Hz to 5 MHz. Structural characterization of the annealed samples was done with the help of X-ray diffraction method. The particle size and single phase formation of $\text{CoNiCuFe}_2\text{O}_4$ ferrite was confirmed by X-ray diffraction analysis. The particle size of prepared sample was confirmed by Scherer's formula. The effect on Particle size (t) and lattice constant (\AA) is observed due to substitution of Co^{2+} in Ni Cu. The impedance meter (LCR meter) is used to obtain the Dielectric properties of prepared pellets. The variations in the structural and dielectric properties of the prepared ferrite material are discussed.

Keywords – Sol-gel auto-combustion X-ray diffraction, Impedance meter (LCR meter), FT-IR,

I. INTRODUCTION

The ferrite nanoparticle are popular in various fields of electronics and communication Engineering because the ferrite material is having excellent and very different properties especially in electric, di-electric and magnetic properties that are sensibly different from the properties of the other bulk materials. Ferrite nanoparticles are very use full in the area where minimization of eddy current loss, magnetic loss is important and magnetic field dependent properties plays very important role.

The ferrite performs a better response at high frequencies because ferrite nanoparticles are having very high electrical resistivity and due to this Ferrite is used as best core material in the transformers and power supply for frequencies from few kilo Hertz to a few Mega Hertz. Ferrite is having high stability, low cost, light weight and lowest volume therefore it is more popular. These are intensively studied due to their technological applications in microwave industries such as Radar Absorbing Material (RAM), satellite communication, microwave dark room and protection of living animals from the harm of microwave [1–7].

II. EXPERIMENTAL

2.1 Synthesis

The high purity AR grade ferric nitrate $[\text{Fe}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}]$, Copper nitrate $[\text{Cu}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}]$, Nickel nitrate $[\text{Ni}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}]$, Cobalt nitrate $[\text{Co}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}]$, citric acid ($\text{C}_6\text{H}_8\text{O}_7$), ammonium hydroxide solution (NH_4OH) and double distilled water were used to prepare the series $[\text{Co}_x \text{Ni}(\text{constant}) \text{Cu}_{0.8-x} \text{Fe}_2\text{O}_4]$ where constant=0.2 with $x=0.2, 0.4$ and 0.6 of ferrite nanoparticles by sol-gel auto combustion synthesis technique. In this chemical process Citric acid was used as a Fuel. These nitrates and citric acid were weighed accurately to have proper stoichiometric proportion required in the final product and all metal nitrates are dissolved in deionized water to form mixed solution. The mixed solutions of all the chemicals were stirred by using magnetic stirrer until the homogeneous solution is obtained. During the stirring process ammonium hydroxide solution was added drop by drop to obtain pH of 7. The mixed solution was simultaneously heated at 100°C for 2 hours

to 4 hours such that formation of gel takes place. The transparent solution was heated at 100 °C for 2 hours to 4 hours for removal of water and solution turns into a viscous brown gel. The temperature of the gel was further increased up to 150 °C, after some time combustion of the gel takes place and fine powder of $[\text{Co}_x\text{Ni}(\text{constant})\text{Cu}_{0.8-x}\text{Fe}_2\text{O}_4]$ ferrite nanoparticle was obtained. The same procedure is repeated for three times for $x=0.2$, $x=0.4$ and $x=0.6$, such that three ferrite materials are prepared. Three ferrite materials represented by the symbol D, E, and A are $[(\text{Co}_{0.2}\text{Ni}_{0.2}\text{Cu}_{0.6})\text{Fe}_2\text{O}_4]$, $[(\text{Co}_{0.4}\text{Ni}_{0.2}\text{Cu}_{0.4})\text{Fe}_2\text{O}_4]$ and $[(\text{Co}_{0.6}\text{Ni}_{0.2}\text{Cu}_{0.2})\text{Fe}_2\text{O}_4]$ respectively. The powder was dried and annealed at 400 °C for 4h in furnace having super kanthal (MoSi_2) heating elements and alumina insulation boards as chamber walls. The pellets of sample are prepared by using binder polyvinyl alcohol (PVA) and it was pressed at 60 kg/cm³ for one min and was dried and annealed at 200 °C for 2 hours. The diameter of pellet is 10mm and thickness is 2mm. Three pellets of ferrite materials are prepared for represented by D, E, and A are $[(\text{Co}_{0.2}\text{Ni}_{0.2}\text{Cu}_{0.6})\text{Fe}_2\text{O}_4]$, $[(\text{Co}_{0.4}\text{Ni}_{0.2}\text{Cu}_{0.4})\text{Fe}_2\text{O}_4]$ and $[(\text{Co}_{0.6}\text{Ni}_{0.2}\text{Cu}_{0.2})\text{Fe}_2\text{O}_4]$ respectively.

2.2 Characterization

The phase analysis and gross structural analysis is done by using X-ray diffractometer ($\text{Cu K}\alpha_1$ radiation=1.5418 Å) and confirmation of single phase spinal structure is done. The average particle size of prepared powder has been calculated using Scherrer formula

$$t = 0.9 \lambda / \beta \cos \theta \quad \text{-----}(1)$$

Where; λ = Wave length of X-rays.

t = Particle size.

θ = Bragg's angle.

β = Full Width Half Maxima of the recorded peak θ and it is corrected for instrumental broadening.

The lattice parameter (a) is calculated from X-ray diffraction data by using formula $1/d^2 = 1/a^2 * (h^2 + k^2 + l^2)$. It is observe that Average Grain Size t (nm) and Lattices Constant a (Å) decreases with increase of Ni^{2+} substitution of in Cu Co as shown in Table 1.

The dielectric constant (ϵ'), dielectric loss tangent ($\tan \delta$) and AC conductivity (σ_{ac}) of prepared samples were measured in the frequency range of 100 Hz to 5 MHz by using digital LCR meter of precision impedance analyser at room temperature. The data of digital LCR meter provides the information of frequency (f), Series Capacitance (C_s), Parallel Capacitance (C_p), Quality factor (Q), by using the this date along with thickness of pellet, $d=0.002$ meter, Diameter of pellet= 10 millimetre and Area of pellet = $\pi r^2 = 3.14 * .005 * .005 \text{ meter}^2 = 0.0000785 \text{ meter}^2$, the calculations for dielectric constant (ϵ'), imaginary part (ϵ'') of dielectric constant and dielectric loss tangent ($\tan \delta$) are completed by using the following equations. The logarithm of frequency ($\text{Log}_{10} f$) is taken in to consideration while plotting the graph of ($\text{Log}_{10} f$) verses any other parameter.

$$\text{Dielectric constant (Real Part)} = \epsilon' = C_p * d / \epsilon_0 * A \quad \text{-----} (2)$$

$$\text{Dielectric constant (Imaginary Part)} = \epsilon'' = (\tan \delta) * \epsilon' \quad \text{-----} (3)$$

$$\text{Dielectric loss tangent} = (\tan \delta) = 1/Q = \epsilon'' / \epsilon' \quad \text{-----} (4)$$

III. RESULTS AND DISCUSSIONS

3.1: Structural analysis.

The XRD pattern of as-synthesized ferrite material of $[(\text{Co}_{0.2}\text{Ni}_{0.2}\text{Cu}_{0.6})\text{Fe}_2\text{O}_4]$ is shown in Fig.1. The highest intensity peaks in all three specimens are observed at (311) and other peaks (220), (400), (422) and (440). The average grain (crystallite) size for all the composites is calculated using Scherrer's formula with respect to the high intense peak plane (311) and Lattices Constant a (Å) is calculated by using the formula $1/d^2 = 1/a^2 * (h^2 + k^2 + l^2)$. It is observed that due to the increase concentration of Co^{2+} ions in NiCu the Bragg's angle shifts towards lower angle and thereby interplaner spacing's (d) values increases. The grain (crystallite) size for all the composites is found in the range of 23.71 nanometer to 28.45 nanometer. The XRD pattern contains no secondary peaks and it gives the confirmation about pure spinal structure of sample.

The lattice constant is found to increase with increase in Co^{2+} concentration x . The variations in lattice constant as a function of Cobalt concentration x can be understood on the basis of the ionic radius of the substituted cations. Since the ionic radius of Co^{2+} ions (0.745Å) is greater than that of Cu^{2+} ions (0.73Å), the substitution is expected to increase the lattice constant with increase in cobalt concentration x . When the larger cobalt ions enters at that time lattice unit cell expands while preserving overall symmetry this is true as long as the lattice constant increases with substituent concentration of cobalt.

The values of lattice constant obtained from XRD data by varying cobalt concentration x are given in Table 1. It can be seen from Table 1 that, the lattice constant and particle size (t) increases with increase of cobalt concentration x and obeys Vegard's law [08-14]. Fig.2. Shows that particle size (t) increases with

increase of Co^{2+} concentration in $[(\text{Co}_x \text{Ni}_{(\text{constant})} \text{Cu}_{0.8-x})\text{Fe}_2\text{O}_4]$ and Fig.3. Shows that lattice constant (\AA) also increases with increase of Co^{2+} concentration in $[(\text{Co}_x \text{Ni}_{(\text{constant})} \text{Cu}_{0.8-x})\text{Fe}_2\text{O}_4]$.

3.2: Dielectric properties.

The effect of Co^{2+} concentration x on the dielectric properties of $[(\text{Co}_{0.2}\text{Ni}_{0.2} \text{Cu}_{0.6})\text{Fe}_2\text{O}_4]$, $[(\text{Co}_{0.4}\text{Ni}_{0.2} \text{Cu}_{0.4})\text{Fe}_2\text{O}_4]$ and $[(\text{Co}_{0.6}\text{Ni}_{0.2} \text{Cu}_{0.2})\text{Fe}_2\text{O}_4]$ have been studied by using LCR meter (impedance analyzer) in frequency range of 100 Hz–5 MHz.

The Fig. 4 shows that the dielectric loss ($\tan \delta$) decreases as the frequency of the applied AC electric field increases because the jumping frequency of charge carriers cannot follow the frequency of the applied field after certain frequency. It is also observed that dielectric loss ($\tan \delta$) rapidly decreases at lower frequencies and remains constant at higher frequencies.

The Zig Zag behaviour in the low frequency region of Dielectric loss curve is observed as shown in Fig. 4. This peak in the Dielectric loss curve is observed when the hopping frequency of the electron between Fe^{2+} – Fe^{3+} ions matches with the frequency of the externally applied electric field. It is expected that the peak may be observable in lower frequency range.

The Fig. 5 shows that the variation in the dielectric constant (ϵ') with increase in the frequency and it is observed that dielectric constant (ϵ') of all spinel ferrite samples rapidly decreases at lower frequencies and remains constant at higher frequencies.

The Fig. 6 shows that the Imaginary Part of Dielectric constant (ϵ'') also decreases rapidly at lower frequency and remains constant at higher frequencies. Similar results were observed by several other investigators [15-19]. The values of the average dielectric constant and average dielectric loss of the samples are listed in Table 2.

According to Koop's the decrease in dielectric constant for increase in frequency can be expressed by considering the solid as composed of well conducting grains which is separated by the poorly conducting grain boundaries. According to Koop's, at lower frequencies, the resistivity is high and the principal effect is of the grain boundaries (low resistivity regions). Therefore, the energy required for electron hopping between Fe^{2+} and Fe^{3+} at the grain boundaries is higher and the energy losses ($\tan \delta$ and ϵ'') are larger [20-25].

The rapid decrease of dielectric constant at lower frequencies is explained on the basis of space charge polarization. According to Maxwell and Wagner two-layer model, the space charge polarization is produced in a di-electric material due to the presence of higher conductivity phases (grains) in the insulating matrix (grain boundaries). When an external electric field is applied, the electrons reach the grain boundary through hopping. If the resistance of the grain boundary is high, the electrons pile up at the grain boundaries and produces polarization. This is called space charge polarization. The assembly of space charge carriers in a dielectric material takes a finite time to line up their axes parallel to the alternating electric field. If the frequency of the external electric field reversal increases, a point is reached where the space charge carriers cannot keep up with the external electric field and the alternation of their direction lags behind that of the field [26-29]. In Fig. 7, FT-IR peaks at 3148.22 cm^{-1} , 2983.34 cm^{-1} , 1644.98 cm^{-1} and 1024.02 cm^{-1} gives the confirmation of Fe_2O_4 .

3.3: AC conductivity (σ) at different concentration of Co^{2+} ions.

It is observed that the AC conductivity remains almost constant in the low frequency region and increases abruptly in the high frequency region Fig. 8. It is well known that the mechanism of the electrical conduction is the same as that of the dielectric polarization.

The increase in the AC conductivity with frequency is also understood by the hopping model. As the frequency of the applied electric field increases, the hopping frequency of electrons between Fe^{3+} – Fe^{2+} ions at adjacent octahedral site also increases, leading to increase in the conductivity.

From Fig. 8. it is observed that for $x=0.2$ (sample D) graph shown by square dots (Black) is having the minimum AC Conductivity and AC Conductivity increases due increase in substitution of Co^{2+} , $x=0.4$ and $x=0.6$ which is shown by circular red dots (sample E) and by triangular blue dots (sample A) respectively.

It shows that the AC conductivity increases with increase in x substitution of Co^{2+} . With the increase in the concentration of Co^{2+} ions (x), the hopping action of charge carriers increases due to the increased concentration of Fe^{3+} ions at B-site. Table 3, shows the values of AC Conductivity for Co^{2+} concentration x at 5 MHz [30-34].

IV. FIGURES AND TABLES

Table 1

Variation of Particle size (t) and Lattices Constant (Å) for due to Substitution of Co^{2+} in $[(\text{Co}_x\text{Ni}_{(1-x)}\text{Cu}_{0.8-x})\text{Fe}_2\text{O}_4]$.

Ferrite Sample	Particle Size t (nm)	Lattices Constant (Å)
(D) x=0.2	23.71	8.315
(E) x=0.4	25.75	8.377
(A) x=0.6	28.45	8.417

Table 2
Variation of Dielectric Constant and Dielectric loss of $[(\text{Co}_x\text{Ni}_{(1-x)}\text{Cu}_{0.8-x})\text{Fe}_2\text{O}_4]$.

Variation in Dielectric Constant and Dielectric loss of D, E and A		
Sample Name	Avg. Dielectric Constant	Avg. Dielectric loss
D $[(\text{Co}_{0.2}\text{Ni}_{0.2}\text{Cu}_{0.6})\text{Fe}_2\text{O}_4]$	40.372577	1.191974
E $[(\text{Co}_{0.4}\text{Ni}_{0.2}\text{Cu}_{0.4})\text{Fe}_2\text{O}_4]$	88.997411	1.342013
A $[(\text{Co}_{0.6}\text{Ni}_{0.2}\text{Cu}_{0.2})\text{Fe}_2\text{O}_4]$	52.907096	0.701638

Table 3
Variation in AC Conductivity of $[(\text{Co}_x\text{Ni}_{(1-x)}\text{Cu}_{0.8-x})\text{Fe}_2\text{O}_4]$.

$[\text{Co}_x(\text{Ni}_{(1-x)}\text{Cu}_{0.8-x})\text{Fe}_2\text{O}_4]$, Ni=constant=0.2	
x	AC Conductivity at 5 MHz
(D) For x=0.2	0.00206424
(E) For x=0.4	0.00259871
(A) For x=0.6	0.00265852

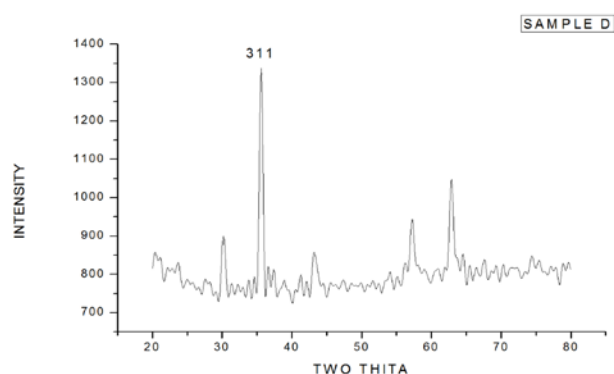


Fig. 1: XRD pattern of sample D, $[(\text{Co}_{0.2}\text{Ni}_{0.2}\text{Cu}_{0.6})\text{Fe}_2\text{O}_4]$.

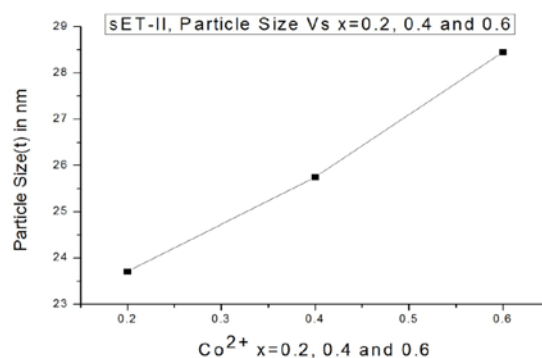


Fig. 2: Particle size (t) verses Co^{2+} substitution x in SET-II (D, E, A).

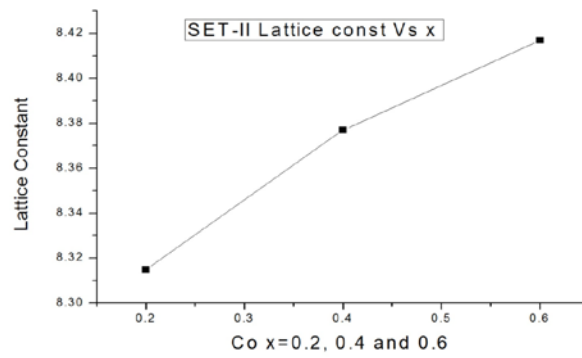


Fig. 3: Lattices Constant versus Co^{2+} substitution x in SET-II (D, E, A).

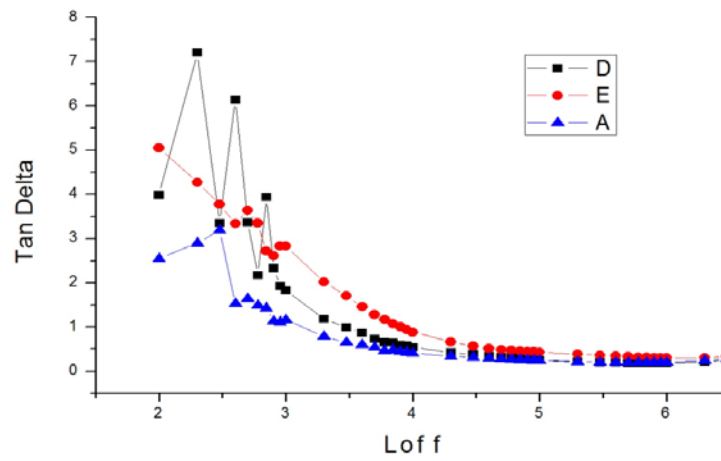


Fig. 4: Variation in dielectric loss ($\tan \delta$) with increase in frequency of ferrite sample D, E and A.

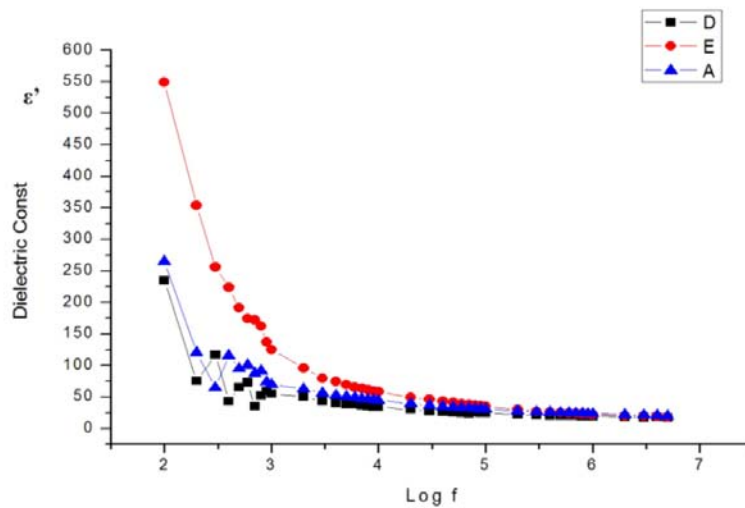


Fig. 5: Variation in Real Part of Dielectric constant (ϵ') with increase in frequency of ferrite sample D, E and A.

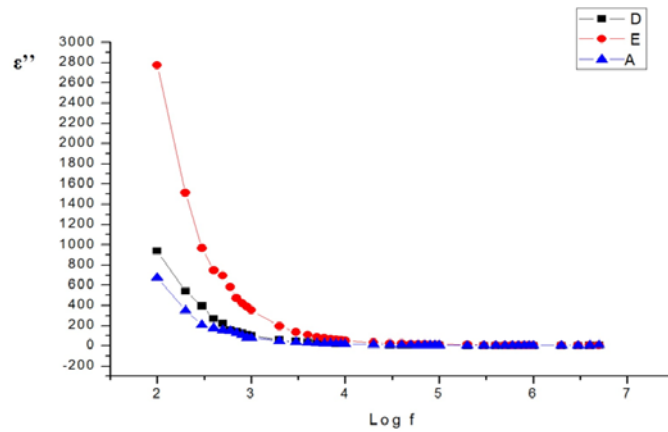


Fig. 6: Variation in imaginary part of Dielectric Constant (ϵ'') with increase in frequency of ferrite sample D, E and A.

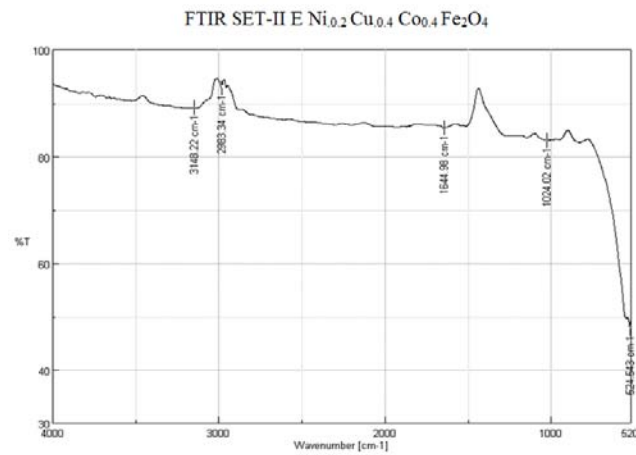


Fig. 7: FTIR graph for SET-II (E), [(4Co_{0.4}Ni_{0.2}Cu₀)Fe₂O₄]

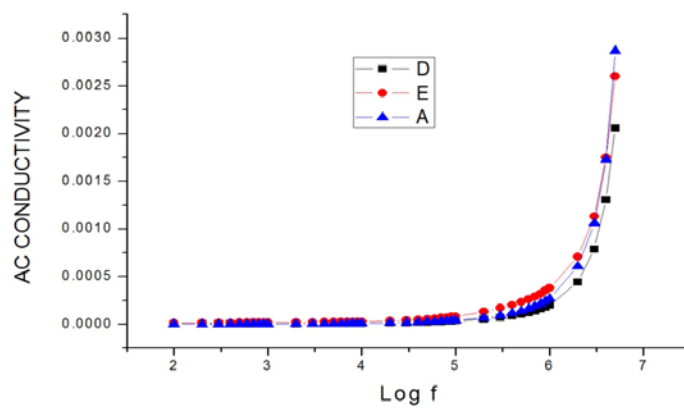


Fig. 8: AC Conductivity of ferrite sample D, E and A.

V. CONCLUSIONS

The nanocrystalline ferrite samples $[(\text{Co}_{0.2}\text{Ni}_{0.2}\text{Cu}_{0.6})\text{Fe}_2\text{O}_4]$, $[(\text{Co}_{0.4}\text{Ni}_{0.2}\text{Cu}_{0.4})\text{Fe}_2\text{O}_4]$ and $[(\text{Co}_{0.6}\text{Ni}_{0.2}\text{Cu}_{0.2})\text{Fe}_2\text{O}_4]$ have been successfully prepared by sol-gel auto combustion technique. All the prepared samples show the single phase cubic spinel structure of the samples. The particle grain size obtained from X-ray diffraction data increases with increase in Co^{2+} substitutions Ni Cu. It clearly shows that the size of the ferrite particles was in the nanometer range. The particle size and nanostructure of the sample was examined by XRD. FTIR also gives the confirmation of spinel ferrite. Measurement of the dielectric constant and dielectric loss in the 100 Hz–5 MHz frequency range showed higher magnitude, at lower frequencies, decreasing with increase in frequency, essentially becoming constant above 4 MHz. The AC conductivity (σ) increases with increase in x substitution of Co^{2+} .

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Academic Collaboration and Co-operation To whomsoever it may Concern

This is to certify that *Mr. Arif Tamboli* from department of Electronic Sciences, Poona College of Arts, Science and Commerce, Camp Pune – 01 is in collaboration and association with our department from the date of signing this document for a period of FIVE (05) years.

The Collaboration is to utilise the expertise and sharing of knowledge between the entities. Dr. J M PATHAN had provided his consent to conduct the following activities with our department under the collaboration:

1. Participation in Faculty Exchange Programme
2. Participation in Student Training Programme
3. Participation in Summer Conferences / Workshops / Symposia etc.
4. Research Collaboration
5. Invited Talks

Dr. J M PATHAN

Assistant Professor

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Dielectric behaviour of Ni^{2+} substituted Cu Co Nanocrystalline Spinel Ferrite Material

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Abstract: Herein, the dielectric properties such as permittivity (real part ϵ' and imaginary part ϵ'') and dielectric loss tangent ($\tan \delta$) are reported for the series $[\text{Ni}_x \text{Cu}(\text{constant}) \text{Co}_{0.8-x} \text{Fe}_2\text{O}_4]$ where constant=0.2 with $x=0.2, 0.4$ and 0.6 of ferrites, prepared by Sol-Gel auto-combustion technique by using high purity metal nitrate and citric acid as a catalyst. The variation in the real part (ϵ') of dielectric constant, imaginary part (ϵ'') of dielectric constant and dielectric loss tangent ($\tan \delta$) are studied at room temperature in the frequency range of 100 Hz to 5 MHz. Structural characterization of the annealed samples was done with the help of X-ray diffraction method. The particle size and single phase formation of $\text{NiCuCoFe}_2\text{O}_4$ ferrite was confirmed by X-ray diffraction analysis and TEM. The particle size of prepared sample was confirmed by Scherer's formula. The effect on Particle size (t) and lattice constant (\AA) is observed due to substitution of Ni^{2+} in Cu Co. The digital LCR meter is used to obtain the magnetic properties of prepared pallets. The variations in the structural and dielectric properties of the prepared ferrite material are discussed.

Keywords: Digital LCR, FT-IR, Sol-gel auto-combustion, TEM, X-ray diffraction.

I. Introduction

Due to very different properties of ferrite material especially in electric, di-electric and magnetic properties that are sensibly different from the properties of the bulk materials, ferrite nanoparticle are popular in various fields of electronics and communication Engineering. Ferrite nanoparticles are very use full in the area where minimization of magnetic loss is important and magnetic field dependent properties plays very important role. Ferrite nanoparticles are having very high electrical resistivity and due to this ferrite perform a better response at high frequencies. Ferrite is used as best core material in the transformers and switch mode power supply for frequencies from few kHz to a few MHz. Ferrite is having high stability, low cost, light weight and lowest volume therefore it is more popular. These are intensively studied due to their technological applications in microwave industries such as Radar Absorbing Material (RAM), satellite communication, microwave dark room and protection of living animals from the harm of microwave [1–14].

II. Experimental

2.1 Synthesis

The high purity AR grade ferric nitrate $[\text{Fe}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}]$, Copper nitrate $[\text{Cu}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}]$, Nickel nitrate $[\text{Ni}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}]$, Cobalt nitrate $[\text{Co}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}]$, citric acid ($\text{C}_6\text{H}_8\text{O}_7$), ammonium hydroxide solution (NH_4OH) were used to prepare the series $[\text{Ni}_x \text{Cu}(\text{constant}) \text{Co}_{0.8-x} \text{Fe}_2\text{O}_4]$ where constant=0.2 with $x=0.2, 0.4$ and 0.6 of ferrite nanoparticles by sol-gel auto combustion synthesis technique. In this chemical process Citric acid was used as a Fuel. These nitrates and citric acid were weighed accurately to have proper stoichiometric proportion required in the final product and all metal nitrates are dissolved in deionized water to form mixed solution. The mixed solutions of all the chemicals were stirred by using magnetic stirrer until the homogeneous solution is obtained. During the stirring process ammonium hydroxide solution was added drop by drop to obtain pH of 7. The mixed solution was simultaneously heated at 100°C for 3 to 4 h to form sol. The transparent sol was heated at 120°C for 2 h for removal of water. The sol turns into a viscous brown gel. The temperature of the gel was further increased up to 150°C , after some time combustion of the gel takes place and fine powder of $[\text{Ni}_x \text{Cu}(\text{constant}) \text{Co}_{0.8-x} \text{Fe}_2\text{O}_4]$ ferrite nanoparticle was obtained. The powder was dried and annealed at 400°C for 4h in furnace having super kanthal (MoSi_2) heating elements and alumina insulation boards as chamber walls. The pallets of sample are prepared by using binder polyvinyl alcohol (PVA) and it was pressed at 60 kg/cm^3 for one min and was dried and annealed at 200°C for 2hours. The diameter of pallet is 10mm and thickness is 2mm. Three ferrite materials represented by the symbol A, B, and C are $[(\text{Ni}_{0.2} \text{Cu}_{0.2} \text{Co}_{0.6}) \text{Fe}_2\text{O}_4]$, $[(\text{Ni}_{0.4} \text{Cu}_{0.2} \text{Co}_{0.4}) \text{Fe}_2\text{O}_4]$ and $[(\text{Ni}_{0.6} \text{Cu}_{0.2} \text{Co}_{0.2}) \text{Fe}_2\text{O}_4]$ respectively.

2.2 Characterization

The phase analysis and gross structural analysis is done by using X-ray diffractometer (Cu K α_1 radiation=1.5418 Å) and confirmation of single phase spinal structure is done. The average particle size of prepared powder has been calculated using Scherrer formula

$$t = 0.9 \lambda / \beta \cos \theta$$

Where; λ = Wave length of X-rays.

t = Particle size.

θ = Bragg's angle.

β = Full Width Half Maxima of the recorded peak θ and it is corrected for instrumental broadening.

The lattice parameter (a) is calculated from X-ray diffraction data by using formula $1/d^2 = 1/a^2 * (h^2 + k^2 + l^2)$. It is observe that Average Grain Size t (nm) and Lattices Constant a (Å) decreases with increase of Ni²⁺ substitution of in Cu Co as shown in Table 1.

The dielectric constant (ϵ'), dielectric loss tangent ($\tan \delta$) and AC conductivity (σ_{ac}) of prepared samples were measured in the frequency range of 100 Hz to 5 MHz by using digital LCR meter of precision impedance analyser at room temperature. The data of digital LCR meter provides the information of frequency (f), Series Capacitance (Cs), Parallel Capacitance (Cp), Quality factor (Q), by using the this date along with thickness of pellet, d=0.002 meter, Diameter of pellet= 10 millimetre and Area of pellet = $\pi r^2 = 3.14 * .005 * .005$ meter²=0.0000785 meter², the calculations for dielectric constant (ϵ'), imaginary part (ϵ'') of dielectric constant and dielectric loss tangent ($\tan \delta$) are completed by using the following equations. The logarithm of frequency (Log₁₀ f) is taken in to consideration while plotting the graph of (Log₁₀ f) verses any other parameter.

Dielectric constant (Real Part) = $\epsilon' = Cp * d / \epsilon_0 * A$

Dielectric constant (Imaginary Part) = $\epsilon'' = (\tan \delta) * \epsilon'$

Dielectric loss tangent= $(\tan \delta) = 1/Q = \epsilon'' / \epsilon'$

III. Results and Discussions

3.1 Structural analysis

The XRD pattern of as-synthesized ferrite material of [(Ni_{0.2} Cu_{0.2} Co_{0.6}) Fe₂O₄], [(Ni_{0.4} Cu_{0.2} Co_{0.4}) Fe₂O₄], [(Ni_{0.6} Cu_{0.2} Co_{0.2}) Fe₂O₄] is shown in Fig.1. The highest intensity peaks in all three specimens are observed at (311) and other peaks (220), (400), (422) and (440). The average grain (crystallite) size for all the composites is calculated using Scherrer's formula with respect to the high intense peak plane (311) and Lattices Constant a (Å) is calculated by using the formula $1/d^2 = 1/a^2 * (h^2 + k^2 + l^2)$. It is observed that due to the increase concentration of Ni²⁺ ions in Cu Co the Bragg's angle shifts towards higher angle and thereby interplaner spacing's (d) values decreases. The grain (crystallite) size for all the composites is found in the range of 28.45 nanometer to 22.52 nanometer. The XRD pattern contains no secondary peaks and it gives the confirmation about pure spinal structure of sample.

The lattice constant is found to decrease with increase in Ni²⁺ concentration x. The variations in lattice constant as a function of Nickel concentration x can be understood on the basis of the ionic radius of the substituted cations. Since the ionic radius of Ni²⁺ ions (0.69Å) is less than that of Co²⁺ ions (0.72Å), the substitution is expected to decrease the lattice constant with increase in nickel concentration x. When the smaller nickel ions enters the lattice unit cell expands while preserving overall symmetry this is true as long as the lattice constant decreases with substituent concentration. The values of lattice constant obtained from XRD data for varying nickel concentration x are given in Table 1. It can be seen from TABLE 1.that, the lattice constant decreases linearly with increase of nickel concentration x and obeys Vegard's law [15-20].

The TEM images shown in Fig. 2 for x=0.2 and x=0.4 gives the confirmation about decrease in the particle size and it is found in the range of 22 nanometer to 28 nanometer due to substitution of Ni²⁺ concentration x.

3.2 Dielectric properties

The effect of Ni²⁺ concentration x on the dielectric properties of [(Ni_{0.2} Cu_{0.2} Co_{0.6}) Fe₂O₄], [(Ni_{0.4} Cu_{0.2} Co_{0.4}) Fe₂O₄], [(Ni_{0.6} Cu_{0.2} Co_{0.2}) Fe₂O₄] have been studied by using LCR meter (impedance analyzer) in frequency range of 100 Hz–5 MHz. The Fig. 3 shows the variation in the dielectric constant (ϵ') with increase in the frequency and it is observed that dielectric properties of spinel ferrite samples rapidly decreases at lower frequencies and remains constant at higher frequencies. The Fig. 4 shows that dielectric loss ($\tan \delta$) also decreases at low frequency. The Fig. 5 shows that the Imaginary Part of Dielectric constant (ϵ'') also decreases at low frequency. Similar results were observed by several other investigations [21-31]. The values of the dielectric constant and dielectric loss of the samples are listed in TABLE 2.

According to Koop's the decrease in dielectric constant for increase in frequency can be expressed by considering the solid as composed of well conducting grains which is separated by the poorly conducting grain

boundaries. According to Koop's, at lower frequencies, the resistivity is high and the principal effect is of the grain boundaries (low resistivity regions). Therefore, the energy required for electron hopping between Fe²⁺ and Fe³⁺ at the grain boundaries is higher and the energy losses (tan δ and ε'') are larger[32-33].

The rapid decrease of dielectric constant at lower frequencies is explained on the basis of space charge polarization. According to Maxwell and Wagner two-layer model, the space charge polarization is produced in a di-electric material due to the presence of higher conductivity phases (grains) in the insulating matrix (grain boundaries). When an external electric field is applied, the electrons reach the grain boundary through hopping. If the resistance of the grain boundary is high, the electrons pile up at the grain boundaries and produces polarization. This is called space charge polarization. The assembly of space charge carriers in a dielectric takes a finite time to line up their axes parallel to the alternating electric field. If the frequency of the field reversal increases, a point is reached where the space charge carriers cannot keep up with the field and the alternation of their direction lags behind that of the field. The FT-IR peaks at 536.114 cm⁻¹, 524.643 cm⁻¹ and 532.257 cm⁻¹ gives the confirmation of Fe₂O₄[34-41].

IV. Figures and Tables

Table 1: Variation of lattice constant a (Å) and Particle size (t) of Ni_x Cu_{0.2} Co_{0.8-x} Fe₂O₄

[Ni _x Cu(constant) Co _{0.8-x}], Cu=constant=0.2		
x	Grain Size t (nm)	Lattices Constant a (Å)
For x=0.2	28.45	8.4175
For x=0.4	25.89	8.3737
For x=0.6	22.52	8.3635

Table 2: Variation of Dielectric Constant and Dielectric loss of Ni_x Cu_{0.2} Co_{0.8-x} Fe₂O₄.

[Ni _x Cu(constant) Co _{0.8-x}], Cu=constant=0.2		
X	Dielectric Constant	Dielectric loss
For X=0.2	52.9070	0.701638
For X=0.4	40.3944	0.523854
For X=0.6	31.1225	0.255394

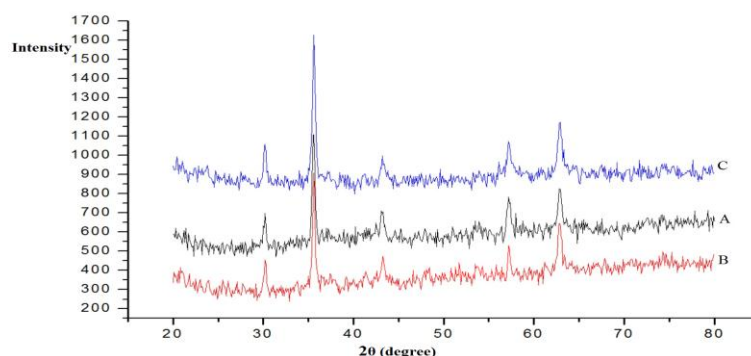
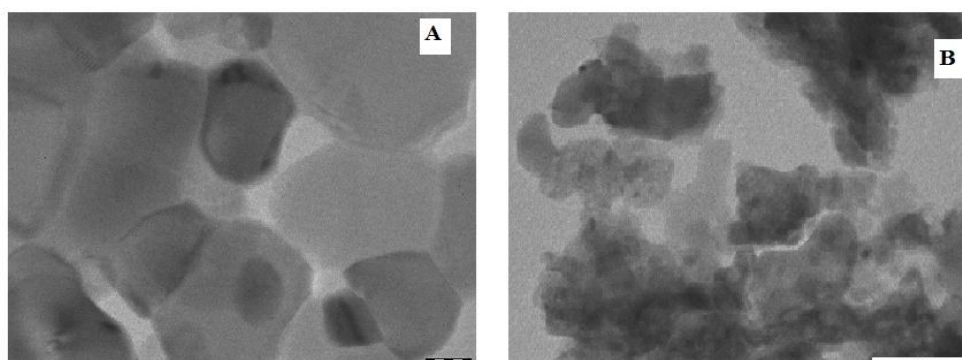


Fig.1: XRD pattern of [(Ni_{0.6} Cu_{0.2} Co_{0.2}) Fe₂O₄], [(Ni_{0.2} Cu_{0.2} Co_{0.6}) Fe₂O₄], [(Ni_{0.4} Cu_{0.2} Co_{0.4}) Fe₂O₄].



TEM images of typical samples of Ni_x Cu_{0.2} Co_{0.8-x} Fe₂O₄ for (A) x = 0.2, (B) x = 0.4

Fig.2: TEM images

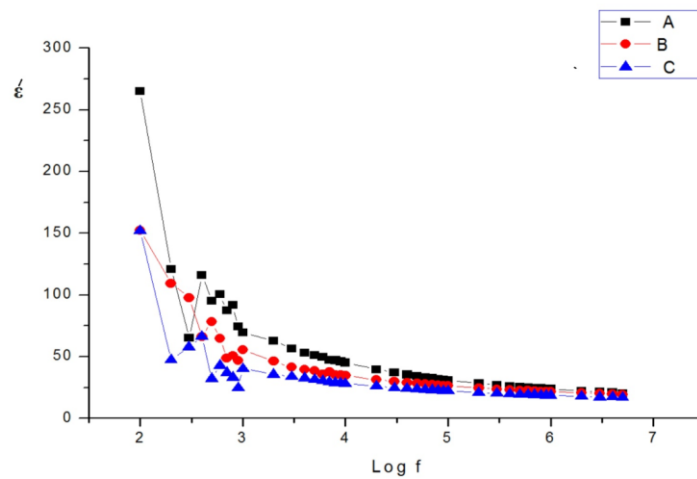


Fig. 3: Variation in dielectric constant (ϵ') with increase in frequency.

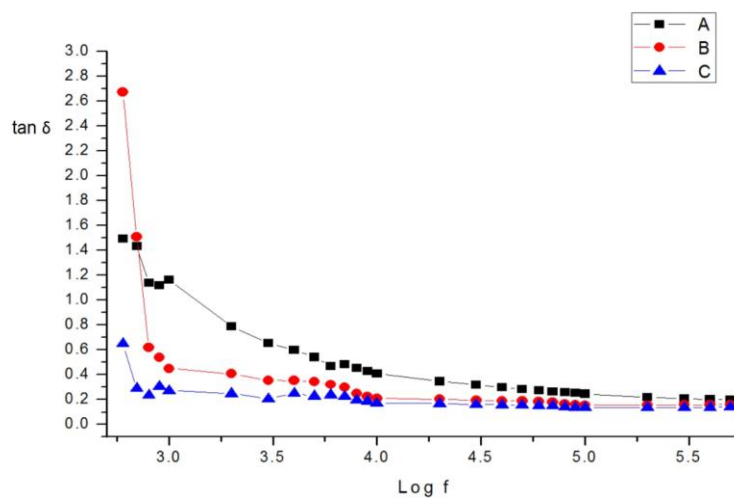


Fig. 4: Variation in dielectric loss ($\tan \delta$) with increase in frequency.

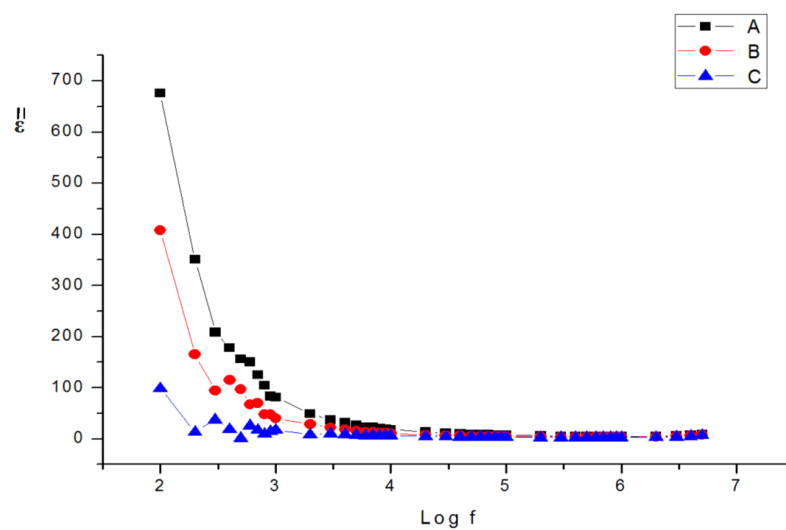


Fig. 5: Variation in Imaginary Part of Dielectric constant (ϵ'') with increase in frequency.

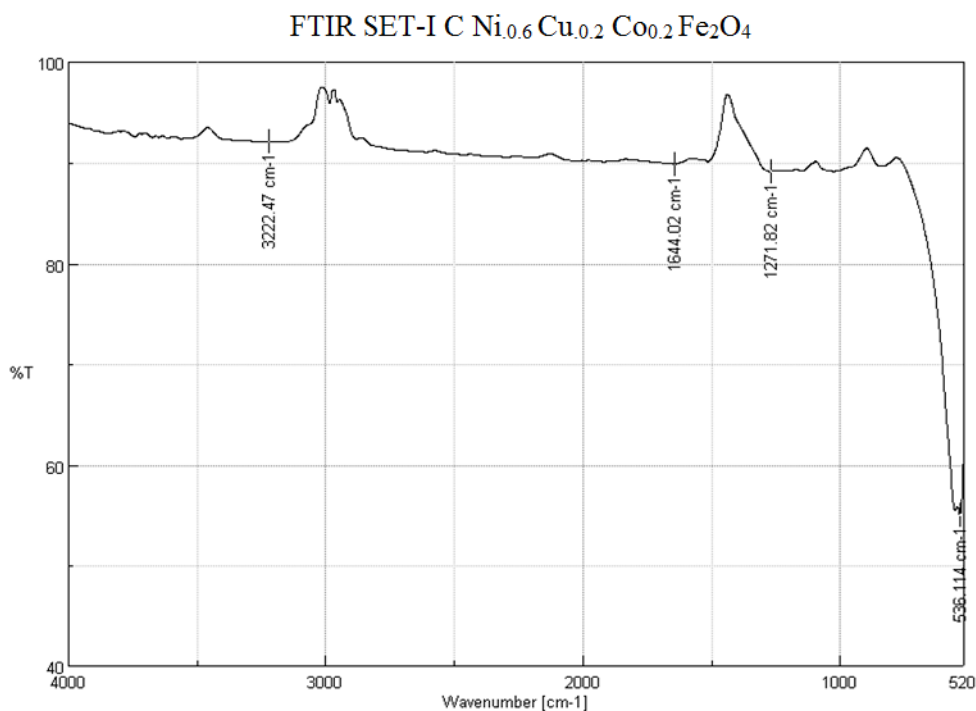


Fig.6: FT-IR spectra of $[(\text{Ni}_{0.6}\text{Cu}_{0.2}\text{Co}_{0.2})\text{Fe}_2\text{O}_4]$.

V. Conclusions

The nanocrystalline ferrite samples $[(\text{Ni}_{0.2}\text{Cu}_{0.2}\text{Co}_{0.6})\text{Fe}_2\text{O}_4]$, $[(\text{Ni}_{0.4}\text{Cu}_{0.2}\text{Co}_{0.4})\text{Fe}_2\text{O}_4]$, $[(\text{Ni}_{0.6}\text{Cu}_{0.2}\text{Co}_{0.2})\text{Fe}_2\text{O}_4]$ have been successfully prepared by sol-gel auto combustion technique. All the prepared samples show the single phase cubic spinel structure of the samples. The particle grain size obtained from X-ray diffraction data decreases with increase in Ni^{+2} substitution Cu Co. It clearly shows that the size of the ferrite particles was in the nanometer range. The particle size and nanostructure of the sample was examined by TEM. The particle size calculated from TEM was found to be in close agreement with XRD. Measurement of the dielectric constant and dielectric loss in the 100 Hz–5 MHz frequency range showed higher magnitude, at lower frequencies, decreasing with increase in frequency, essentially becoming constant above 3.5 MHz.

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Academic Collaboration and Co-operation To whomsoever it may Concern

This is to certify that *Mr. Arif Tamboli* from department of Electronic Sciences, Poona College of Arts, Science and Commerce, Camp Pune – 01 is in collaboration and association with our department from the date of signing this document for a period of FIVE (05) years.

The Collaboration is to utilise the expertise and sharing of knowledge between the entities. Dr. J M PATHAN had provided his consent to conduct the following activities with our department under the collaboration:

1. Participation in Faculty Exchange Programme
2. Participation in Student Training Programme
3. Participation in Summer Conferences / Workshops / Symposia etc.
4. Research Collaboration
5. Invited Talks

Dr. J M PATHAN

Assistant Professor

Incharge Physics Research Laboratory

Effect on and Correlation between Particle Size, Lattice Constant and AC Conductivity of Nanocrystalline spinel Ferrite Material due to substitution of Ni^{2+} , Co^{2+} and Cu^{2+} in CuCo, NiCu and CoNi Respectively Prepared by Sol Gel Auto Combustion Method

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ABSTRACT: Herein the preparation of ferrite materials by using chemical reactions such as SOL-GEL Auto Combustion Technique is explained and importance of Nanocrystalline spinel ferrite material. Structural characterization of the annealed samples at 400°C for 4 hours was done by using X-ray diffraction method (XRD). The single phase formation of $\text{NiCuCoFe}_2\text{O}_4$ was confirmed by X-ray diffraction analysis. The Fourier transform Infra Red Spectra (FT-IR) confirmed that the synthesized material is ferrite. XRD revealed that the average crystalline particle size which was calculated by using Scherer method is between 22 to 32 nm. The lattice constant is also calculated. The pellets are made from ferrite powder by using polyvinyl alcohol (PVA) as binder. The data obtained from LCR-Q meter is used for calculating Dielectric loss tangent ($\tan \delta$), Dielectric constant (ϵ) and AC Conductivity in the frequency range of 100Hz to 5MHz at room temperature. The effect on Particle size is observed due to doping of Ni^{2+} , Co^{2+} and Cu^{2+} in CuCo, NiCu and CoNi respectively. The correlation ship between the Particle size, lattice constant and AC Conductivity is explained.

KEYWORDS: Sol-gel auto-combustion, X-ray diffraction (XRD), FT-IR, LCR-Q meter.

I. INTRODUCTION

Nanocrystalline Materials have become a subject of considerable interest in last few decades and many physical studies have been devoted to them. The ability to produce nanosized due to small grain size which changes the magnetic, dielectric and resistivity properties and opened new application for materials such as magnetic data storage, strong magnetron in electronics, Ferro fluid technology, magnetically targeted drug carriers, filters in electronic communication and agents in magnetic resonance imaging.

Nano-ferrites form an important class of Nanocrystalline materials because of their low weigh, high resistivity and low energy losses (eddy current) and hence have vast technological application over wide range of frequencies

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Vol. 6, Issue 6, June 2017

[1-2]. Recent studies have shown that the physical properties of nanoparticles are influenced significantly by the processing technique [3-4]. Since crystallite size, distribution of particle sizes and inter particle spacing have the greatest impact on AC conductivity and Dielectric properties. Many wet-chemical methods are employed for the preparation of the nano-sized spinel ferrite. One of them is sol-gel auto combustion which has recently become very popular technique. It is a simple process, which offers significant saving in time and energy consumption over the traditional methods and requires a low sintering temperature. This method is used to obtain improved properties, more homogeneity and narrow particle distribution thereby influencing structural, electrical and Dielectric properties of spinel ferrite [5-7]. It is well known that, some magnetic properties such as saturation magnetization and Coercivity and some Dielectric properties such as Dielectric loss tangent ($\tan \delta$), AC electrical conductivity (σ_{ac}) and Dielectric constant (Real Part= ϵ') depend strongly on the particle size and microstructure of the materials. Therefore, it is interesting and important to develop techniques by which the size and shape of the particles can be well controlled. One of the ways to prepare the nanocrystalline spinel ferrite material with required properties is Sol-gel auto combustion technique. In the present work we have systematically studied the effect of doping of Ni^{2+} , Co^{2+} and Cu^{2+} in $CuCo$, $NiCu$ and $CoNi$ respectively on structural properties and AC conductivity of Nanocrystalline spinel ferrite material.

II. RELATED WORK

2.1. Experimental technique

The high purity AR grade ferric nitrate ($Fe(NO_3)_3 \cdot 9H_2O$), Copper nitrate ($Cu(NO_3)_2 \cdot 6H_2O$), Nickel nitrate ($Ni(NO_3)_2 \cdot 6H_2O$), Cobalt nitrate ($Co(NO_3)_2 \cdot 6H_2O$), citric acid ($C_6H_8O_7$), ammonium hydroxide solution (NH_4OH) were used to prepare $Ni_x Cu_{0.2} Co_{0.8-x} Fe_2O_4$ nanoparticles by sol-gel auto combustion synthesis technique. In this chemical process Citric acid was used as a Fuel [8-10]. These nitrates and citric acid were weighed accurately to have proper stoichiometric proportion required in the final product. The mixed solutions of all the chemicals were stirred until the homogeneous solution is obtained. During the stirring process ammonium hydroxide solution was added drop by drop to obtain pH of 7. The mixed solution was simultaneously heated at $100^\circ C$ for 3 to 4 h to form sol. The transparent sol was further heated at $100^\circ C$ for 2 h for removal of water. The sol turns into a viscous brown gel. The temperature of the gel was further increased up to $120^\circ C$, after some time combustion of the gel takes place and fine powder of ferrite nanoparticles was obtained. The ferrite powder was sintered at $400^\circ C$ for 4 hours in air medium to get better crystallization and homogeneous distribution in the spinel and finally ground to get $[(Ni_{0.2} Cu_{0.2} Co_{0.6})Fe_2O_4]$, $[(Ni_{0.4} Cu_{0.2} Co_{0.4})Fe_2O_4]$, $[(Ni_{0.6} Cu_{0.2} Co_{0.2})Fe_2O_4]$, $[(Ni_{0.2} Cu_{0.6} Co_{0.2})Fe_2O_4]$, $[(Ni_{0.2} Cu_{0.4} Co_{0.4})Fe_2O_4]$ and $[(Ni_{0.4} Cu_{0.4} Co_{0.2})Fe_2O_4]$ ferrite powders. **Table 1** indicates Label and composition of ferrite materials for all six fractions divided in to three Sets.

The elemental stoichiometric coefficient, ϕ_e , is used to control the ratio of fuel to oxidizer in the reaction. ϕ_e represents the ratio between the oxidizing and reducing components of the metal nitrate fuel mixture. When ϕ_e is less than one ($\phi_e < 1$) it is fuel rich and when ϕ_e is greater than one ($\phi_e > 1$), the mixture does not have enough fuel for the completion of reaction. **Fig. 1** shows the flow chart of auto combustion synthesis used for the preparation of the ferrite powders and pellet.

2.2. Perpetration and Sintering of pellets

The pellets are prepared by mixing the polyvinyl alcohol (PVA) as binder in to ferrite powder. The mixed powder was uniaxially pressed by using a hydraulic press machine by applying the pressure of about 60 kg/cm^3 for about 1 minute in a die of 10mm diameter. The final sintering of pellets was carried out at $200^\circ C$ for about 2 hours in air medium to densify the pellets. The pellets of diameter D_0 -10 mm, thickness-2 mm are fabricated. The prepared samples of pellets were sintered in a furnace which uses electricity for heating the chamber with the help of super kanthal ($MoSi_2$) heating elements and alumina insulation boards as chamber walls. The dimension of chamber is $250 \times 150 \times 150 \text{ mm}$. The thermal regime of the furnace was controlled through a "Eurotherm" programmer-cum-controller designed by using microcontroller with an accuracy of $\pm 2^\circ C$. The compacted samples heated from room temperature to $200^\circ C$ at a rate $1^\circ C/\text{min}$ followed by a soaking at $200^\circ C$ for 2 hours for binder burnout.

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Vol. 6, Issue 6, June 2017

2.3. Characterization of AC conductivity (σ_{ac})

The AC conductivity (σ_{ac}) of prepared samples was measured in the frequency range of 100 Hz to 5 MHz by using impedance analyser (LCR-Q Meter) meter at room temperature. The data acquisition system of digital impedance analyser (LCR-Q meter) provides the information of applied frequency (f), measured Series Capacitance (Cs), Parallel Capacitance (Cp), Quality factor (Q).

The data provided by digital impedance analyser meter and by using the thickness of pellet, $d=0.002$ meter, Diameter of pellet= 10 millimetre the Area of pellet = $\pi r^2 = 3.14 \times 0.005^2 = 0.0000785$ meter² is calculated and it is used for calculations of AC Conductivity (σ_{ac}) after calculating real part of dielectric constant (ϵ'), dielectric loss tangent ($\tan \delta$). Following equations are used

$$\text{Dielectric loss tangent} = (\tan \delta) = 1/Q = \epsilon'' / \epsilon' - (1)$$

$$\text{Dielectric constant (Real Part)} = \epsilon' = C_p \cdot d / \epsilon_0 \cdot A - (2)$$

$$\text{Dielectric constant (Imaginary Part)} = \epsilon'' = (\tan \delta) \cdot \epsilon' - (3)$$

$$\text{AC electrical conductivity} = \sigma_{ac} = 2\pi f \cdot \epsilon_0 \cdot \epsilon' \cdot (\tan \delta) = \omega \cdot \epsilon_0 \cdot \epsilon' \cdot (\tan \delta) - (4)$$

$$\text{Lattices Constant (\AA)} \text{ is calculated by using the formula } \frac{1}{d^2} = \frac{1}{a^2 \times (h^2 + k^2 + l^2)} - (5)$$

Table 2 shows average AC Conductivity for all six samples ferrite material calculated in the frequency range of 100Hz to 5MHz at room temperature.

III. RESULTS AND DISCUSSION

3.1. X-ray diffraction pattern

Fig. 2 shows the X-ray diffraction pattern of SET-II (D, E & A), $\text{Ni}_{0.2}\text{Cu}_{0.8-x}\text{Co}_x\text{Fe}_2\text{O}_4$ for $x = 0.2, 0.4$ and 0.6 . All the compositions exhibit single phase cubic spinel structure with Fd_{3m} space group and exclude the presence of any secondary phase. All the reflections are slightly broader and less intense which indicate the nanocrystalline nature of the samples. The analysis of X-ray diffraction pattern revealed that all the samples under investigation possess single phase cubic spinel structure. Using the XRD data, the interplaner spacing 'd' values for all the reflections were determined using Bragg's law. The values of Particle size and lattice constant obtained from XRD data for all samples A to F of ferrite materials are given in **Table 3**.

3.2. Effect of Ni^{2+} substitution on Lattice constant and Particle size

In Set-I, It is observed that due to the concentration of Ni^{2+} ions in place of Co^{2+} ions the Bragg's angle shifts towards higher angle and thereby interplaner spacing 'd' values decreases. The lattice constant is found to decrease with increase in Ni^{2+} concentration x. The variations in lattice constant as a function of Nickel concentration x can be understood on the basis of the ionic radius of the substituted cations. Since the ionic radius of Ni^{2+} ions (0.69\AA) is less than that of Co^{2+} ions (0.72\AA), the substitution is expected to decrease the lattice constant with increase in Ni^{2+} concentration x. When the smaller nickel ions enters the lattice unit cell expands while preserving overall symmetry this is true as long as the lattice constant decreases with substituent concentration. The values of Particle size and lattice constant obtained from XRD data by varying Ni^{2+} doping are given in Table 4. It can be seen from **Table 4**, that, the lattice constant decreases with Ni^{2+} doping and obeys Vegard's law [11-14]. The Particle size also decreases with Ni^{2+} doping. **Fig 3** and **Fig 4** show the correlation between Particle Size and Average AC Conductivity due to doping of Ni^{+2} respectively. **Fig 5** and **Fig 6** show the correlation between Lattice Constant and Average AC Conductivity due to doping of Ni^{+2} respectively.

3.3. Effect of Co^{2+} substitution on Lattice constant and Particle size

In Set-II, It is observed that due to the inclusion of Co^{2+} ions in place of Cu^{2+} ions the Bragg's angle shifts towards lower angle and thereby interplaner spacing 'd' values increases. The lattice constant is found to increase with

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 6, June 2017

increase in Co^{2+} concentration x . The variations in lattice constant as a function of Cobalt ions concentration x can be understood on the basis of the ionic radius of the substituted cations. Since the ionic radius of Co^{2+} ions (0.745\AA) is greater than that of Cu^{2+} ions (0.73\AA), the substitution is expected to increase the lattice constant with increase in Cobalt doping x [15-17]. The values of Particle size and lattice constant obtained from XRD data by varying Co^{2+} ions doping are given in Table 5. Fig 7 and Fig 8 show the correlation between Particle Size and Average AC Conductivity due to doping of Co^{2+} respectively. Fig 9 and Fig 10 show the correlation between Lattice Constant and Average AC Conductivity due to doping of Co^{2+} respectively.

When the larger Cobalt ions enters, the lattice unit cell expands while preserving overall symmetry this is true as long as the lattice constant increases with substituent concentration of Cobalt [18-19].

3.4. Effect of Cu^{2+} substitution on Lattice constant and Particle size

In Set – III, It is observed that due to the inclusion of Cu^{2+} ions in place of Ni^{2+} ions, from 0.2 to 0.4 the Bragg's angle shifts towards lower angle and thereby interplaner spacing 'd' values increases. The Lattice constant and Particle size is found to increase with increase in Cu^{2+} doping from 0.2 to 0.4. The Lattice constant and Particle size is found to decrease for further doping of Cu^{2+} from 0.4 to 0.6, x .

The variations in lattice constant as a function of Copper concentration x can be understood on the basis of the ionic radius of the substituted cations. Since the ionic radius of Cu^{2+} ions (0.73\AA) is greater than that of Ni^{2+} ions (0.69\AA), the substitution is expected to increase the lattice constant with increase in Copper concentration x [20-22]. When the larger Copper ions enter, the lattice unit cell expands while preserving overall symmetry this is true as long as the lattice constant increases with substituent concentration of Copper. The values of Particle size and lattice constant obtained from XRD data by varying Cu^{2+} ions doping are given in Table 6. Fig 11 and Fig 13 show the correlation between Particle Size and Lattice Constant due to doping of Cu^{2+} ions.

3.5. AC conductivity (σ) at different concentration of Ni^{2+} ions (A, B and C)

The AC conductivity of all ferrite samples due to Ni^{2+} ions doping is calculated in the frequency range of 100 Hz to 5 MHz and average of AC conductivity if each sample is taken in to consideration for plotting the graph of Ni^{2+} ions doping ($x=0.2, 0.4$ & 0.6) verses average AC conductivity. From Fig. 4 it is observed that average AC conductivity decreases with increase of Ni^{2+} ions doping.

With the increase in the concentration of Ni^{2+} ions (x), the hopping action of charge carriers decreases due to the decreased concentration of Fe^{3+} ions at B-site. It is observed that Lattice constant, particle size and AC conductivity decreases with Ni^{2+} doping ($x=0.2, 0.4$ & 0.6). Table 7 shows the average AC conductivity of ferrite samples A, B & C.

3.6. AC conductivity (σ) at different concentration of Co^{2+} ions (D, E and A)

The AC conductivity of all ferrite samples due to Co^{2+} doping is calculated in the frequency range of 100 Hz to 5 MHz and average of AC conductivity if each sample is taken in to consideration for plotting the graph of Co^{2+} doping ($x=0.2, 0.4$ & 0.6) verses average AC conductivity. From Fig. 8 it is observed that average AC conductivity increases with increase of Co^{2+} doping from 0.2 to 0.4 and thereafter AC conductivity decreases with increase of Co^{2+} doping from 0.4 to 0.6.

The decrease in AC conductivity may be due to effect of skin depth and decreases value of Cu^{2+} ions in SET-II. Table 8 shows the average AC conductivity of ferrite samples D, E & A.

3.7. AC conductivity (σ) at different concentration of Cu^{2+} ions (C, F and D)

The AC conductivity of all ferrite samples due to Cu^{2+} ions doping is calculated in the frequency range of 100 Hz to 5 MHz and average of AC conductivity if each sample is taken in to consideration for plotting the

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 6, June 2017

graph of Cu^{2+} ions doping ($x=0.2, 0.4$ & 0.6) verses average AC conductivity. From **Fig. 14** it is observed that average AC conductivity increases with increase of Cu^{2+} ions doping.

With the increase in the concentration of Cu^{2+} ions (x), the hopping action of charge carriers increases due to the increased concentration of Fe^{3+} ions at B-site.

It is well known that the mechanism of the electrical conduction is the same as that of the dielectric polarization [23-24]. **Table 9** shows the average AC conductivity of ferrite samples C, F & D.

The FTIR spectroscopy confirms the single phase nature of the prepared sample. The peak 536.114 cm^{-1} gives the confirmation of Fe_2O_4 . Fig. 8 shows the IR absorption peak at 536.114 cm^{-1} .

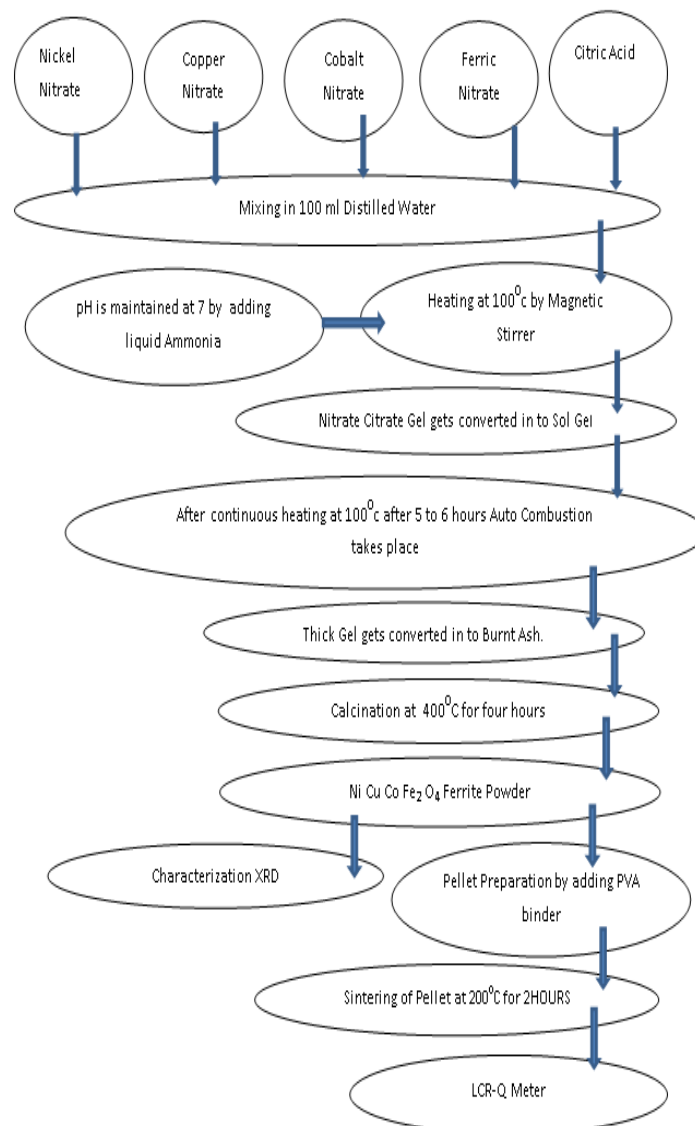


Fig.1: Flow Chart of SOL GEL for Ferrite Material and Pellet fabrication

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 6, June 2017

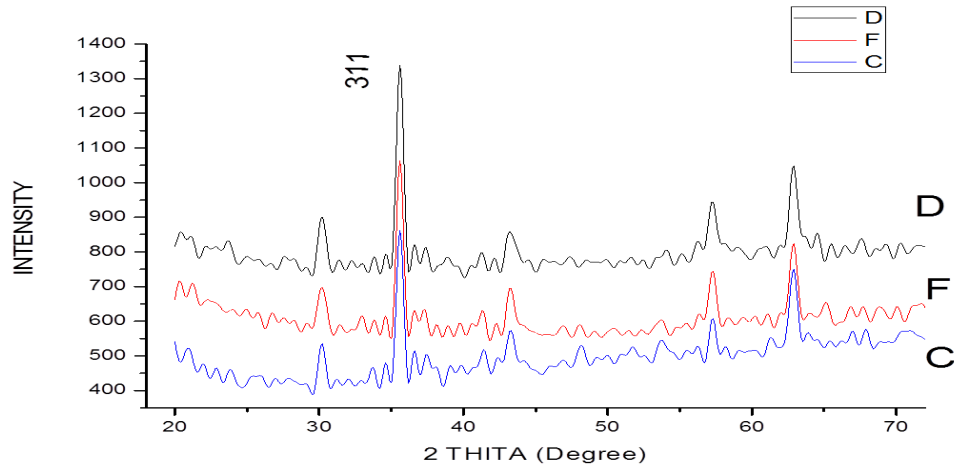


Fig. 2 XRD Pattern of SET-II ferrite samples.

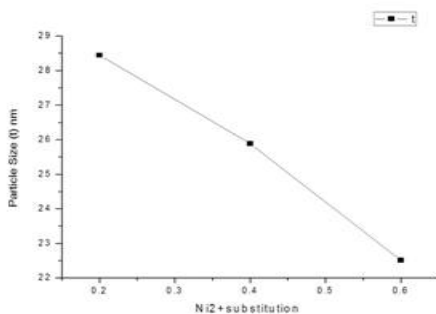


Fig. 3: Ni²⁺ doping verses particle size.

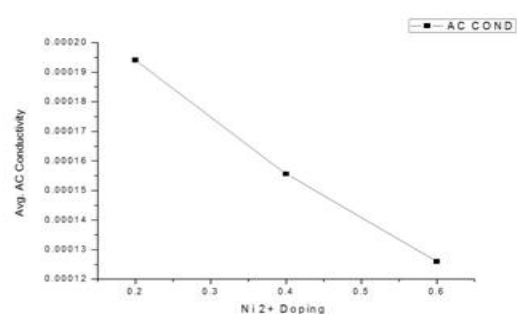
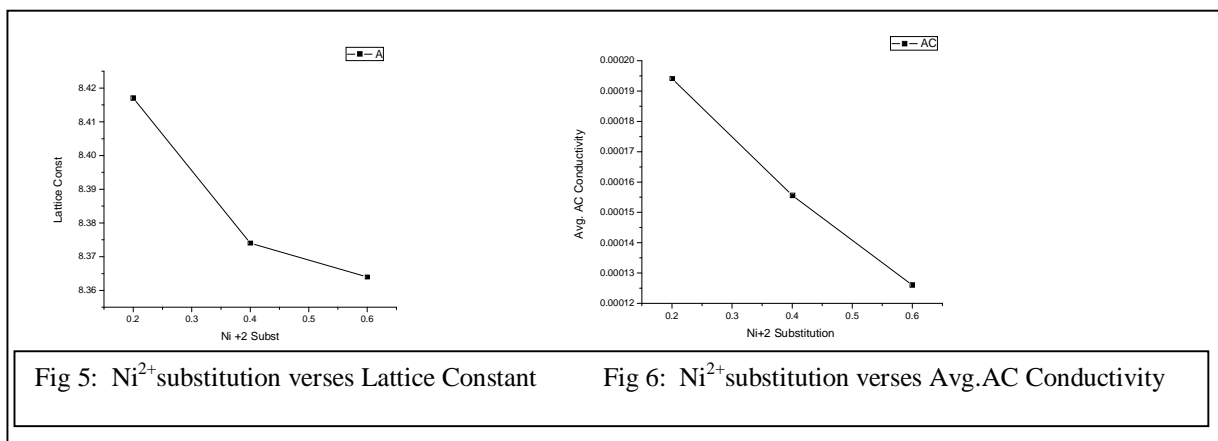


Fig. 4: Ni²⁺ doping verses Avg. AC Conductivity.



International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 6, June 2017

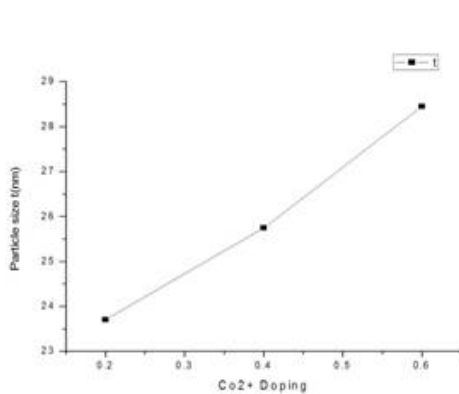


Fig. 7: Co²⁺ doping versus particle size.

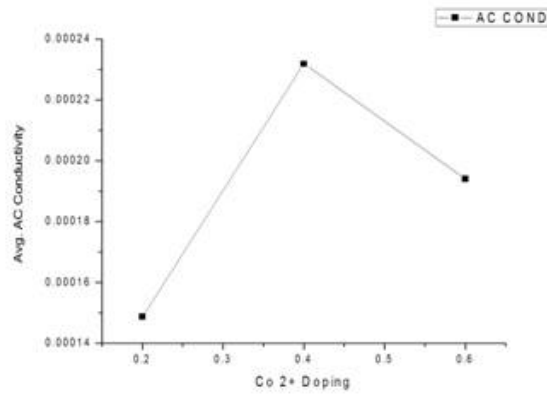


Fig. 8: Co²⁺ doping versus Avg. AC conductivity.

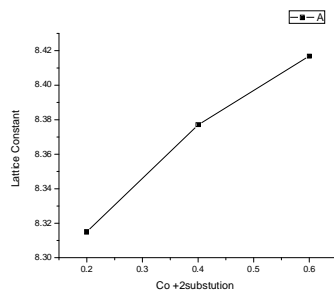


Fig 9: Co²⁺ substitution versus Lattice Constant

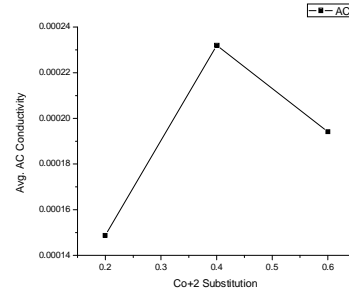


Fig 10: Co²⁺ substitution versus Avg. AC Conductivity

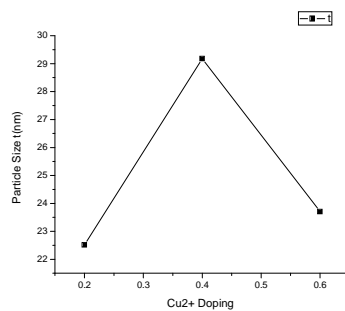


Fig 11: Cu²⁺ substitution versus Particle Size.

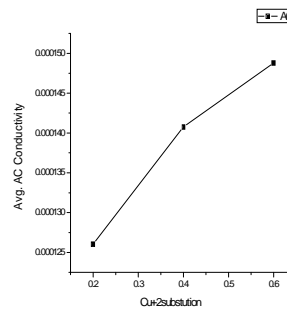


Fig 12: Cu²⁺ substitution versus Avg. AC Conductivity

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

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Vol. 6, Issue 6, June 2017

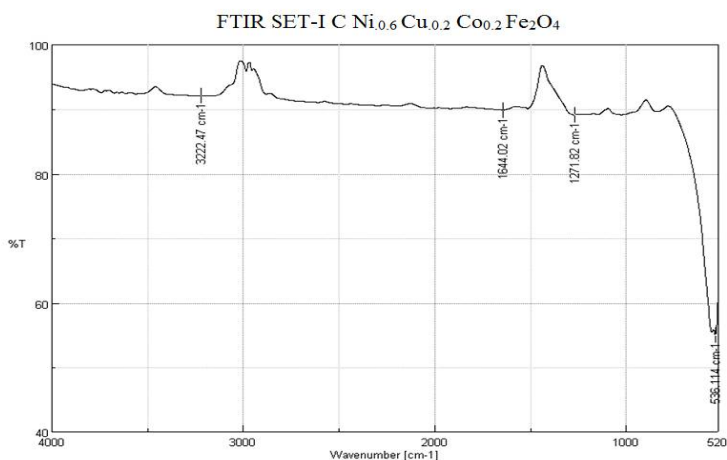
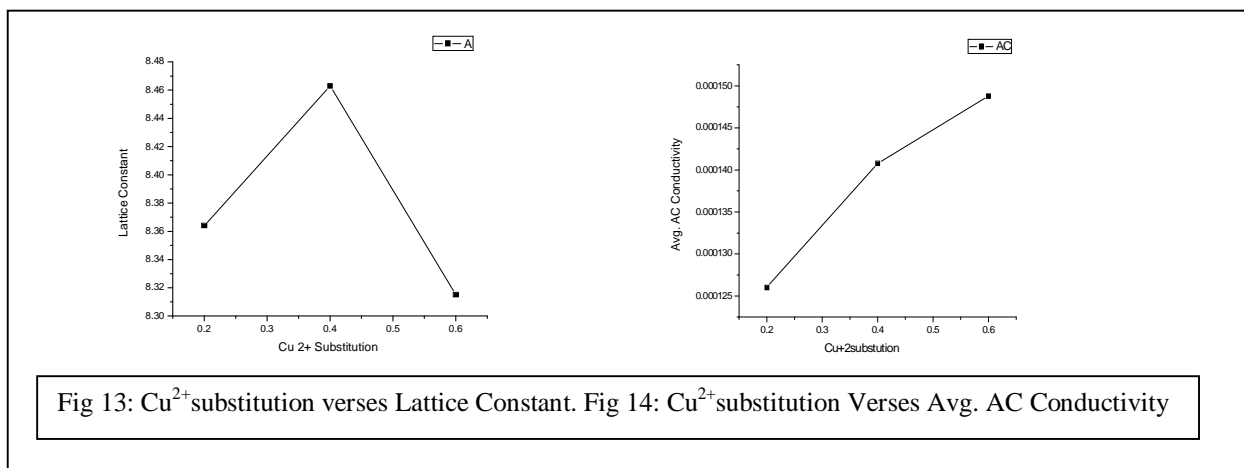


Fig 15: FTIR graph for SET-I (C)

Table 1: Label and Composition of Ferrite Material.

SET	Label	Ferrite Material
SET-I	A	$[(\text{Ni}_{0.2}\text{Cu}_{0.2}\text{Co}_{0.6})\text{Fe}_2\text{O}_4]$
	B	$[(\text{Ni}_{0.4}\text{Cu}_{0.2}\text{Co}_{0.4})\text{Fe}_2\text{O}_4]$
	C	$[(\text{Ni}_{0.6}\text{Cu}_{0.2}\text{Co}_{0.2})\text{Fe}_2\text{O}_4]$
SET-II	D	$[(\text{Ni}_{0.2}\text{Cu}_{0.6}\text{Co}_{0.2})\text{Fe}_2\text{O}_4]$
	E	$[(\text{Ni}_{0.2}\text{Cu}_{0.4}\text{Co}_{0.4})\text{Fe}_2\text{O}_4]$
	A	$[(\text{Ni}_{0.2}\text{Cu}_{0.2}\text{Co}_{0.6})\text{Fe}_2\text{O}_4]$
SET-III	C	$[(\text{Ni}_{0.6}\text{Cu}_{0.2}\text{Co}_{0.2})\text{Fe}_2\text{O}_4]$
	F	$[(\text{Ni}_{0.4}\text{Cu}_{0.4}\text{Co}_{0.2})\text{Fe}_2\text{O}_4]$
	D	$[(\text{Ni}_{0.2}\text{Cu}_{0.6}\text{Co}_{0.2})\text{Fe}_2\text{O}_4]$

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 6, June 2017

Table 2: Average AC Conductivity of Ferrite Samples (A to F).

Ferrite Material	Avg. AC Conductivity
SET-I- A [(Ni _{0.2} Cu _{0.2} Co _{0.6})Fe ₂ O ₄]	0.000194143
SET-I- B [(Ni _{0.4} Cu _{0.2} Co _{0.4})Fe ₂ O ₄]	0.000155638
SET-I- C [(Ni _{0.6} Cu _{0.2} Co _{0.2})Fe ₂ O ₄]	0.000126047
SET-II- D [(Ni _{0.2} Cu _{0.6} Co _{0.2})Fe ₂ O ₄]	0.000148797
SET-II- E [(Ni _{0.2} Cu _{0.4} Co _{0.4})Fe ₂ O ₄]	0.000231988
SET-III- F [(Ni _{0.4} Cu _{0.4} Co _{0.2})Fe ₂ O ₄]	0.000140762

Table 3: Particle Size and Lattice Constant of Ferrite Samples(A to F).

Ferrite Sample	Particle Size t (nm)	Lattices Constant (Å)
SET-I- A [(Ni _{0.2} Cu _{0.2} Co _{0.6})Fe ₂ O ₄]	28.45	8.417
SET-I- B [(Ni _{0.4} Cu _{0.2} Co _{0.4})Fe ₂ O ₄]	25.89	8.374
SET-I- C [(Ni _{0.6} Cu _{0.2} Co _{0.2})Fe ₂ O ₄]	22.52	8.364
SET-II- D [(Ni _{0.2} Cu _{0.6} Co _{0.2})Fe ₂ O ₄]	23.71	8.315
SET-II- E [(Ni _{0.2} Cu _{0.4} Co _{0.4})Fe ₂ O ₄]	25.75	8.377
SET-III- F [(Ni _{0.4} Cu _{0.4} Co _{0.2})Fe ₂ O ₄]	29.18	8.463

Table 4: Particle Size and Lattice Constant due to Ni²⁺ doping for SET-I Ferrite Samples.

Ferrite Sample	Particle Size t (nm)	Lattices Constant (Å)
SET-I- A [(Ni _{0.2} Cu _{0.2} Co _{0.6})Fe ₂ O ₄]	28.45	8.417
SET-I- B [(Ni _{0.4} Cu _{0.2} Co _{0.4})Fe ₂ O ₄]	25.89	8.374
SET-I- C [(Ni _{0.6} Cu _{0.2} Co _{0.2})Fe ₂ O ₄]	22.52	8.364

Table 5: Particle Size and Lattice Constant due to Co²⁺ doping for SET-II Ferrite Samples.

Ferrite Sample	Particle Size t (nm)	Lattices Constant (Å)
SET-II- D [(Ni _{0.2} Cu _{0.6} Co _{0.2})Fe ₂ O ₄]	23.71	8.315
SET-II- E [(Ni _{0.2} Cu _{0.4} Co _{0.4})Fe ₂ O ₄]	25.75	8.377
SET-I- A [(Ni _{0.2} Cu _{0.2} Co _{0.6})Fe ₂ O ₄]	28.45	8.417

Table 6: Particle Size and Lattice Constant due to Cu²⁺ doping for SET-III Ferrite Samples.

Ferrite Sample	Particle Size t (nm)	Lattices Constant (Å)
SET-I- C [(Ni _{0.6} Cu _{0.2} Co _{0.2})Fe ₂ O ₄]	22.52	8.364
SET-III- F [(Ni _{0.4} Cu _{0.4} Co _{0.2})Fe ₂ O ₄]	29.18	8.463
SET-II- D [(Ni _{0.2} Cu _{0.6} Co _{0.2})Fe ₂ O ₄]	23.71	8.315

Table 7: Average AC Conductivity of SET-I.

[Ni _x Cu(constant)Co _{0.8-x} Fe ₂ O ₄], Cu=constant=0.2	
x	Avg. AC Conductivity
(A) For x=0.2	0.000194143
(B) For x=0.4	0.000155638
(C) For x=0.6	0.000126047

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 6, June 2017

Table 8: Average AC Conductivity of SET-II.

[(Ni _(constant) Cu _{0.8-x} Co _x)Fe ₂ O ₄] , Ni =constant=0.2	
x	Avg. AC Conductivity
(D) For x=0.2	0.000148797
(E) For x=0.4	0.000231988
(A) For x=0.6	0.000194143

Table 9: Average AC Conductivity of SET-III.

[(Ni _{0.8-x} Cu _x Co _(constant))Fe ₂ O ₄], Co = constant = 0.2	
x	Avg. AC Conductivity
(C) For x=0.2	0.000126047
(F) For x=0.4	0.000140762
(D) For x=0.6	0.000148797

IV. CONCLUSION

We have successfully prepared six different types of Nanocrystalline Ferrite materials by successfully implementing Sol Gel Auto combustion method. All ferrite materials are having particle size in nanometer range and exhibit good AC conductivity. Ferrite materials can use as core in transformer as well as fabricating antenna and as dielectric material in capacitors.

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Date: 17 – 06 – 2016

Academic Collaboration and Co-operation To whomsoever it may Concern

This is to certify that *Mr. Arif Tamboli* from department of Electronic Sciences, Poona College of Arts, Science and Commerce, Camp Pune – 01 is in collaboration and association with our department from the date of signing this document for a period of FIVE (05) years.

The Collaboration is to utilise the expertise and sharing of knowledge between the entities. Dr. J M PATHAN had provided his consent to conduct the following activities with our department under the collaboration:

1. Participation in Faculty Exchange Programme
2. Participation in Student Training Programme
3. Participation in Summer Conferences / Workshops / Symposia etc.
4. Research Collaboration
5. Invited Talks

Dr. J M PATHAN

Assistant Professor

Incharge Physics Research Laboratory

Correlation between Lattice Constant, Bulk Density and Dielectric Loss of Nanocrystalline spinel Ferrite Material due to Doping Effect of Ni^{2+} , Co^{2+} and Cu^{2+} in CuCo, NiCu and CoNi respectively using Sol Gel Method.

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Aurangabad, Maharashtra, India⁴.

ABSTRACT: The preparation of ferrite materials by using SOL-GEL Auto Combustion Technique is explained and importance of Nanocrystalline spinel ferrite material. Structural characterization of the annealed samples of ferrite material at 400°C for 4 hours is done by using X-ray diffraction method (XRD). The single phase formation of $\text{NiCuCoFe}_2\text{O}_4$ ferrite material is confirmed by X-ray diffraction analysis by using Braggs Law. XRD revealed that the average crystalline particle size which was calculated by using Scherer method is between 20 to 30 nm. The lattice constant is calculated by using proper formula. The pellets of ferrite material are made by adding polyvinyl alcohol (PVA) as binder in powder of ferrite material. Impedance meter, LCR-Q meter is used to calculate the Dielectric Loss in the frequency range of 100 Hz to 5 MHz at room temperature. The change in Lattice constant is observed due to doping of Ni^{2+} , Co^{2+} and Cu^{2+} in CuCo, NiCu and CoNi respectively. The correlation ship between the Lattice constant, Bulk Density and Dielectric Loss ($\tan \delta$) of Nanocrystalline spinel Ferrite Material is discussed.

KEYWORDS: Sol-gel auto-combustion, X-ray diffraction (XRD), LCR-Q Meter.

I. INTRODUCTION

The properties of material changes at nanoscale and certain properties such as physical, electric, Magnetic and Dielectric properties of Nanocrystalline ferrite Material change drastically at nano scale. The ability to produce nanosized due to small grain size which changes the physical, electric, Magnetic, Dielectric and resistivity properties of Nanocrystalline ferrite Material opened new application for materials such as Electromagnetic wave absorber, magnetic data storage, strong in electronic appliance, Ferro fluid technology, gas sensors, magnetically targeted drug carriers, filters in electronic communication and agents in magnetic resonance imaging.

The Nanocrystalline ferrite Material is form an important class of Nanocrystalline materials because of their low weigh, high resistivity, long life, low cost of preparation and low energy losses (eddy current). It plays important

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Vol. 6, Issue 7, July 2017

role in technological application over wide range of frequencies [1-3]. Recent studies have shown that the physical properties of nanoparticles are influenced significantly by the processing technique [4-6]. Since crystallite size, distribution of particle sizes and inter particle spacing have the greatest impact on Dielectric properties such as Dielectric loss and AC Conductivity. Many wet-chemical methods are employed for the preparation of the nano-sized spinel ferrite. One of them is sol-gel auto combustion which has recently become very popular technique. It is a simple process, which offers significant saving in time, electricity and Money as compare to other traditional methods and it also requires a low sintering temperature. Sol gel method is used to obtain better physical properties, more homogeneity and narrow particle size distribution thereby influencing structural, electrical and Dielectric properties of Nanocrystalline ferrite Material [7-9]. It is well known that, some magnetic properties such as saturation magnetization and Coercivity and some Dielectric properties such as Dielectric loss tangent ($\tan \delta$), AC electrical conductivity (σ_{ac}) and Dielectric constant (Real Part= ϵ') depend strongly on Lattice constant, Bulk Density, particle size and microstructure of the materials. Therefore, it is interesting and important thing to develop the various techniques by which the size and shape of the particles can be well controlled. One of the ways to prepare the nanocrystalline spinel ferrite material with required properties is Sol-gel auto combustion technique. In the present work we have systematically studied the effect of doping of Ni^{2+} , Co^{2+} and Cu^{2+} in CuCo, NiCu and CoNi respectively on Lattice Constant, Bulk Density and Dielectric Loss($\tan \delta$) of Nanocrystalline spinel Ferrite Material.

II. RELATED WORK

2.1. Experimental technique

In sol-gel auto combustion synthesis technique, high purity AR grade chemicals such as ferric nitrate ($Fe(NO_3)_3 \cdot 9H_2O$), Copper nitrate ($Cu(NO_3)_2 \cdot 6H_2O$), Nickel nitrate ($Ni(NO_3)_2 \cdot 6H_2O$), Cobalt nitrate ($Co(NO_3)_2 \cdot 6H_2O$), citric acid ($C_6H_8O_7$), ammonium hydroxide solution (NH_4OH) were used to prepare the series of $[(Ni_{0.2} Cu_{0.2} Co_{0.6})Fe_2O_4]$, $[(Ni_{0.4} Cu_{0.2} Co_{0.4})Fe_2O_4]$, $[(Ni_{0.6} Cu_{0.2} Co_{0.2})Fe_2O_4]$, $[(Ni_{0.2} Cu_{0.6} Co_{0.2})Fe_2O_4]$, $[(Ni_{0.2} Cu_{0.4} Co_{0.4})Fe_2O_4]$ and $[(Ni_{0.4} Cu_{0.4} Co_{0.2})Fe_2O_4]$ Nano crystalline ferrite materials. In this chemical process Citric acid was used as a Fuel [8-10]. These nitrates and citric acid were weighed accurately to have proper stoichiometric proportion required in the final product. The mixed solutions of all the chemicals were stirred until the homogeneous solution is obtained. During the stirring process ammonium hydroxide solution was added drop by drop to obtain pH of 7. The mixed solution was simultaneously heated at $100^\circ C$ for 3 to 4 h to form sol. The transparent sol was further heated at $100^\circ C$ for 2 h for removal of water. The sol turns into a viscous brown gel. The temperature of the gel was further increased up to $120^\circ C$, after some time combustion of the gel takes place and fine powder of ferrite nanoparticles was obtained. The ferrite powder was sintered at $400^\circ C$ for 4 hours in air medium to get better crystallization and homogeneous distribution in the spinel and finally ground to get the series of Nano crystalline ferrite material. Table 1 indicates Label and composition for the series of ferrite materials of all six reactions which is divided in to three Sets. Table 2 indicates the values of Lattice Constant, Bulk Density and Dielectric Loss ($\tan \delta$) of all six Nanocrystalline spinel Ferrite Material prepared by Sol Gel Method. Fig. 1 shows the Sol gel auto combustion synthesis used for the preparation of the ferrite powders.

2.2. Perpetration and Sintering of pellets

The pellets are prepared by mixing the polyvinyl alcohol (PVA) as binder in to ferrite powder. The mixed powder was uniaxially pressed by using a hydraulic press machine by applying the pressure of about 60 kg/cm^3 for about 1 minute in a die of 10mm diameter. The final sintering of pellets was carried out at $200^\circ C$ for about 2 hours in air medium to densify the pellets. The pellets of diameter D_0 -10 mm, thickness-2 mm are fabricated. The prepared samples of pellets were sintered in a furnace which uses electricity for heating the chamber with the help of super kanthal ($MoSi_2$) heating elements and alumina insulation boards as chamber walls. The dimension of chamber is $250 \times 150 \times 150 \text{ mm}$. The thermal regime of the furnace was controlled through a "Eurotherm" programmer-cum-controller designed by using microcontroller with an accuracy of $\pm 2^\circ C$. The compacted samples heated from room

International Journal of Innovative Research in Science, Engineering and Technology

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Vol. 6, Issue 7, July 2017

temperature to 200°C at a rate 1°C/min followed by a soaking at 200°C for 2 hours for binder burnout.

2.3. Characterization of Lattice constant, Bulk Density and Dielectric Loss

Using the XRD data, the interplaner spacing 'd' values for all the reflections were determined using Bragg's law. The bulk density of all nanocrystalline spinel ferrite material is measured by using Archimedes principle [10-11].

Lattices Constant (Å) is calculated by using the formula $\frac{1}{d^2} = \frac{1}{a^2 \times (h^2 + k^2 + l^2)}$ – (1)

The Dielectric Loss of prepared samples was measured in the frequency range of 100 Hz to 5 MHz by using impedance analyser (LCR-Q Meter) meter at room temperature. The data acquisition system of digital impedance analyser (LCR-Q meter) provides the information of applied frequency (f), and Quality factor (Q).

Dielectric loss tangent= (tan δ) = 1/Q – (2)

III. RESULTS AND DISCUSSION

3.1. X-ray diffraction pattern

Fig. 2 shows the X-ray diffraction pattern of A, B, C, D & F. Its compositions exhibit single phase cubic spinel structure with $Fd\bar{3}m$ space group and there is not presence of any secondary phase. All the reflections are slightly broader and less intense which indicate the nanocrystalline nature of the samples. The analysis of X-ray diffraction pattern revealed that all the samples under investigation possess single phase cubic spinel structure.

3.2. Effect of Ni^{2+} substitution on Lattice Constant, Bulk Density and Dielectric Loss (tan δ).

Due to the doping of Ni^{2+} ions in place of Co^{2+} ions, it is observe that Bragg's angle shifts towards higher angle and thereby interplaner spacing 'd' values decreases. It is observe that lattice constant decreases with increase in Ni^{2+} doping from x=0.2 to x=0.6. The variations in lattice constant as a function of Nickel concentration x can be understood on the basis of the ionic radius of doped cations. The ionic radius of Ni^{2+} ions (0.69Å) is less than that of Co^{2+} ions (0.72Å) therefore due to effect of doping the lattice constant expected to decrease with increase in Ni^{2+} concentration of doping. When the smaller nickel ions enters the lattice unit cell expands while preserving overall symmetry this is true as long as the lattice constant decreases with doping concentration of Ni^{2+} and obeys Vegard's law [12-16]. Fig 3 shows the decrease in the value of Lattice constant with the increase in Ni^{2+} concentration of doping. From Fig. 5 it is observed that due to increase of Ni^{2+} doping from 0.2 to 0.4 Bulk Density decreases and thereafter Bulk Density increases with further increase in doping of Ni^{2+} ions from 0.4 to 0.6. The

The average Dielectric Loss (tan δ) all ferrite samples due to Ni^{2+} doping is calculated in the frequency range of 100 Hz to 5 MHz. From Fig. 4 it is observed that due to increase of Ni^{2+} doping from 0.2 to 0.6, average Dielectric Loss (tan δ) decreases. Fig 3 and Fig 4 show the correlation between lattice constant and average Dielectric Loss (tan δ), both decreases with increase of Ni^{2+} ions doping from 0.2 to 0.6.

Table 3 indicates the values of Lattice Constant, Bulk Density and Dielectric Loss (tan δ) of Nanocrystalline spinel Ferrite Material in SET-I, namely A, B and C.

The properties of Dielectric material are it is insulator and it gets charged when it is placed under the influence of electric field [17-19]. The decrease in Dielectric Loss (tan δ) may be due to Vander walls equation effect. The increase in the concentration of Ni^{2+} ions at octahedral (B) site causes the migration of Fe^{3+} ions to tetrahedral (A) site.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

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Vol. 6, Issue 7, July 2017

This increased concentration of Fe^{3+} ions increases the hopping rate of electrons between Fe^{3+} and Fe^{2+} ions at tetrahedral (A) site and thus leads to decrease the Dielectric Loss ($\tan \delta$).

3.3. Effect of Co^{2+} substitution on Lattice Constant, Bulk Density and Dielectric Loss ($\tan \delta$).

It is observed that due to the inclusion of Co^{2+} ions in place of Cu^{2+} ions the Bragg's angle shifts towards lower angle and lattice constant found to increase with increase in Co^{2+} ions doping from $x=0.2$ to 0.6 . The variations in lattice constant as a function of Cobalt ions doping concentration x can be understood on the basis of the ionic radius of the doped cations. The ionic radius of Co^{2+} ions (0.745\AA) is greater than that of Cu^{2+} ions (0.73\AA), therefore it is expected to increase the lattice constant with increase in Cobalt doping x [20-22]. When the larger Cobalt ions enters, the lattice unit cell expands while preserving overall symmetry this is true as long as the lattice constant increases with substituent concentration of Cobalt [23-24].

Fig 6 shows the increase in the value of Lattice constant with the increase in doping concentration of Co^{2+} . Fig 7 it is observe that Bulk Density increases with the increase in doping concentration of Co^{2+} from $x=0.2$ to $x=0.6$. From Fig. 8 it is observed that due to increase of Co^{2+} doping from 0.2 to 0.4 average Dielectric Loss ($\tan \delta$) increases and thereafter average Dielectric Loss ($\tan \delta$) decreases with further increase in doping of Co^{2+} ions from 0.4 to 0.6 .

Fig 6 and Fig 7 show the correlation between lattice constant and Bulk density, both increases with the increase of Co^{2+} ions doping from 0.2 to 0.6 . Table 4 indicates the values of Lattice Constant, Bulk Density and Dielectric Loss ($\tan \delta$) of Nanocrystalline spinel Ferrite Material in SET-II, namely D, E and A.

3.4. Effect of Cu^{2+} substitution on Lattice Constant, Bulk Density and Dielectric Loss ($\tan \delta$).

It is observed that Lattice constant gets affected due to the doping of Cu^{2+} ions in place of Ni^{2+} ions. Due to doping of Cu^{2+} ions from 0.2 to 0.4 the Bragg's angle shifts towards lower angle and Lattice constant is found to increase with increase in Cu^{2+} doping from 0.2 to 0.4 . But due to further doping of Cu^{2+} from $x=0.4$ to $x=0.6$ Bragg's angle shifts towards higher angle which causes to decrease the Lattice constant.

The variations in lattice constant as a function of Copper concentration x can be understood on the basis of the ionic radius of the substituted cations. Since the ionic radius of Cu^{2+} ions (0.73\AA) is greater than that of Ni^{2+} ions (0.69\AA), the substitution is expected to increase the lattice constant with increase in Copper concentration x [25-26]. When the larger Copper ions enter, the lattice unit cell expands while preserving overall symmetry this is true as long as the lattice constant increases with substituent concentration of Copper.

Fig. 9, Fig. 10 and Fig. 11 it is observed that due to increase of Cu^{2+} doping from 0.2 to 0.4 Lattice constant, average Dielectric Loss ($\tan \delta$) and Bulk density increases and thereafter Lattice constant, average Dielectric Loss ($\tan \delta$) and Bulk density decreases with further increase in doping of Cu^{2+} ions from 0.4 to 0.6 .

Table 5 indicates the values of Lattice Constant, Bulk Density and Dielectric Loss ($\tan \delta$) of Nanocrystalline spinel Ferrite Material in SET-III, namely C, F and D.

The increase in the concentration of Cu^{2+} ions at the tetrahedral (A) site causes the migration of Fe^{3+} ions to octahedral (B) site. This increased concentration of Fe^{3+} ions increases the hopping rate of electrons between Fe^{3+} and Fe^{2+} ions at the octahedral site and thus leads to the increase in the Dielectric Loss for the doping of Cu^{2+} from 0.2 to 0.4 .

According to Koop's at lower frequencies, the resistivity is high and the principal effect is of the grain boundaries (low resistivity regions). Therefore, the energy required for electron hopping between Fe^{2+} and Fe^{3+} at the grain boundaries is higher and the energy losses are larger [27-28].

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

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Vol. 6, Issue 7, July 2017

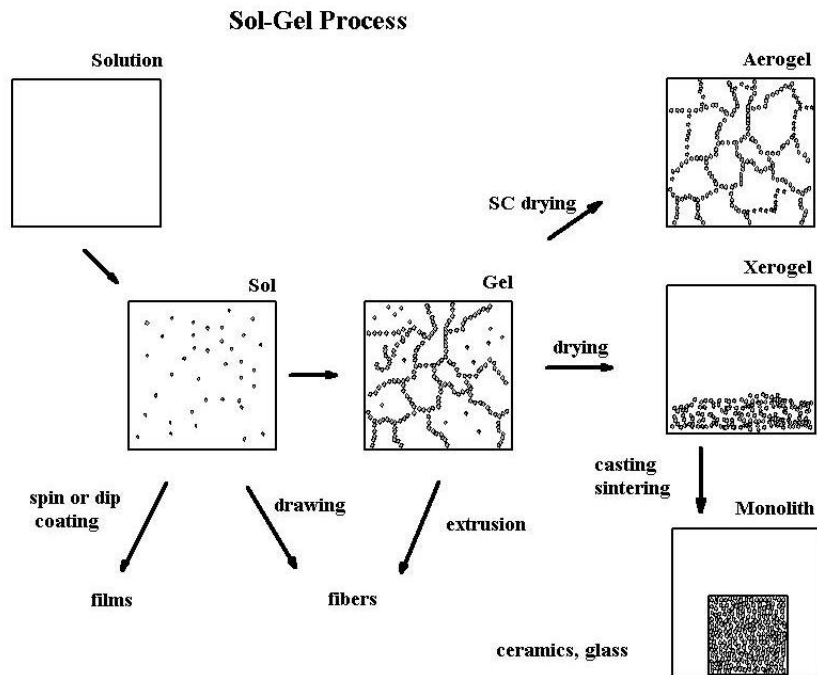


Fig.1: Blocks of SOL GEL for Ferrite Material.

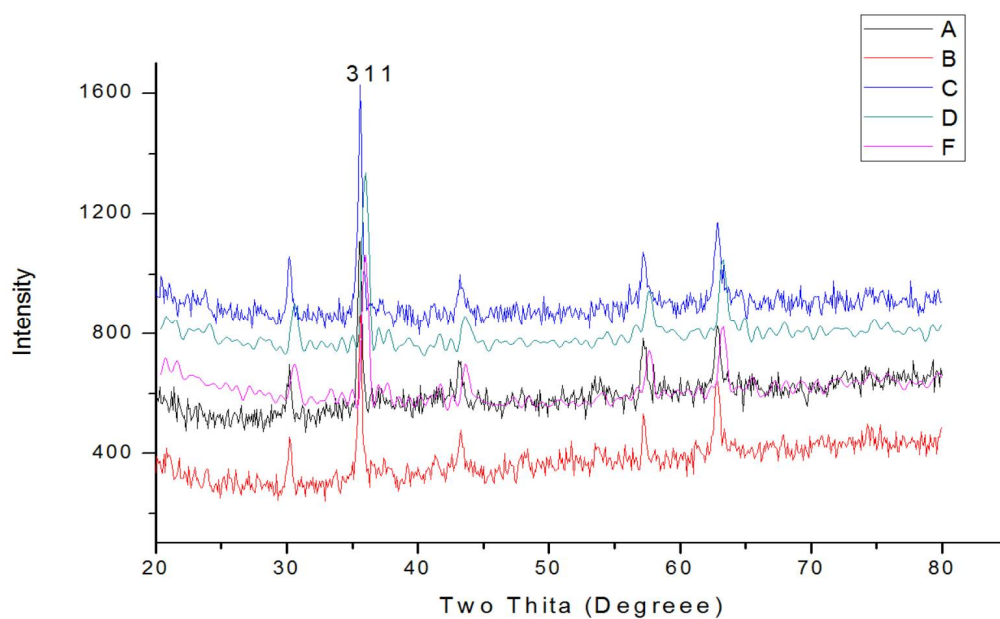


Fig. 2: XRD Pattern of ferrite samples

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 7, July 2017

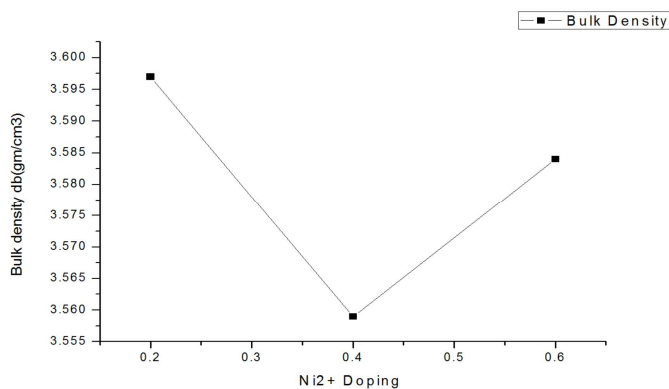
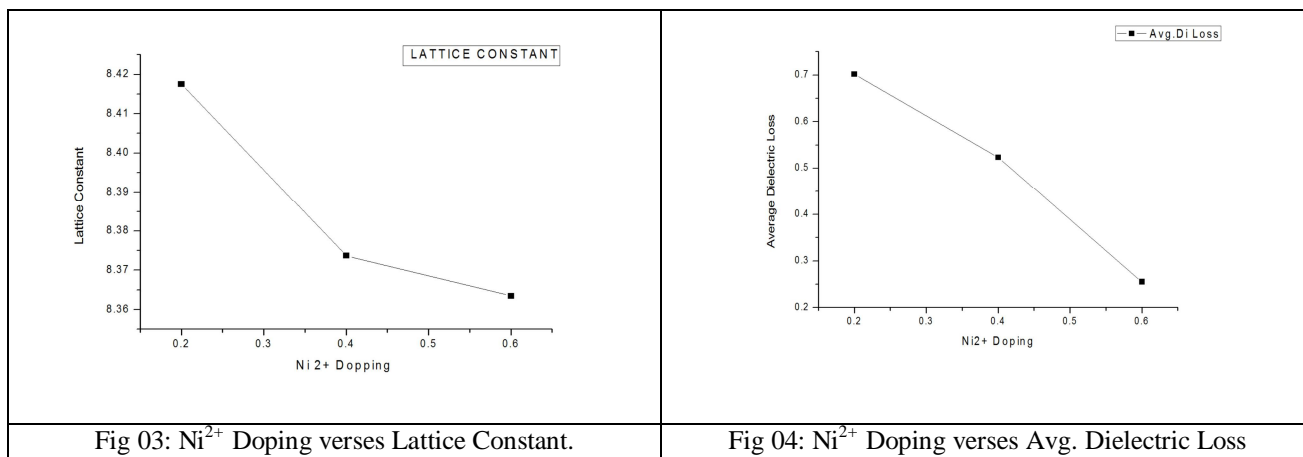
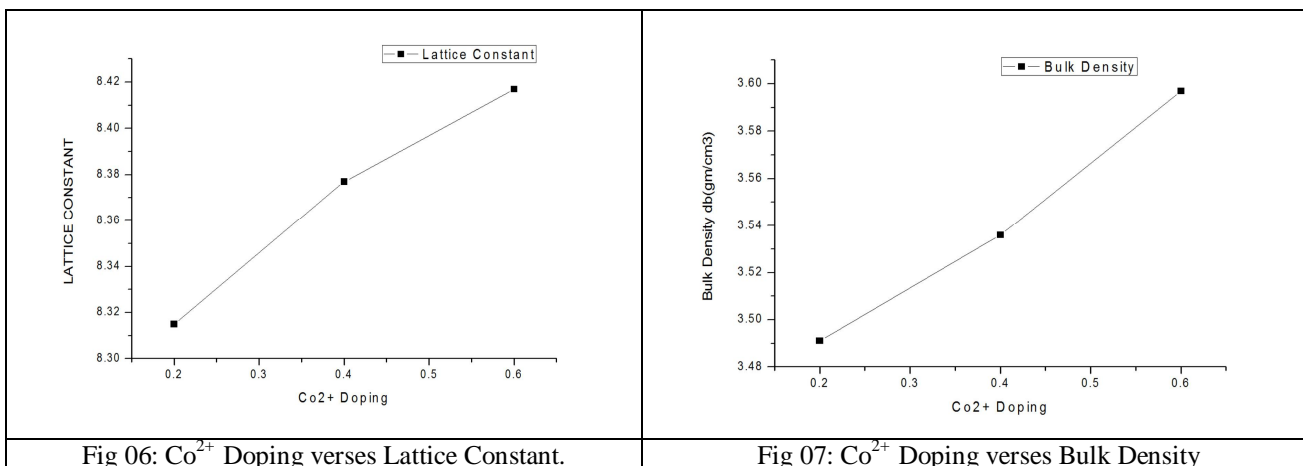


Fig 05: Ni²⁺ Doping verses Bulk Density.



International Journal of Innovative Research in Science, Engineering and Technology

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Vol. 6, Issue 7, July 2017

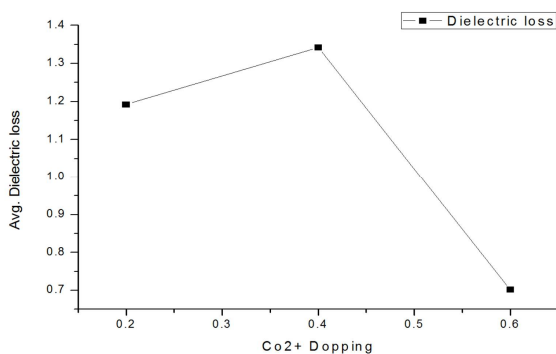


Fig 08: Co²⁺ Doping versus Average Dielectric Loss.

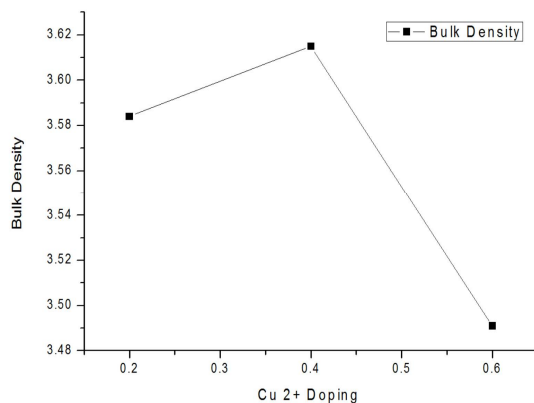
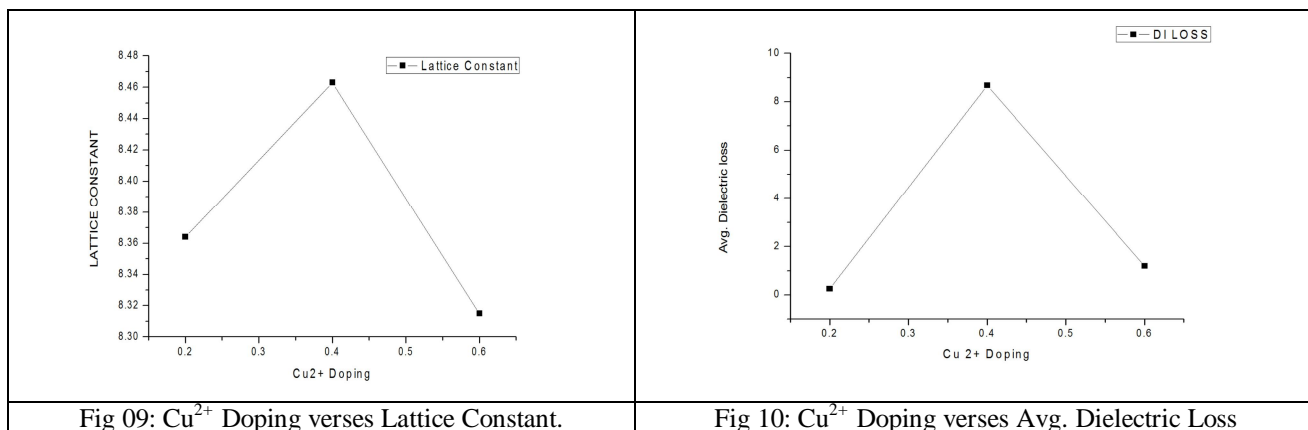


Fig 11: Cu²⁺ Doping versus Bulk Density.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 7, July 2017

Table 1: Label and Composition of Ferrite Material.

SET	Label	Ferrite Material
SET-I	A	$[(\text{Ni}_{0.2}\text{Cu}_{0.2}\text{Co}_{0.6})\text{Fe}_2\text{O}_4]$
	B	$[(\text{Ni}_{0.4}\text{Cu}_{0.2}\text{Co}_{0.4})\text{Fe}_2\text{O}_4]$
	C	$[(\text{Ni}_{0.6}\text{Cu}_{0.2}\text{Co}_{0.2})\text{Fe}_2\text{O}_4]$
SET-II	D	$[(\text{Ni}_{0.2}\text{Cu}_{0.6}\text{Co}_{0.2})\text{Fe}_2\text{O}_4]$
	E	$[(\text{Ni}_{0.2}\text{Cu}_{0.4}\text{Co}_{0.4})\text{Fe}_2\text{O}_4]$
	A	$[(\text{Ni}_{0.2}\text{Cu}_{0.2}\text{Co}_{0.6})\text{Fe}_2\text{O}_4]$
SET-III	C	$[(\text{Ni}_{0.6}\text{Cu}_{0.2}\text{Co}_{0.2})\text{Fe}_2\text{O}_4]$
	F	$[(\text{Ni}_{0.4}\text{Cu}_{0.4}\text{Co}_{0.2})\text{Fe}_2\text{O}_4]$
	D	$[(\text{Ni}_{0.2}\text{Cu}_{0.6}\text{Co}_{0.2})\text{Fe}_2\text{O}_4]$

Table 2: Bulk Density, Lattices Constant (Å) and Avg. Dielectric loss of All Ferrite Samples (A to F).

Ferrite Sample	Bulk Density	Lattices Constant (Å)	Avg. Dielectric loss
A	3.597	8.417	0.701638
B	3.559	8.374	0.523853
C	3.584	8.364	0.255394
D	3.491	8.315	1.191974
E	3.536	8.377	1.342013
F	3.615	8.463	8.680219

Table 3: Bulk Density, Lattices Constant (Å) and Avg. Dielectric loss due to Ni^{2+} doping for SET-I Ferrite Samples.

Ferrite Sample	Bulk Density	Lattices Constant (Å)	Avg. Dielectric loss
A	3.597	8.417	0.701638
B	3.559	8.374	0.523853
C	3.584	8.364	0.255394

Table 4: Bulk Density, Lattices Constant (Å) and Avg. Dielectric loss due to Co^{2+} doping for SET-II Ferrite Samples.

Ferrite Sample	Bulk Density	Lattices Constant (Å)	Avg. Dielectric loss
D	3.491	8.315	1.191974
E	3.536	8.377	1.342013
A	3.597	8.417	0.701638

Table 5: Bulk Density, Lattices Constant (Å) and Avg. Dielectric loss due to Cu^{2+} doping for SET-III Ferrite Samples.

Ferrite Sample	Bulk Density	Lattices Constant (Å)	Avg. Dielectric loss
C	3.584	8.364	0.255394
F	3.615	8.463	8.680219
D	3.491	8.315	1.191974

IV. CONCLUSION

All ferrite materials are having particle size in nanometer range and exhibit good Dielectric Loss ($\tan \delta$). Ferrite materials can use as electromagnetic wave absorber, core in transformer as well as fabricating antenna and as dielectric

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 7, July 2017

material in capacitors. Sol Gel Auto combustion method is successfully implemented and six different types of Nanocrystalline Ferrite materials successfully prepared.

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Academic Collaboration and Co-operation To whomsoever it may Concern

This is to certify that *Mr. Arif Tamboli* from department of Electronic Sciences, Poona College of Arts, Science and Commerce, Camp Pune – 01 is in collaboration and association with our department from the date of signing this document for a period of FIVE (05) years.

The Collaboration is to utilise the expertise and sharing of knowledge between the entities. Dr. J M PATHAN had provided his consent to conduct the following activities with our department under the collaboration:

1. Participation in Faculty Exchange Programme
2. Participation in Student Training Programme
3. Participation in Summer Conferences / Workshops / Symposia etc.
4. Research Collaboration
5. Invited Talks

Dr. J M PATHAN

Assistant Professor

Incharge Physics Research Laboratory

Effect on AC Conductivity of Nanocrystalline Spinel Ferrite Material due to Substitution of Ni^{2+} , Co^{2+} and Cu^{2+} in CuCo , NiCu and CoNi Respectively Prepared by Sol Gel Auto Combustion Method

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ABSTRACT: Herein, the Dielectric properties such as AC Conductivity (σ_{ac}) are reported for the nanocrystalline spinel ferrite material in the series of $[\text{Ni}_x \text{Cu}(\text{constant}) \text{Co}_{0.8-x} \text{Fe}_2\text{O}_4]$, $[\text{Co}_x \text{Ni}(\text{constant}) \text{Cu}_{0.8-x} \text{Fe}_2\text{O}_4]$ and $[\text{Cu}_x \text{Co}(\text{constant}) \text{Ni}_{0.8-x} \text{Fe}_2\text{O}_4]$ where constant=0.2 with $x=0.2, 0.4$ and 0.6 synthesized by using AR grade metal nitrates with the help of Sol-Gel auto-combustion technique. The variation in the AC Conductivity is studied at room temperature by using the LCR Meter in the frequency range of 100 Hz to 5MHz. The effect on AC Conductivity due to the substitution of Ni^{2+} , Co^{2+} and Cu^{2+} density 'x' in $[\text{Ni}_x \text{Cu}(\text{constant}) \text{Co}_{0.8-x} \text{Fe}_2\text{O}_4]$, $[\text{Co}_x \text{Ni}(\text{constant}) \text{Cu}_{0.8-x} \text{Fe}_2\text{O}_4]$ and $[\text{Cu}_x \text{Co}(\text{constant}) \text{Ni}_{0.8-x} \text{Fe}_2\text{O}_4]$ respectively is discussed. The nanocrystalline spinel Structural of ferrite material is confirmed by Fourier Transform Infrared Spectroscopy (FT-IR) and Scanning Electron Microscope (SEM). The presence of metal nitrates is confirmed by Energy Dispersive X- Ray Spectroscopy (EDX).

KEYWORDS: Sol-gel auto-combustion, LCR meter, FT-IR, SEM and EDX.

I. INTRODUCTION

The dielectric properties of nanocrystalline ferrite materials make them suitable for magnetic storage devices and high frequency applications in the field of electronic science and communication technology. The ferrite material of specific AC conductivity is also used to reduce electromagnetic noise, frequency filters and electric spike absorber. It is also used in fabricating light weight transformer and in various frequency filters. Frequency ferrites are widely used in microwave devices such as insulators, circulators, and phase splitter and shifters because of their high resistivity, low eddy current loss and excellent magnetic properties. The general formula of ferrite is MFe_2O_4 and magnetic properties of ferrites are dependent on the distribution of metal cation at tetrahedral A-site and at octahedral B-site. Where $\text{M}=\text{Zn}^{2+}$, $\text{M}=\text{Cu}^{2+}$, $\text{M}=\text{Co}^{2+}$, $\text{M}=\text{Mg}^{2+}$, $\text{M}=\text{Ni}^{2+}$ etc. [1-5].

International Journal of Innovative Research in Science, Engineering and Technology

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Vol. 6, Issue 6, June 2017

II. MATERIALS AND METHODS

2.1 Synthesis of ferrite powder

In Sol Gel method the chemical reaction is helping for auto combustion and this process is a self-sustaining combustion synthesis technique and it results in providing fine homogeneous powder of metal-oxide. The sol gel auto combustion process basically takes place in two steps namely (a) Formation of a Gel and (ii) Auto-Ignition. Aqueous precursor solution contains various metal nitrates and fuel such as ascorbic acid, urea, glycine, and citric acid. This solution was heated until the excess water is removed by evaporating. Here citric acid is used as fuel. At the end of chemical reaction the viscous liquid foam gets ignited and undergoes self-sustained combustion and produces ashes containing the oxide product. Very large amount of heat is generated during combustion process in the form of either fire or a flame and therefore, the process is called as auto combustion process. External heat is given by using hot base plate at 100°C, till the formation of gel. When ignition starts at that time dried gel burnt in a self-propagating combustion manner until all gels were completely burnt out to form a fluffy loose structure and converted in to fluffy ash as shown in Fig. 1 and Fig. 2.

In auto combustion reaction the energy is supplied itself due to fuel citric acid. During the auto combustion process Gases such as CO₂, H₂O and N₂ gets evolve, and formation of fine particle ashes takes place. The auto combustion method uses the energy produced by the exothermic decomposition of a redox mixture of an organic compound with metal nitrates. In the combustion organic compounds, nitrates and mixture behave like conventional oxidants and fuels. Very huge amount of heat of combustion (or flame temperature) helps in crystallization and formation of the required phase. The properties of the final product in the form of ash such as surface area, particle size and porosity depend on the method of combustion. The departure of gases helps the desegregation of the products due to which porosity increases and heat dissipation also takes place due to departure of gases. Exothermicity of combustion is controlled by the ratio of oxidizer to fuel and nature of the fuel used in chemical reaction [6-10].

Without the use of costly and expensive high temperature furnaces this technique produces a homogeneous product in a very short amount of time. Auto combustion synthesis reaction can be influenced by many parameters such as the fuel-to-oxidizer ratio, the type of fuel, the ignition temperature and the hardness of water of the precursor mixture. The fuel to oxidizer ratio also plays a very important role in influencing the reaction and reducing the time. A way to control the flame temperature of the reaction is by varying the ratio of fuel to oxidizer.

The elemental stoichiometric coefficient, ϕ_e , is used to control the ratio of fuel to oxidizer in the reaction. ϕ_e represents the ratio between the oxidizing and reducing components of the metal nitrate fuel mixture. When ϕ_e is less than one ($\phi_e < 1$) it is fuel rich and when ϕ_e is greater than one ($\phi_e > 1$), the mixture does not have enough fuel for the completion of reaction. Fig. 3 shows the auto combustion synthesis flow chart used for the synthesis of the ferrite powders.

Ferrite powder is prepared by using sol-gel auto combustion method. Analytical grade Nickel Nitrate [Ni(NO₃)₂·6H₂O], Copper Nitrate [Cu(NO₃)₂·3H₂O], Cobalt Nitrate [Co(NO₃)₂·6H₂O], Iron Nitrate [Fe(NO₃)₃·9H₂O], Citric Acid [C₆H₈O₇·H₂O], Distilled water is prepared in the laboratory using all quick fit glass assembly and liquid ammonia were used as raw materials in sol gel auto combustion method.

The series [Ni_xCu(constant)Co_{0.8-x}Fe₂O₄], [Co_xNi(constant)Cu_{0.8-x}Fe₂O₄] and [Cu_xCo(constant)Ni_{0.8-x}Fe₂O₄] where, constant=0.2 with x= 0.2, 0.4 and 0.6 of ferrites have been prepared in three Sets namely SET-I, SET-II and SET-III using Sol-Gel Auto-combustion method. All the chemicals were from E-mark, India (AR grade with 98% purity to 99.9% purity).

Accurately weighted quantity of Metal nitrates and citric acid is added in to distilled water of 100ml and a solution is prepared. The solution in a glass beaker was homogenized by continuous stirring with the help of magnetic needle by using the instrument so called magnetic stirrer. The magnetic stirrer is having the facility of controlling the revolution per minit (RPM) of magnetic needle as well as temperature of base plate. The acidic or alkaline level (pH) of the solution was adjusted to 7 using liquid ammonia and the solution is continuously heated at 100°C on a hot plate with magnetic stirrer with the help of hard glass beaker. With continuous heating it initially transformed into sol then gel and it requires five to six hours shown. When liquid gets converted in to gel the magnetic needle is removed and gel stick with magnetic needle is used for IR characterization.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 6, June 2017

The ferrite powder material was sintered in an electrical furnace with super kanthal (MoSi_2) heating elements and alumina insulation boards as chamber walls. The size of the chamber is 250x150x150 mm. The thermal regime of the furnace was controlled through a “Eurotherm” programmer-cum-controller by using microcontrollers with an accuracy of $\pm 2^\circ\text{C}$. The already crushed and grounded samples are heated from room temperature to 400°C at a rate $1^\circ\text{C}/\text{min}$ followed by a soaking at 400°C for 4 hours.

The ferrite powder was sintered at 400°C for 4 hours in air medium to get better crystallization and homogeneous cation distribution in the spinel and finally ground to get $[(\text{Ni}_{0.2} \text{Cu}_{0.2}\text{Co}_{0.6})\text{Fe}_2\text{O}_4]$, $[(\text{Ni}_{0.4} \text{Cu}_{0.2}\text{Co}_{0.4})\text{Fe}_2\text{O}_4]$, $[(\text{Ni}_{0.6} \text{Cu}_{0.2}\text{Co}_{0.2})\text{Fe}_2\text{O}_4]$, $[(\text{Ni}_{0.2} \text{Cu}_{0.6}\text{Co}_{0.2})\text{Fe}_2\text{O}_4]$, $[(\text{Ni}_{0.2} \text{Cu}_{0.4}\text{Co}_{0.4})\text{Fe}_2\text{O}_4]$ and $[(\text{Ni}_{0.4} \text{Cu}_{0.4}\text{Co}_{0.2})\text{Fe}_2\text{O}_4]$ ferrite powders. Table 1 indicates Label and composition of ferrite materials for all three Sets.

2.2 Perpetration and Sintering of pellets:

The pellets are prepared by mixing the polyvinyl alcohol (PVA) as binder in to ferrite powder. The mixed powder was uniaxially pressed by using a hydraulic press machine by applying the pressure of about $60 \text{ kg}/\text{cm}^3$ for about 1 minute in a die of 10mm diameter. The final sintering of pellets was carried out at 200°C for about 2 hours in air medium to densify the pellets. The pellets of diameter D_0 -10 mm, thickness-2 mm are fabricated. The prepared samples of pellets were sintered in a furnace which uses electricity for heating the chamber with the help of super kanthal (MoSi_2) heating elements and alumina insulation boards as chamber walls. The dimension of chamber is 250x150x150 mm. The thermal regime of the furnace was controlled through a “Eurotherm” programmer-cum-controller designed by using microcontroller with an accuracy of $\pm 2^\circ\text{C}$. The compacted samples heated from room temperature to 200°C at a rate $1^\circ\text{C}/\text{min}$ followed by a soaking at 200°C for 2 hrs for binder burnout. The pellets are shown in Fig. 4.

2.3 Characterization of AC conductivity (σ_{ac}).

The dielectric constant (ϵ'), dielectric loss tangent ($\tan \delta$) and AC conductivity (σ_{ac}) of prepared samples were measured in the frequency range of 100 Hz to 5 MHz by using impedance analyser meter at room temperature. The data acquisition system of digital impedance analyser (LCR meter) provides the information of applied frequency (f), measured Series Capacitance (Cs), Parallel Capacitance (Cp), Quality factor (Q).

The data provided by digital impedance analyser meter and the available reading such as thickness of pellet, $d=0.002$ meter, Diameter of pellet= 10 millimetre and Area of pellet $= \pi r^2 = 3.14 \times 0.005^2 = 0.0000785 \text{ meter}^2$ is used for calculations for real part of dielectric constant (ϵ'), dielectric loss tangent ($\tan \delta$) and AC Conductivity. The logarithm of frequency ($\log_{10} f$) is taken in to consideration while plotting the graph of ($\log_{10} f$) verses any other parameter. Following equations are used

$$\text{Dielectric loss tangent} = (\tan \delta) = 1/Q = \epsilon'' / \epsilon' - (1)$$

$$\text{Dielectric constant (Real Part)} = \epsilon' = C_p \cdot d / \epsilon_0 \cdot A - (2)$$

$$\text{Dielectric constant (Imaginary Part)} = \epsilon'' = (\tan \delta) \cdot \epsilon' - (3)$$

$$\text{AC electrical conductivity} = \sigma_{ac} = 2\pi f \cdot \epsilon_0 \cdot \epsilon' \cdot (\tan \delta) = \omega \cdot \epsilon_0 \cdot \epsilon' \cdot (\tan \delta) - (4)$$

III. RESULTS AND DISCUSSIONS

3.1 AC conductivity (σ) at different concentration of Ni^{2+} ions (A, Band C):

The variation of AC conductivity with the frequency at different concentration of Ni^{2+} ions is shown in Fig. 5. It shows that the AC conductivity decreases with increase in x substitution of Ni^{2+} . With the increase in the concentration of Ni^{2+} ions (x), the hopping action of charge carriers decreases due to the decreased concentration of Fe^{3+} ions at B-site. From Fig. 5, it is observed that for $x=0.2$ (sample A) graph shown by square dots (Black) is having the maximum AC Conductivity and AC Conductivity decreases with the increase in $x=0.4$ (sample B) and for $x=0.6$ (sample C) which is shown by circular dots (Red) and triangular dots (Blue) respectively.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 6, June 2017

The increase in the AC conductivity with frequency is also understood by the hopping model. As the frequency of the applied electric field increases, the hopping frequency of electrons between Fe^{3+} – Fe^{2+} ions at adjacent octahedral site also increases, leading to increase in the conductivity [11-15]. Table 2, shows the values of AC Conductivity for substitution x of Ni^{2+} at 5 MHz.

3.2 AC conductivity (σ) at different concentration of Co^{2+} ions (D, E and A):

From Fig. 6, it is observed that for $x=0.2$ (sample D) graph shown by square dots (Black) is having the minimum AC Conductivity. Here AC Conductivity increases due increase in substitution of Co^{2+} , $x=0.4$ and $x=0.6$ which is shown by circular red dots (sample E) and by triangular blue dots (sample A) respectively.

Table 3, shows the values of AC Conductivity for substitution x of Co^{2+} at 5 MHz.

3.3 AC conductivity (σ) at different concentration of Cu^{2+} ions (D, F and C):

The variation of AC conductivity with the frequency at different concentration of Cu^{2+} ions is shown in Fig. 7. It reveals that the AC conductivity initially increases with increase in x substitution of Cu^{2+} up to $x=0.4$ and then it decreases with further increase in x substitution of Cu^{2+} up to $x=0.6$. With the increase in the concentration of Cu^{2+} ions (x), the hopping action of charge carriers increases due to the increased concentration of Fe^{3+} ions at B-site and further it decreases. Table 4, shows the values of AC Conductivity for substitution x of Ni^{2+} at 5 MHz.

Fig. 7, indicates square dots (Black) for $x=0.2$ is having moderate AC Conductivity in between $x=0.4$ and $x=0.6$, but for $x=0.4$ the circular dots (Red) shows that AC Conductivity increases and thereafter due to further increase in $x=0.6$ AC Conductivity decreases at 5 MHz. This decrease in AC conductivity is shown by triangular dots (Blue). Table 4, shows the values of AC Conductivity for substitution x of Cu at 5 MHz.

It is observed that for all the samples of ferrite material the AC conductivity remains almost constant in the low frequency region and increases abruptly in the high frequency region. Such type of observation is also reported by many researchers. It is well known that the mechanism of the electrical conduction is the same as that of the dielectric polarization [16-18]. Table 5, shows average AC Conductivity for all six samples ferrite material calculated in the range of 100Hz to 5MHz.

The FTIR spectroscopy confirms the single phase nature of the prepared sample. The peak 536.114 cm^{-1} gives the confirmation of Fe_2O_4 . Fig. 8 shows the IR absorption peak at 536.114 cm^{-1} [19-22].

Scanning electron microscope (SEM) images gives the confirmation of particle sizes of around 22–29 nm of $\text{NiCuCo Fe}_2\text{O}_4$ nanoparticles. Fig. 9 shows SEM. A SEM micro graph also shows a uniform grain growth with small pores and high densification at the calcining temperature of 400°C . EDX gives the confirmation about the presence of $\text{NiCuCo Fe}_2\text{O}_4$ in proper proportion. Fig. 10 shows EDX.



Fig. 1: Formation of Gel



Fig. 2: Formation of Ash.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 6, June 2017

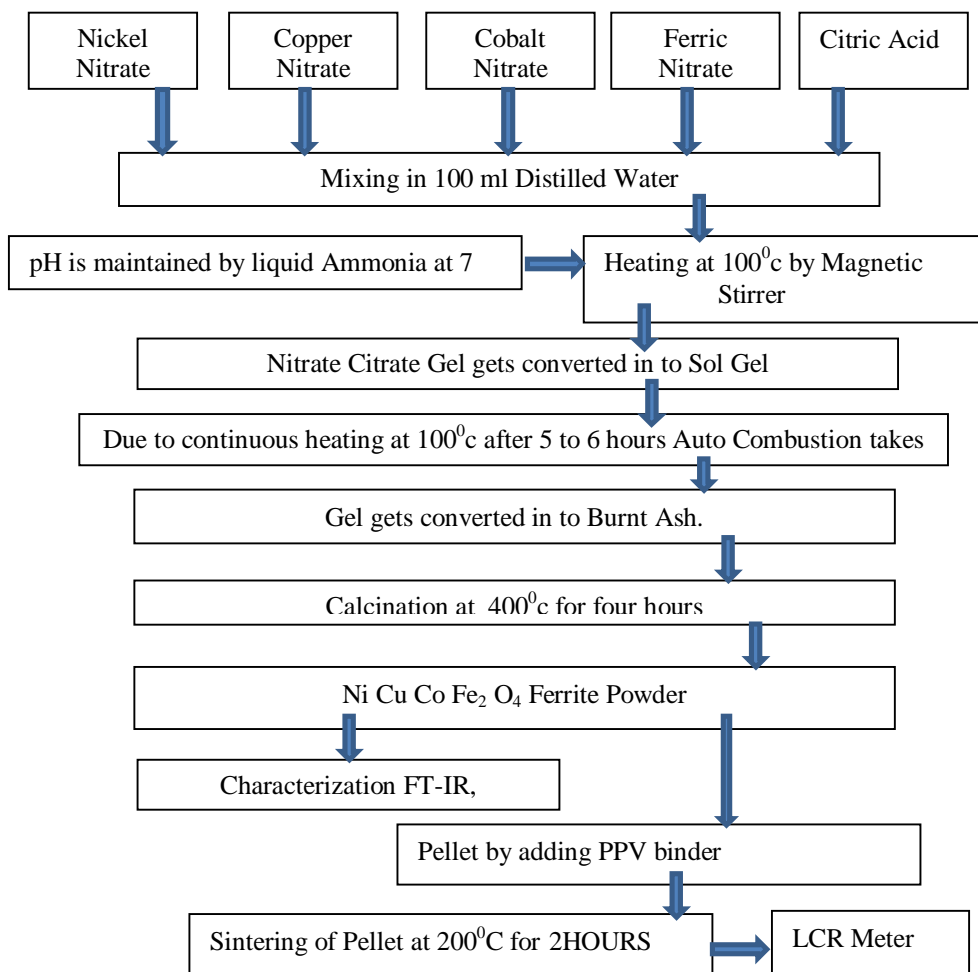


Fig. 3: Flow chart of Sol Gel Method



Fig. 4: Pellet Photograph.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 6, June 2017

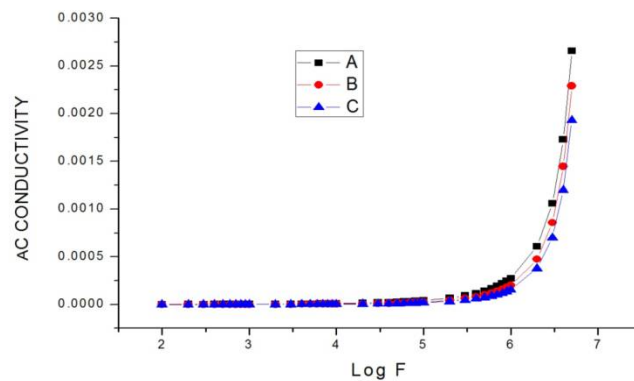


Fig. 5: AC Conductivity for A, B and C.

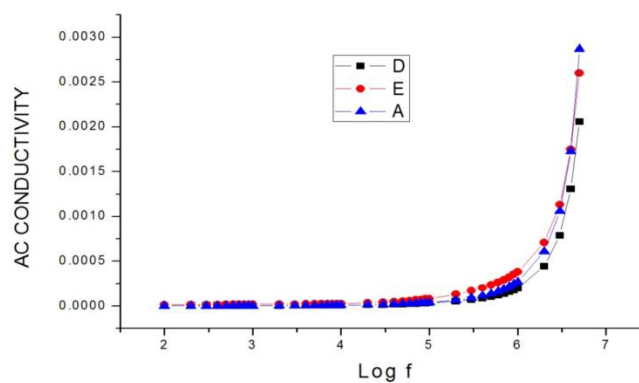


Fig. 6: AC Conductivity for D, E and A.

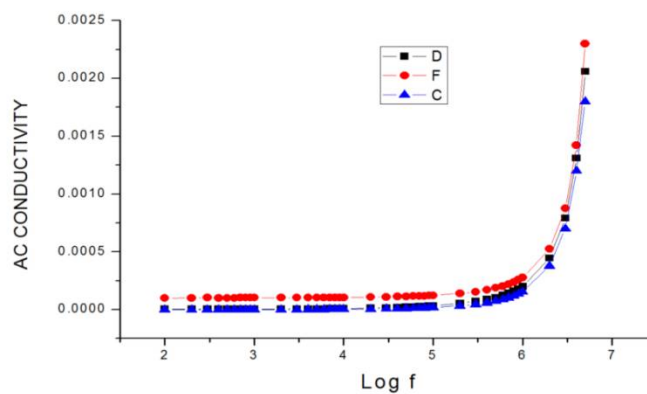


Fig. 7: AC Conductivity for D, F and C.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 6, June 2017

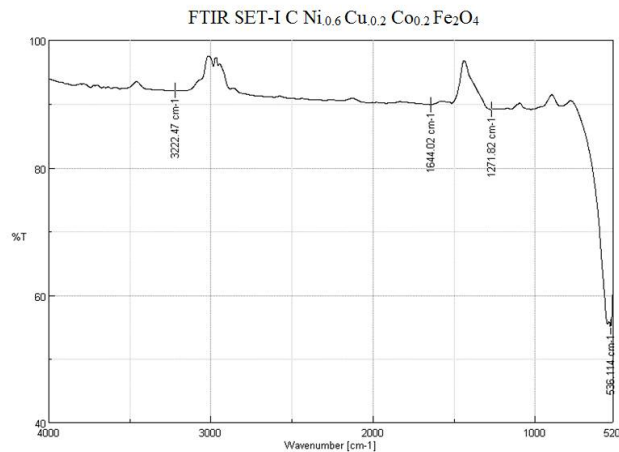


Fig. 8: FTIR graph for SET-I (C)

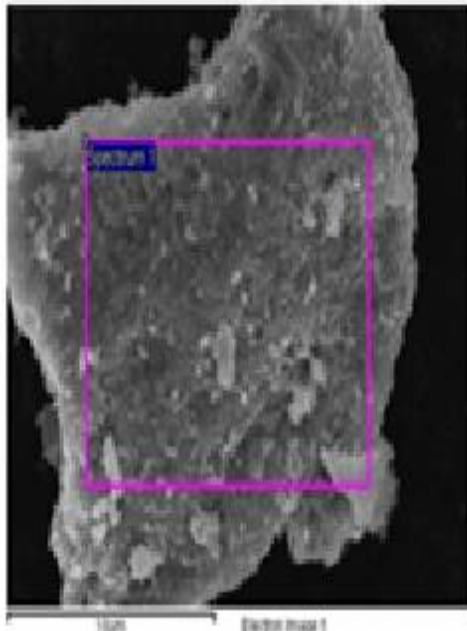


Fig. 9: SEM Photograph.

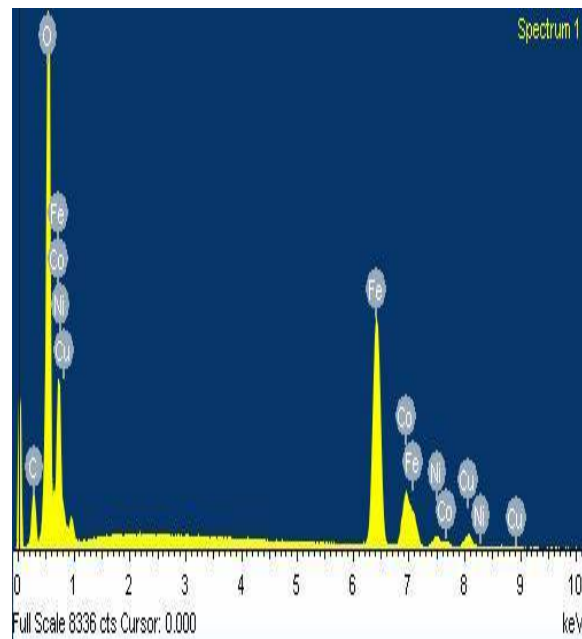


Fig. 10: EDX Photograph.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 6, June 2017

Table 1: Label and Composition of Ferrite Material.

SET	Label	Ferrite Material
SET-I	A	$[(\text{Ni}_{0.2}\text{Cu}_{0.2}\text{Co}_{0.6})\text{Fe}_2\text{O}_4]$
	B	$[(\text{Ni}_{0.4}\text{Cu}_{0.2}\text{Co}_{0.4})\text{Fe}_2\text{O}_4]$
	C	$[(\text{Ni}_{0.6}\text{Cu}_{0.2}\text{Co}_{0.2})\text{Fe}_2\text{O}_4]$
SET-II	D	$[(\text{Co}_{0.2}\text{Ni}_{0.2}\text{Cu}_{0.6})\text{Fe}_2\text{O}_4]$
	E	$[(\text{Co}_{0.4}\text{Ni}_{0.2}\text{Cu}_{0.4})\text{Fe}_2\text{O}_4]$
	A	$[(\text{Co}_{0.6}\text{Ni}_{0.2}\text{Cu}_{0.2})\text{Fe}_2\text{O}_4]$
SET-III	C	$[(\text{Ni}_{0.6}\text{Cu}_{0.2}\text{Co}_{0.2})\text{Fe}_2\text{O}_4]$
	F	$[(\text{Ni}_{0.4}\text{Cu}_{0.4}\text{Co}_{0.2})\text{Fe}_2\text{O}_4]$
	D	$[(\text{Ni}_{0.2}\text{Cu}_{0.6}\text{Co}_{0.2})\text{Fe}_2\text{O}_4]$

Table 2: AC Conductivity of SET-I.

$[\text{Ni}_x\text{Cu}(\text{constant})\text{Co}_{0.8-x}\text{Fe}_2\text{O}_4], \text{Cu}=\text{constant}=0.2$	
x	AC Conductivity at 5 MHz
(A) For x=0.2	0.002658529
(B) For x=0.4	0.002290749
(C) For x=0.6	0.001927343

Table 3: AC Conductivity of SET-II.

$[(\text{Ni}_{(\text{constant})}\text{Cu}_{0.8-x}\text{Co}_x)\text{Fe}_2\text{O}_4], \text{Ni}=\text{constant}=0.2$	
x	AC Conductivity at 5 MHz
(D) For x=0.2	0.00206424
(E) For x=0.4	0.00259871
(A) For x=0.6	0.00265852

Table 4: AC Conductivity of SET-III.

$[(\text{Ni}_{0.8-x}\text{Cu}_x\text{Co}_{(\text{constant})})\text{Fe}_2\text{O}_4], \text{Co}=\text{constant}=0.2$	
x	AC Conductivity at 5 MHz
(D) For x=0.2	0.00206424
(F) For x=0.4	0.00210402
(C) For x=0.6	0.00192734

Table 5: Average AC Conductivity of all samples.

Ferrite	Avg. AC Conductivity
SET-I- A $[(\text{Ni}_{0.2}\text{Cu}_{0.2}\text{Co}_{0.6})\text{Fe}_2\text{O}_4]$	0.000194143
SET-I- B $[(\text{Ni}_{0.4}\text{Cu}_{0.2}\text{Co}_{0.4})\text{Fe}_2\text{O}_4]$	0.000155638
SET-I- C $[(\text{Ni}_{0.6}\text{Cu}_{0.2}\text{Co}_{0.2})\text{Fe}_2\text{O}_4]$	0.000126047
SET-II- D $[(\text{Ni}_{0.2}\text{Cu}_{0.6}\text{Co}_{0.2})\text{Fe}_2\text{O}_4]$	0.000148797
SET-II- E $[(\text{Ni}_{0.2}\text{Cu}_{0.4}\text{Co}_{0.4})\text{Fe}_2\text{O}_4]$	0.000231988
SET-III- F $[(\text{Ni}_{0.4}\text{Cu}_{0.4}\text{Co}_{0.2})\text{Fe}_2\text{O}_4]$	0.000140762

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 6, June 2017

IV. CONCLUSION

We have successfully fabricated the six different types of Nanocrystalline Ferrite materials and successfully implemented Sol Gel Auto combustion method. All ferrite materials exhibit good AC conductivity and it can be used as core in transformer as well as fabricating antenna and in capacitors.

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Academic Collaboration and Co-operation To whomsoever it may Concern

This is to certify that *Mr. Arif Tamboli* from department of Electronic Sciences, Poona College of Arts, Science and Commerce, Camp Pune – 01 is in collaboration and association with our department from the date of signing this document for a period of FIVE (05) years.

The Collaboration is to utilise the expertise and sharing of knowledge between the entities. Dr. J M PATHAN had provided his consent to conduct the following activities with our department under the collaboration:

1. Participation in Faculty Exchange Programme
2. Participation in Student Training Programme
3. Participation in Summer Conferences / Workshops / Symposia etc.
4. Research Collaboration
5. Invited Talks

Dr. J M PATHAN

Assistant Professor

Incharge Physics Research Laboratory

Effect on Dielectric Properties of Nanocrystalline Spinel Ferrite Material due to Substitution of Cu^{2+} in Co Ni.

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ABSTRACT: Herein, the Dielectric properties such as Dielectric loss tangent ($\tan \delta$), Dielectric constant (Real Part= ϵ'), Dielectric constant (Imaginary Part= ϵ'') and AC electrical conductivity (σ_{ac}) are reported for the series $[(\text{Cu}_x\text{Co}_{(1-x)})\text{Fe}_2\text{O}_4]$ where constant=0.2 with $x=0.2, 0.4$ and 0.6 of nanocrystalline spinel ferrites, synthesized by Sol-Gel auto-combustion technique. High purity metal nitrates are used for synthesis and citric acid as a catalyst. The variation in the Dielectric loss tangent ($\tan \delta$), Dielectric constant (Real Part= ϵ'), Dielectric constant (Imaginary Part= ϵ'') and AC electrical conductivity (σ_{ac}) are studied at room temperature due to the effect of substitution of Cu^{2+} density 'x' in $[(\text{Cu}_x\text{Co}_{(1-x)})\text{Fe}_2\text{O}_4]$. The nanocrystalline spinel structural of ferrite material is confirmed by X-ray diffractometer (XRD) and Fourier Transform Infrared Spectroscopy (FT-IR). The variations in the structural and Dielectric properties of the prepared ferrite material are discussed.

Keywords -Sol-gel auto-combustion, X-ray diffraction, FT-IR, LCR-Q meter.

I. INTRODUCTION

The Dielectric properties of nanocrystalline ferrite materials make them suitable for high frequency applications in the field of telecommunication and signal processing. Ferrites can also be used as an electromagnetic noise and wave absorber, multilayer chip indicators (MLCIs), light weight transformer core and in frequency filters. Ferrites are widely used in microwave devices such as insulators, circulators, and phase splitter and shifters because of their high resistivity, low dielectric loss and excellent magnetic properties [J. Azadmanjiri et al., 2007, Z. Yue et al., 1999]. The general formula of ferrite is MFe_2O_4 and electrical and magnetic properties of ferrites are dependent on the distribution of metal cation at tetrahedral A-site and at octahedral B-site [U.N. Trivedi et al., 2000]. Where $\text{M}=\text{Ni}^{2+}$, $\text{M}=\text{Cu}^{2+}$, $\text{M}=\text{Co}^{2+}$, $\text{M}=\text{Mg}^{2+}$, $\text{M}=\text{Zn}^{2+}$ etc.

Different techniques have been developed for the preparation of the nanosized ferrites, namely sol-gel, micro emulsion, double sintering, hydrothermal, co-precipitation, ball milling and microwave heating to improve the performance of the nano ferrites [M.C. Dimri et al., 2006, L. Zhao et al., 2006, R.S. Devan et al., 2006, L. Yin et al., 2007]. Sol-gel auto-combustion is the simplest methodology to synthesize the nanosized ferrites with good homogeneity at low annealing temperature. The aim of the present work is to investigate the effect on Structural and Dielectric properties due to substitution of Cu^{2+} ions density 'x' in $[(\text{Cu}_x\text{Co}_{(1-x)})\text{Fe}_2\text{O}_4]$.

II. MATERIALS AND METHODS

2.1 Synthesis

The high purity AR grade ferric nitrate $[\text{Fe}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}]$, Copper nitrate $[\text{Cu}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}]$, Nickel nitrate $[\text{Ni}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}]$, Cobalt nitrate $[\text{Co}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}]$, citric acid ($\text{C}_6\text{H}_8\text{O}_7$), ammonium hydroxide solution (NH_4OH) were used to prepare the series $[(\text{Cu}_x\text{Co}_{(1-x)})\text{Fe}_2\text{O}_4]$ where constant=0.2 with $x=0.2, 0.4$ and 0.6 of ferrite nanoparticles by sol-gel auto combustion synthesis technique. In this chemical

process Citric acid was used as a Fuel. The flow chart of Sol Gel is explained in Fig. 1. All metal nitrates and citric acid were weighed accurately to have proper stoichiometric proportion required in the final product and all metal nitrates are dissolved in 100 ml deionized water to form mixed solution. The mixed solutions of all the chemicals were stirred by using magnetic stirrer until the homogeneous solution is obtained. During the stirring process ammonium hydroxide solution was added drop by drop to obtain pH at constant value of 7. The mixed solution was simultaneously heated at 100 °C for 3 to 4 h to form sol. The sol turns into a viscous brown gel. The temperature of the gel was further increased up to 150 °C, after some time combustion of the gel takes place and fine powder of $[(\text{Ni}_{0.8-x}\text{Cu}_x\text{Co}_{(\text{constant})})\text{Fe}_2\text{O}_4]$ ferrite nanoparticle was obtained. The powder was dried and annealed at 400 °C for 4 hours in furnace having super kanthal (MoSi_2) heating elements and alumina insulation boards as chamber walls [L. J. Berchmans et al., 2004]. The pellets of sample are prepared by using binder polyvinyl alcohol (PVA) and it was pressed at 60 kg/cm³ for one min and was dried and annealed at 200 °C for 2 hours. The diameter of pellet is 10mm and thickness is 2mm. Three ferrite materials represented by the symbol C, F, and D, are $[(\text{Cu}_{0.2}\text{Co}_{0.2}\text{Ni}_{0.6})\text{Fe}_2\text{O}_4]$, $[(\text{Cu}_{0.4}\text{Co}_{0.2}\text{Ni}_{0.4})\text{Fe}_2\text{O}_4]$ and $[(\text{Cu}_{0.6}\text{Co}_{0.2}\text{Ni}_{0.2})\text{Fe}_2\text{O}_4]$ respectively.

2.2 Characterization.

The phase analysis and gross structural analysis is done by using X-ray diffractometer (Cu K_α radiation=1.5418 Å) and confirmation of single phase spinel structure is done. Lattice Constant a (Å) is calculated by using the formula $1/d^2 = 1/a^2 * (h^2 + k^2 + l^2)$. The particle size (t) of prepared powder has been calculated using Scherrer formula

$$t = 0.9 \lambda / \cos(\theta) \dots\dots\dots(1)$$

Where; λ = Wave length of X-rays.

t = Particle size.

θ = Bragg's angle.

$\Delta 2\theta$ = Full Width Half Maxima of the recorded peak and it is corrected for instrumental broadening.

It is observed that all the peaks in the pattern belong to the spinel structure and it is confirmed that the samples have pure spinel phase [J. Jing et al., 2007]. The variation in Lattice constant and particle size t (nm) is shown in Table 1. It is observed that Particle Size t (nm) is maximum for x=0.6, $[(\text{Cu}_{0.6}\text{Co}_{0.2}\text{Ni}_{0.2})\text{Fe}_2\text{O}_4]$. The Dielectric measurements at room temperature were carried out using LCR-Q meter. The bulk density of the $[(\text{Cu}_x\text{Co}_{(\text{constant})}\text{Ni}_{0.8-x})\text{Fe}_2\text{O}_4]$ sample was measured by using Archimedes principle [C. Caizer et al., 2002].

The dielectric constant (ϵ'), dielectric loss tangent ($\tan \delta$) and AC conductivity (σ_{ac}) of prepared samples were measured in the frequency range of 100 Hz to 5 MHz by using impedance analyser meter at room temperature. The data acquisition system of digital impedance analyser meter provides the information of applied frequency (f), measured Series Capacitance (Cs), Parallel Capacitance (Cp), Quality factor (Q).

The data provided by digital impedance analyser meter along with thickness of pellet, d=0.002 meter, Diameter of pellet= 10 millimetre and Area of pellet = $\pi r^2 = 3.14 * .005 * .005 \text{ meter}^2 = 0.0000785 \text{ meter}^2$, the calculations for real part of dielectric constant (ϵ'), dielectric loss tangent ($\tan \delta$) and AC Conductivity are calculated with the help of following equations. The logarithm of frequency ($\log_{10} f$) is taken in to consideration while plotting the graph of ($\log_{10} f$) verses any other parameter.

$$\text{Dielectric loss tangent} = (\tan \delta) = 1/Q = \epsilon'' / \epsilon' \dots\dots\dots(2)$$

$$\text{Dielectric constant (Real Part)} = \epsilon' = C_p * d / \epsilon_0 * A \dots\dots\dots(3)$$

$$\text{Dielectric constant (Imaginary Part)} = \epsilon'' = (\tan \delta) * \epsilon' \dots\dots\dots(4)$$

$$\text{AC electrical conductivity} = \sigma_{ac} = 2 \pi f * \epsilon_0 * \epsilon'' * (\tan \delta) \dots\dots\dots(5)$$

$$\text{or } \sigma_{ac} = \epsilon_0 * \epsilon'' * (\tan \delta) * 2 \pi f$$

Vibrating Sample Magnetometer (VSM) is used for collecting the data. Properly weighted powder of ferrite samples is placed in hard glass tube and hard glass tube is placed under the strong magnetic field. The

samples are set in to vibration by using the crystal oscillator of very high frequency. The computerized controlled data acquisition system is used for the measurement of Saturation magnetization $[M_s]$ (emu/gm), Magnetic moment $[M_r]$ (emu/gm) and Coercivity $[H_c]$ (Oe)].

III. RESULTS AND DISCUSSIONS

3.1 Structural Analysis.

The XRD pattern of as-synthesized ferrite material of $[\text{Cu}_x\text{Co}(\text{constant})\text{Ni}_{0.8-x}\text{Fe}_2\text{O}_4]$ for constant=0.2 and $x=0.2, 0.4$ and 0.6 are $[(\text{Cu}_{0.2}\text{Co}_{0.2}\text{Ni}_{0.6})\text{Fe}_2\text{O}_4]$, $[(\text{Cu}_{0.4}\text{Co}_{0.2}\text{Ni}_{0.4})\text{Fe}_2\text{O}_4]$, $[(\text{Cu}_{0.6}\text{Co}_{0.2}\text{Ni}_{0.2})\text{Fe}_2\text{O}_4]$ respectively and its XRD pattern is shown in Fig.2. The highest intensity peaks in all three specimens are observed at (311) and other peaks (220), (400), (422) and (440). The average grain (crystallite) size for all the composites is calculated using Scherer's formula with respect to the high intense peak plane (311). The grain (crystallite) size for all the composites is found in the range of 22.52 nm to 33.71 nm. The XRD pattern contains no secondary peaks and it gives the confirmation about pure spinel structure of sample.

It is observed that due to the concentration of Cu^{2+} ions in place of Ni^{2+} ions the Bragg's angle shifts towards lower angle and thereby interplaner spacing 'd' values increases. The lattice constant is found to increase with increase in Cu^{2+} concentration x . The variations in lattice constant as a function of Copper concentration x can be understood on the basis of the ionic radius of the substituted cations. Since the ionic radius of Cu^{2+} ions (0.73Å) is greater than that of Ni^{2+} ions (0.69Å), the substitution is expected to increase the lattice constant with increase in Copper concentration x . When the larger Copper ions enters, the lattice unit cell expansion takes place while preserving overall symmetry this is true as long as the lattice constant increases with substituent of Copper. The values of lattice constant obtained from XRD data for varying Copper concentration x are given in below Table 1. It can be seen from Table 1 and Fig. 3 that, the lattice constant increases with Copper concentration x . The Fig. 4 represents that the particle size increases with substitution x of Cu^{2+} .

3.2 Real Part of Dielectric constant() and imaginary part of Dielectric constant().

Dielectric properties of the ferrites are dependent on the temperature, frequency of applied electric field and its structure. Fig. 5 and Fig.6 show the observed frequency dependence of Real Part of Dielectric constant() and imaginary part of Dielectric constant() for different applied frequency. It is observed from the Fig. 5 and Fig.6, that dielectric properties of spinel ferrite samples that is, Real Part of Dielectric constant() and imaginary part of Dielectric constant() decrease rapidly in the low frequency region and it decreases very slowly in the high frequency region and it is almost frequency independent (constant) at very high frequency above 3.5 MHz. Similar results were observed by several other investigations [Navneet Singh et al., 2011, S.R. Sawant et al., 2002, P.K. Roy et al., 2008, I.H. Gul et al., 2008, M.U. Islam et al., 2004, J. Smit et al., 1959, B.D. Cullity et al., 1978].

This type of dielectric behavior in the ferrites has been explained by the Maxwell–Wagner and Koop's phenomenological theory [A. Verma et al., 2006]. In this model, a dielectric medium is assumed to be made up of highly conducting grains and poorly conducting grain boundaries. The grain boundaries are more effective at lower frequencies while the grains are found to be more effective at higher frequencies.

The rapid decrease of dielectric constant at lower frequencies is explained on the basis of space charge polarization. According to Maxwell and Wagner two-layer model, the space charge polarization is produced in a di-electric material due to the presence of higher conductivity phases (grains) in the insulating matrix (grain boundaries). When an external electric field is applied, the electrons reach the grain boundary through hopping. If the resistance of the grain boundary is high, the electrons pile up at the grain boundaries and produces polarization. This is called space charge polarization. The assembly of space charge carriers in a dielectric takes a finite time to line up their axes parallel to the alternating electric field. If the frequency of the field reversal increases, a point is reached where the space charge carriers cannot keep up with the field and the alternation of their direction lags behind that of the field [C.G. Koops 1951].

Dielectric constants (ϵ') of the material come into the picture from the space charge polarization produced inside the material. In the ferrites, electrons are the main charge carriers and the motion of electrons takes place between Fe^{2+} ions and Fe^{3+} ions present at crystallographically equivalent sites, i.e., octahedral sites (B site).

This is known as the hopping mechanism of electron transfer. The observed decrease in Dielectric constants (ϵ') with the increase in frequency is due to the fact that the electron hopping between Fe^{3+} – Fe^{2+} ions at octahedral sites (B site) cannot follow the alteration of AC electric field at higher frequencies. The electrons have to pass through the well-conducting grains and the poorly conducting grain boundaries. As the grain boundaries have large resistance, the electrons pile up there and produce large space charge polarization. Therefore, the dielectric constants (ϵ' and ϵ'') have large values in low frequency range. With the further increase in frequency, the electrons change their direction of motion rapidly, which hinders the movement of electrons inside the dielectric material and accumulation of charge at the grain boundaries decreases. This decreases the space charge polarization and therefore, the values of the dielectric constants are also reduced at very high frequency and become stable at very high.

These values of dielectric constants real part and imaginary part (ϵ' and ϵ'') increase with increase in x for $[(\text{Cu}_x \text{Co}_{(1-x)} \text{Ni}_{0.8-x})\text{Fe}_2\text{O}_4]$ spinel ferrites. Fig. 5 and Fig. 6 show that the dielectric constants real part and imaginary part (ϵ' and ϵ'') is very high for increased concentration of Cu^{2+} ions, especially for sample D where $x=0.6$ it is high. This is due to the fact that the Cu^{2+} ions replace the Fe^{3+} ions at the A-site easily in comparison to Ni^{2+} ions. The replaced Fe^{3+} ions migrate from A-site to the B-site (tetrahedral to octahedral), which increases the concentration of Fe^{2+} – Fe^{3+} ion pairs at the B-site and therefore the amount of space charge polarization is increased, which leads to increase in the values of dielectric constants. Similar results have been reported for the Li–Ni–Cd, Ni–Cu, Ni–Cu–Al and Li–Mn ferrite systems [J.C. Maxwell 1973, K. Roumaïh 2008, S.S. Ata-Allah et al., 2009, B. Ramesh et al., 2008].

3.3 Dielectric loss ($\tan \delta$):

It is observed that the dielectric loss ($\tan \delta$) decreases as the frequency of the applied AC electric field increases because the jumping frequency of charge carriers cannot follow the frequency of the applied field after certain frequency. Frequency dependence of the dielectric loss ($\tan \delta$) for different values of x is shown in Fig. 7 and it reveals that the dielectric loss increases with the increase in concentration of Cu^{2+} ions. The increase in the concentration of Cu^{2+} ions at the tetrahedral (A) site causes the migration of Fe^{3+} ions to octahedral (B) site. This increased concentration of Fe^{3+} ions increases the hopping rate of electrons between Fe^{3+} and Fe^{2+} ions at the octahedral site and thus leads to the increase in the dielectric loss.

The zig zag peak in the low frequency region of Dielectric loss curve is observed as shown in Fig. 7. This peak in the Dielectric loss curve is observed when the hopping frequency of the electron between Fe^{2+} – Fe^{3+} ions matches with the frequency of the externally applied electric field. It is expected that the peak may be observable in lower frequency range.

The Fig. 7 shows that dielectric loss ($\tan \delta$) decreases at lower frequency. Similar results were observed by several other investigations [R.G. Kharabe et al., 2006, T. Nakamura et al., 1996, A. Verma et al., 2000, L.G. Van Uitert 1995, C. Heck 1974, M.R. Anantharaman et al., 1999]. The values of the average Dielectric constant and Dielectric loss of the ferrite samples are listed in Table 2.

3.4 Dielectric loss ($\tan \delta$):

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3.5 AC conductivity:

It is observed that the AC conductivity remains almost constant in the low frequency region and increases abruptly in the high frequency region Fig. 8. It is well known that the mechanism of the electrical conduction is the same as that of the dielectric polarization. The increase in the AC conductivity with frequency is also understood by the hopping model. As the frequency of the applied electric field increases, the hopping frequency of electrons between Fe^{3+} – Fe^{2+} ions at adjacent octahedral site also increases, leading to increase in the conductivity.

The variation of AC conductivity with the frequency at different concentration of Cu^{2+} ions is shown in Fig. 8. It is observed that the AC conductivity increases with increase in concentration of Cu^{2+} ions $x=0.4$ and further it decreases due to increase in concentration of Cu^{2+} ions $x=0.6$. With the increase in the concentration of Cu^{2+} ions (x), the hopping action of charge carriers increases due to the increased concentration of Fe^{3+} ions at B-site. Similar results have been reported for Ni–Zn and Zn ferrites [T. Jahanbin et al., 2010, N. Sivakumar et al., 2007, N. Ponpandian et al., 2002]. The values of the AC Conductivity at 5 MHz of the ferrite samples are listed in Table 3.

The FT-IR peaks shown in Fig. 9, at 536.114 cm^{-1} , 524.643 cm^{-1} and 532.257 cm^{-1} gives the confirmation of Ferrite.

Table 1:

Variation in bulk density [$d_b(\text{gm/cm}^3)$], Particle size (t) and Lattices Constant (\AA) of Ferrite Samples.

Ferrite Sample	$d_b(\text{gm/cm}^3)$	Particle Size t (nm)	Lattices Constant (\AA)
(C)	3.584	22.52	8.364
(F)	3.615	29.18	8.463
(D)	3.691	33.71	8.581

Table 2:

Variation of Dielectric Constant and Dielectric loss of Ferrite Samples

[($\text{Cu}_x \text{Co}(\text{constant}) \text{Ni}_{0.8-x}$) Fe_2O_4], $\text{Cu}=\text{constant}=0.2$		
X	Avg. Dielectric Constant	Avg. Dielectric loss
(C) For $X=0.6$	28.09914	0.255394
(F) For $X=0.4$	31.01230	0.563892
(D) For $X=0.2$	40.37258	1.122172

Table 3:

AC Conductivity of Ferrite Samples at 5 MHz

[($\text{Cu}_x \text{Co}(\text{constant}) \text{Ni}_{0.8-x}$) Fe_2O_4], $\text{Co}=\text{constant}=0.2$	
x	AC Conductivity at 5 MHz
(C) For $x=0.6$	0.00192734
(F) For $x=0.4$	0.00210402
(D) For $x=0.2$	0.00206424

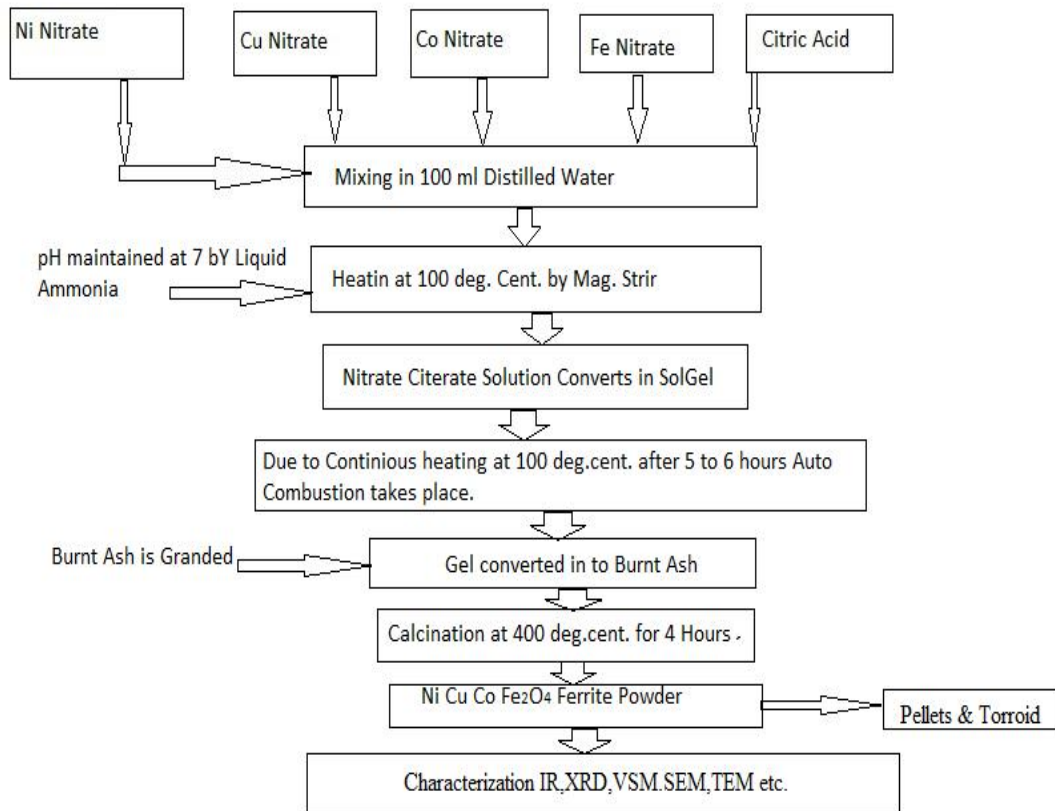


Fig.1: Flow Chart of Sol Gel Method.

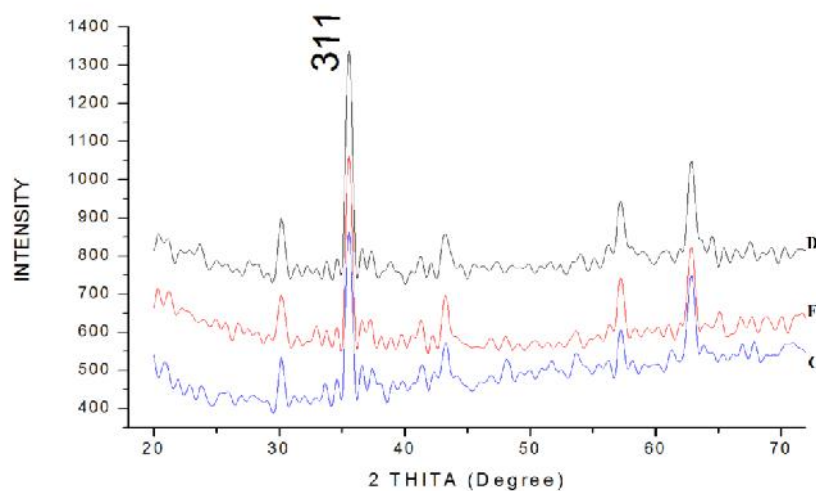


Fig. 2: XRD pattern of D, F and C respectively for $[(\text{Cu}_{0.6}\text{Co}_{0.2}\text{Ni}_{0.2}) \text{Fe}_2\text{O}_4]$, $[(\text{Cu}_{0.4}\text{Co}_{0.2}\text{Ni}_{0.4})\text{Fe}_2\text{O}_4]$ and $[(\text{Cu}_{0.2}\text{Co}_{0.2}\text{Ni}_{0.6})\text{Fe}_2\text{O}_4]$.

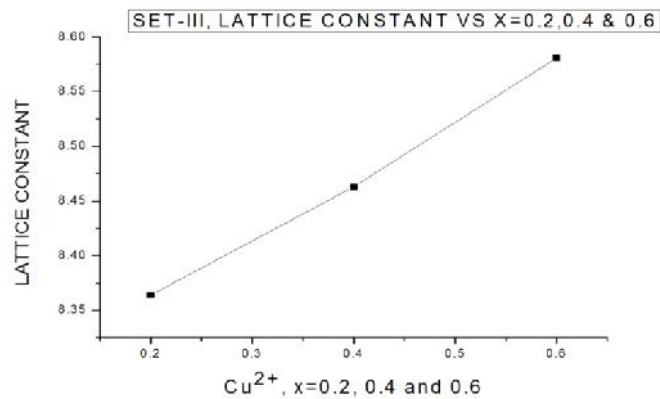


Fig. 3: Variation in Lattice Constant due to substitution of Cu²⁺.

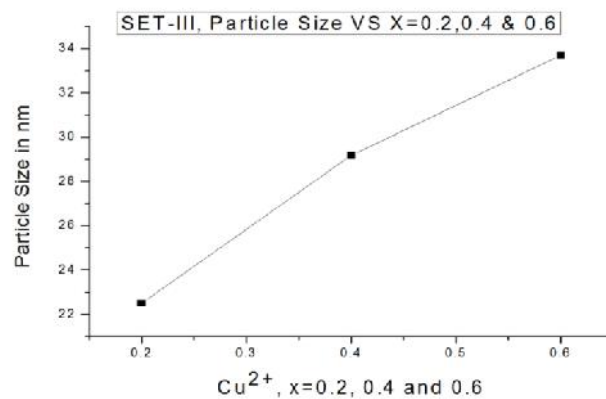


Fig. 4: Variation in Particle size due to substitution of Cu²⁺.

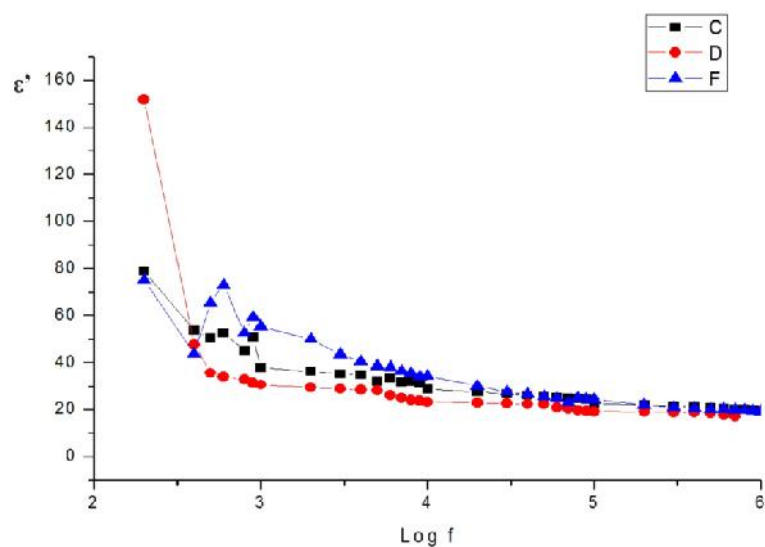


Fig. 5: Variation in Real Part of Dielectric constant() with increase in frequency.

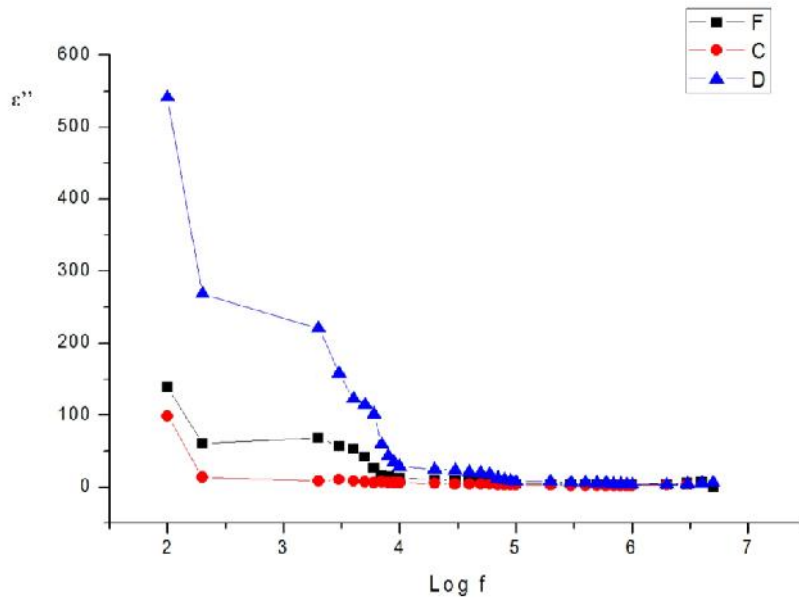


Fig. 6:
 Variation in imaginary part of Dielectric constant() with increase in frequency

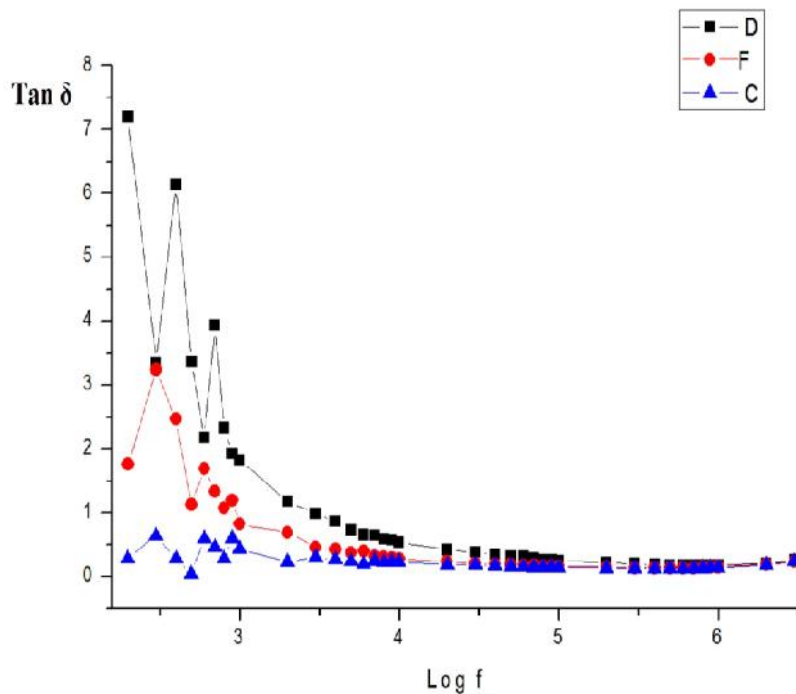


Fig. 7: Variation in dielectric loss (tan) with increase in frequency

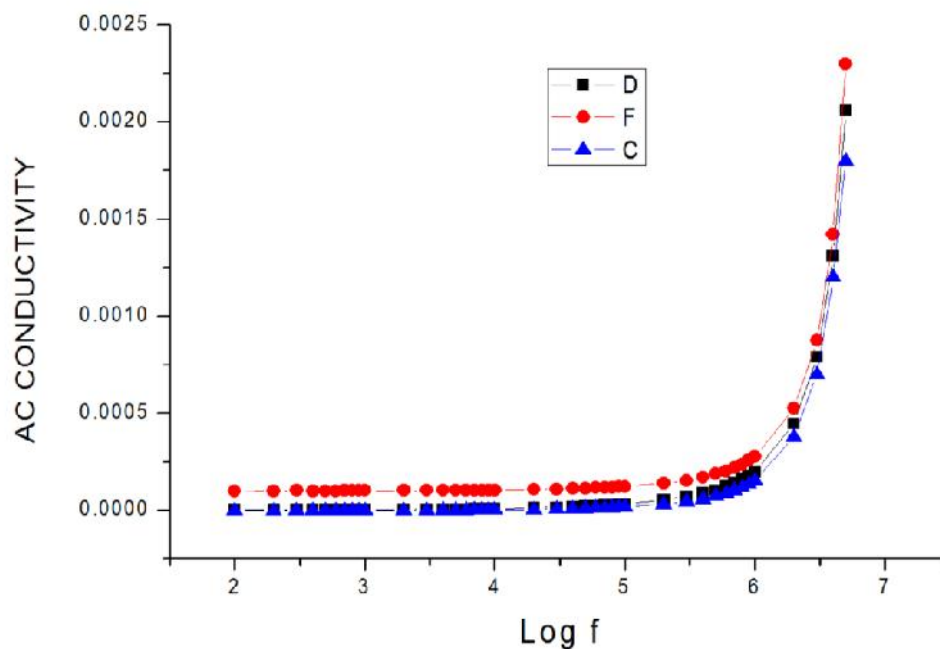


Fig. 8: Variation in AC Conductivity with increase in frequency.

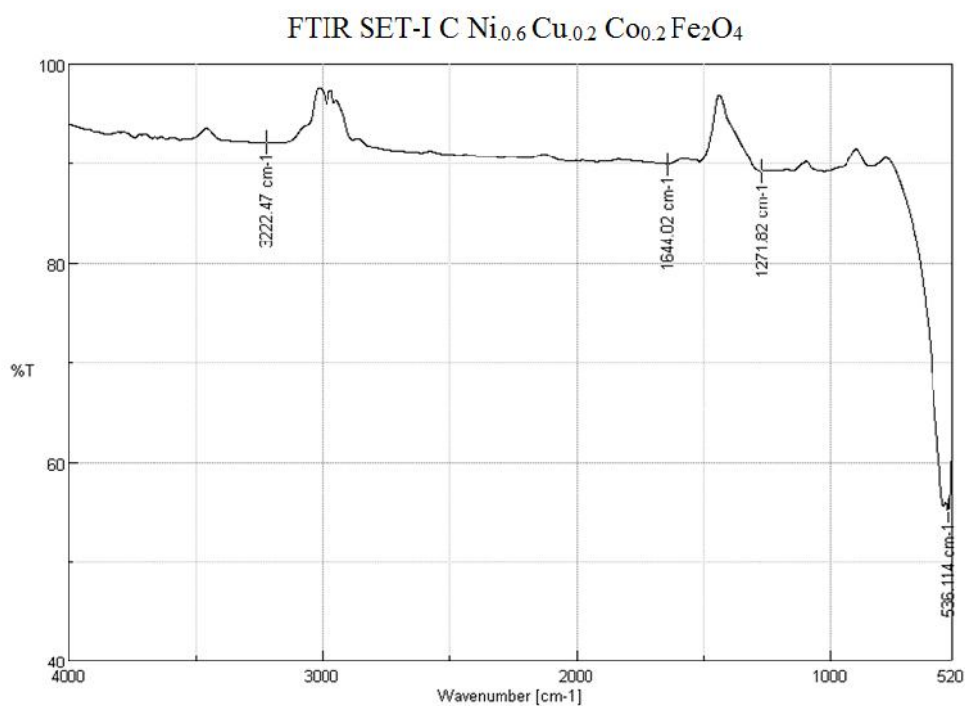


Fig. 9: FT-IR spectra of $[(\text{Cu}_x \text{Co}_{(\text{constant})} \text{Ni}_{0.8-x})\text{Fe}_2\text{O}_4]$.

IV. CONCLUSION

The nanocrystalline ferrite samples $[(\text{Ni}_{0.6}\text{Cu}_{0.2}\text{Co}_{0.2})\text{Fe}_2\text{O}_4][(\text{Ni}_{0.4}\text{Cu}_{0.4}\text{Co}_{0.2})\text{Fe}_2\text{O}_4][(\text{Ni}_{0.2}\text{Cu}_{0.6}\text{Co}_{0.2})\text{Fe}_2\text{O}_4]$ have been successfully prepared by sol-gel auto combustion technique. All the prepared samples show the single phase cubic spinel structure of the samples. The particle grain size obtained from X-ray diffraction data. It clearly shows that the size of the ferrite particles was in the nanometer range. The value of Dielectric constants () increase with increase in substitution x of Cu^{2+} in Ni Co, similarly the AC conductivity also increase with increase in substitution x of Cu^{2+} in Ni Co. The dielectric loss ($\tan \delta$) rapidly decreases at lower frequency and becomes constant at higher frequency. Measurement of the dielectric constant and dielectric loss in the frequency range of 100 Hz–5 MHz showed higher magnitude at lower frequencies and it decreases with increase in frequency. It is observed that value of AC Conductivity initially increases with increase in substitution x of Cu^{2+} in Ni Co up to $x=0.4$ and then decrease with further increase in substitution $x=0.6$ of Cu^{2+} .

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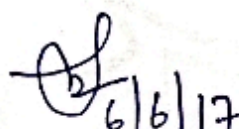
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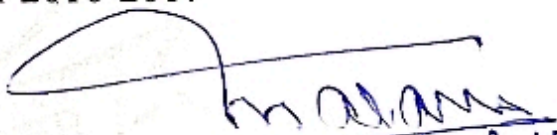
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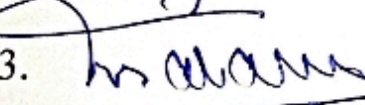

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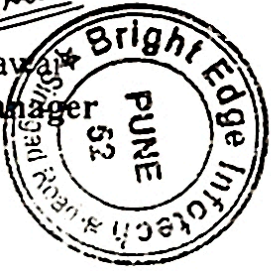
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We found him sincere work towards completing his given project in a timely manner by fulfilling our expectations and end users expectations.

He has always rendered his services with his highest degree of responsibility and professionalism. We wish him all the best and a bright future.

For Brightedge Infotech

Mahesh
Mahesh Gawde
Project Manager

A circular stamp with the text "Bright Edge Infotech" around the top half and "PUNE" in the center. The number "52" is also visible in the center.



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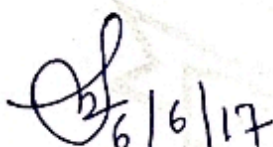
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from the University of Pune

for the academic year 2016-2017

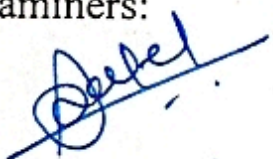

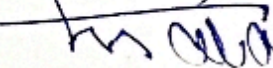

Project Incharge

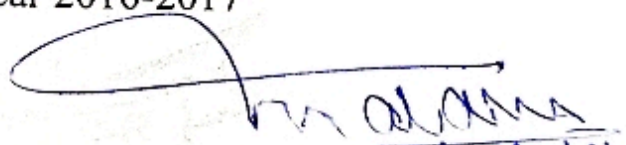
Examiners:

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6.6.17






Head

Dept. of Computer Science

HEAD
Dept. of Computer Science
Poona College, Camp
PUNE-411001.



WEBETRON TECHNOLOGY
Perception beyond Boundries

 www.webetron.in
 contact@webetron.in
 020 - 6540 9090
 Office No. 18, R-Cube Building,
Opposite Vinayak Hospital,
Pune - Mumbai Highway,
Waraje, Pune - 58

Date: 27th Apr 2017

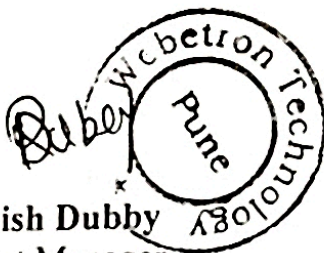
CERTIFICATE

This is to certify that Mr. Shabab Pathan student of AKI's Poona College of Arts, Science and Commerce, Pune has undergone training as a full-time Software Developer Trainee and completed a project on "Document Protechtor" in Webetron Technology at Pune. He has carried out this project from 12th Dec 2016 to 27th April 2017 during this period. He worked 35 Hours per week.

He was involved in entire development life cycle during this project. I found him sincere work towards completing his given project in a timely manner by fulfilling our expectations and end users expectations.

He has always rendered his services with his highest degree of responsibility and professionalism. We wish him all the best and a bright future.

Regards,



Rajnish Dubby
Project Manager



CERTIFICATE

This is to certify that the project entitled
ONLINE GIFT SHOPPING SYSTEM
has been completed successfully by

Shahid Sayyed (10431)

towards the fulfillment of
Master of Computer Science
from the University of Pune
for the academic year 2016-2017

Maadam
Project Incharge
(Maadam Alam)
Examiners:

1. *Devi*

2. *Devi*

3. *Maadam*
G.B.V.R.

Maadam
G.B.V.R.
Head

Dept. of Computer Science

HEAD

Dept. of Computer Science

Poona College, Camp

PUNE-411001

Date: 29 Apr 2017

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Shahid Nasir Sayyed** student of **AKI's Poona College of Arts, Science and Commerce, Pune** has partially completed his project titled **"Online Gift Shopping System"** in our company during the period **13th Dec 2016 to 29th Apr 2017** under the guidance of **Mr. Pankaj Jadhav**.


As per our Confidential Agreement employee shall keep secret any data obtained from company. Employee should not use this data (source code, software, technical and user documentation, business-plans, design versions, information on clients and employees, etc.) in his own interests both while working for company and after completion of his project work.

As per our measurements and reporting structure he is hard working and has been excellent during the training program.

Incraft not provided any source code.

We wish him all the success for his future.

For Incraft Technologies


Pankaj Jadhav
Project Manager

Head Office -
EON IT Tower Road, Knowledge
Park, Kharadi Gaon,
Pune:-411014

Branch Office -
Office No. B-202 Mega Center,
Hadapsar , Pune - 411028

Contact -
Landline: 020-60301832
Mobile No : 91-808-751-5200
Mail: info@incrafttechnologies.co
Web: incrafttechnologies.com

Anjuman Khairul Islam's

POONA COLLEGE OF ARTS, SCIENCE AND COMMERCE

(Affiliated to Savitribai Phule Pune University: ID No. PU/PN/ASC/023/1970)

K.B. Hidayatullah Road, Camp, Pune - 411001. Maharashtra, India

Tel.: +91-20-26454240 / 26446319. Fax: +91-20-26453707

Email : principal@akipoonacollege.ac.in Website: www.akipoonacollege.ac.in



CERTIFICATE

This is to certify that the project entitled

Pune Night Life

has been completed successfully by

Mulla Aslam Imamsab (10435)

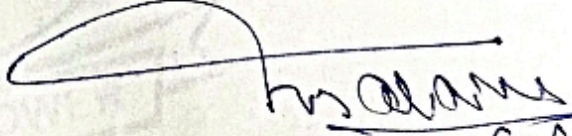
towards the fulfillment of

Master of Computer Science


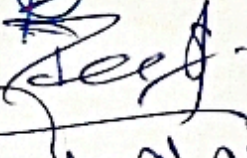
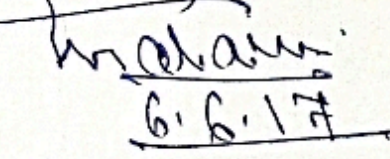
from the University of Pune

for the academic year 2016-2017


6/6/17
Project Incharge


Head 6.6.17
Dept. of Computer Science

Examiners:

1. 
2. 
3. 
6.6.17

HEAD
Dept. of Computer Science
Poona College, Camp
PUNE-411001.



Oxcytech System

Beyond Expectation

Date: 29 April 2017

TO WHOMSOEVER IT MAY CONCERN

This is to certify that,

Mr. Aslam Imamsab Mulla

Has completed the project "**Pune Night Life (PNL)**" work in our organization under the guidance of Mr. Arshad Khan from 25 January, 2017 to 30 April, 2017.

He has worked in our organization. His performance was excellent and we found him honest and dedicated towards his work.

We wish him all the best for his future assignment and endeavor.

For Oxcytech System

Project Manager
(Arshad Khan)





Anjuman Khairul Islam's
POONA COLLEGE OF ARTS, SCIENCE AND COMMERCE

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K.B. Hidayatullah Road, Camp, Pune - 411001. Maharashtra, India

Tel.: +91-20-26454240 / 26446319. Fax: +91-20-26453707

Email : principal@akipoonacollege.ac.in Website: www.akipoonacollege.ac.in




CERTIFICATE

This is to certify that the project entitled
Book My Ticket (Online Event Booking)
has been completed successfully by

Zunain Bashir Bargir (10427)

towards the fulfillment of
Master of Computer Science
from the University of Pune
for the academic year 2016-2017

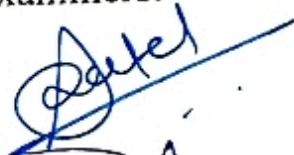
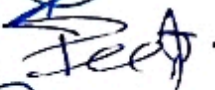
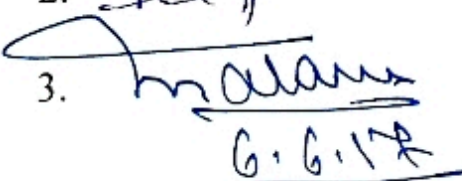

Project Incharge


Examiners:

1.

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6.6.17


Head

HEAD
Dept. of Computer Science
Poona College, Camp
PUNE-411001.



SoftZeal Technology Pvt. Ltd.

Office No. 6, Nirmiti Heights, Beside DCC Computer Mall,
Near Z Bridge, JM Road, Deccan, Pune.
Tel : 020 65 260 111 Email : info@softzeal.com

Date: 30th May 2017

CERTIFICATE

This is to certify that **Mr. Zunain Bargir**, a student of **AKI's Poona College of Arts , Science and Commerce, Pune** has undergone training as a full-time Software trainee completed a project on **"Book My Ticket (Online Event Booking System)"** in **Softzeal Technology Pvt Ltd.** at Pune. He has carried out this project from 12th Dec 2016 to 30th May 2017 during this period.

We found him sincere work towards completing his given project in a timely manner by fulfilling our expectations and end users expectations.

He has always rendered his services with his highest degree of responsibility and professionalism. We wish him all the best and a bright future.

Regards,


(HR Manager)
SoftZeal Technology Pvt. Ltd.





Anjuman Khairul Islam's
POONA COLLEGE OF ARTS, SCIENCE AND COMMERCE

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Email : principal@akipoonacollege.ac.in Website: www.akipoonacollege.ac.in



CERTIFICATE

This is to certify that the project entitled

Stock Manager System

has been completed successfully by

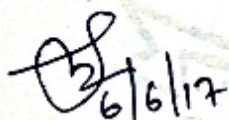
Sonali Borde (10432)

towards the fulfillment of

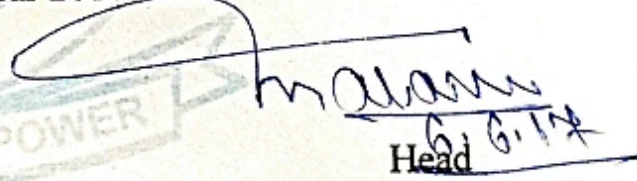
Master of Computer Science

from the University of Pune

for the academic year 2016-2017


6/6/17

Project Incharge

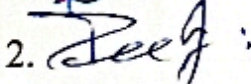

6/6/17

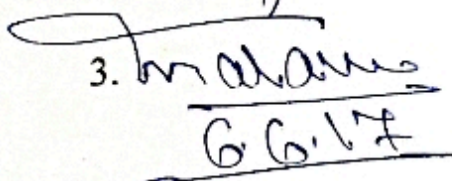
Head

Dept. of Computer Science

Examiners:

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6/6/17

HEAD
Dept. of Computer Science
Poona College, Camp
PUNE 411001



YUGMA
SOFTTECH

Date: 31/05/2017

CERTIFICATE

This is certify that **Miss. Sonali Borde** student of "AKI's Poona College Of Arts, Commerce & Science, Pune" has completed internship as a part of her Final Semester, "M.Sc.(Computer Science)" course curriculum as per the **Savitribai Phule Pune University** for regulation for the academic year 2016-2017.

She has partially completed "**Stock Manager System**" organization from 13th Dec 2016 to till date. She was pursuing project under the guidance of Mr. Nagesh More. During her tenure, we found her to be hard working, conscientious & responsible trainee. The feed back of her participant has always been positive.

Wish success in all her future endeavors.

Sincerely,


(Project Manager)



Anjuman Khairul Islam's
POONA COLLEGE OF ARTS, SCIENCE AND COMMERCE

(Affiliated to Savitribai Phule Pune University: ID No. PU/PN/ASC/023/1970)

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Tel.: +91-20-26454240 / 26446319. Fax: +91-20-26453707

Email : principal@akipoonacollege.ac.in Website: www.akipoonacollege.ac.in



CERTIFICATE

This is to certify that the project entitled

Translation Community Portal

has been completed successfully by

Salman Herurkar (10429)

towards the fulfillment of

Master of Computer Science

from the University of Pune

for the academic year 2016-2017


6/6/17
Project Incharge


5.6.17
Head

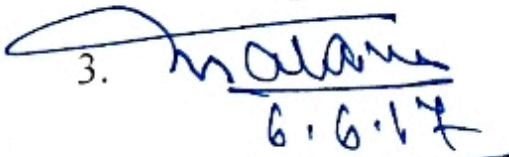
Dept. of Computer Science
HEAD

Dept. of Computer Science
Poona College, Camp
PUNE-411001.

Examiners:

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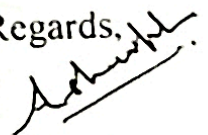
3. 
6.6.17

Date: 02/05/2017

CERTIFICATE

This is to certify that Mr. Salman Shafi Herurkar student of Poona College of Arts, Science and Commerce has worked on the project titles Translation Community Portal at Alfa Infotech, Pune, during the period of Industrial training.

In this tenure he has shown keen interest in the work and had executed the work with sincerity.

Regards,


Shaikh M.A.
(Project Manager)

Anjuman Khairul Islam's

POONA COLLEGE OF ARTS, SCIENCE AND COMMERCE

(Affiliated to Savitribai Phule Pune University: ID No. PU/PN/ASC/023/1970)

K.B. Hidayatullah Road, Camp, Pune - 411001. Maharashtra, India

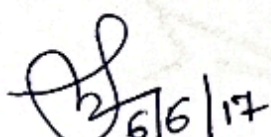
Tel.: +91-20-26454240 / 26446319. Fax: +91-20-26453707

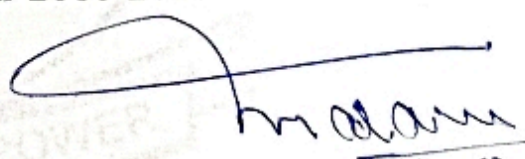
Email : principal@akipoonacollege.ac.in Website:www.akipoonacollege.ac.in

CERTIFICATE

This is to certify that the project entitled
Customer Relational Management (CRM)
has been completed successfully by
Habeeburrahman Manzoor Ahmed (10433)

towards the fulfillment of
Master of Computer Science
from the University of Pune
for the academic year 2016-2017


6/6/17
Project Incharge

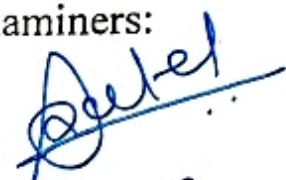

Head 6/6/17
Dept. of Computer Science

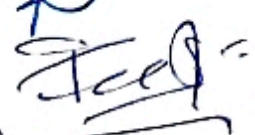
Examiners:

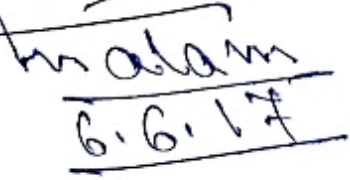
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6.6.17

HEAD
Dept. of Computer Science
Poona College, Camp
PUNE-411001.



PRECURSOR
Infotech Private Limited

Date: 22nd April 2017

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Habeeburrahman manzoor Ahmed** student of **AKI's Poona College of Arts, Science and Commerce, Pune** has partially completed his project titled "**Customer Relational Management**" in our company during the period 20th Dec 2016 to 22nd April 2017.

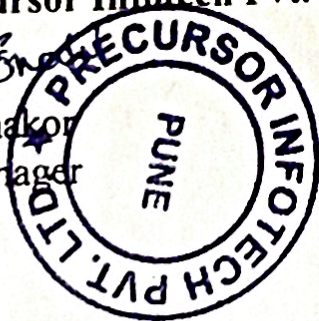
As per our Confidential Agreement employee shall keep secret any data obtained from company. Employee should not use this data (source code, software, technical and user documentation, business-plans, design versions, information on clients and employees, etc.) in his own interests both while working for company and after completion of his project work.

As per our measurements and reporting structure he is hard working and has been excellent during the training program.

We wish him all the success for his future.

For Precursor Infotech Pvt. Ltd.

Sonali Chakor
HR - Manager





ACTIVITY REPORT

(2018 - 2019)

I. Basic Details:

Name of The Activity: Educational Trip to Bhaskaracharya Pratishthan, Pune			
Date	Faculty	Department/ Committee	Coordinator Name & Phone no.
15/01/2017	Science	Mathematics	Dr. Amjad Shaikh Mob No. 9890627503
Time	Venue	Activity for class/ group & student number	Nature: Academic/co- curricular / extracurricular/ Environmental/ social/ other
One day (5.30 am to 10.30 pm)	Bhaskaracharya Pratishthan, Pune	S.Y. /T.Y.B.Sc. (Mathematics)	Co-curricular

II. Brief Information about the Activity (Criterion no - II):

Topic/ Subject of the activity	: Educational Trip to Bhaskaracharya Pratishthan, Pune
Objective for conducting the activity	<ul style="list-style-type: none">To encourage and motivate students for higher studies in reputed institutesTo explore future prospect of mathematics and statisticsTo expose renowned institutes in India
Methodology	Faculty members from department of mathematics, Bhaskaracharya Pratishthan interacted and guided students about further teaching and research opportunities and industrial applications of mathematics and statistics.
Outcome	18 Students from S.Y./T.Y. B.Sc. have participated and had an amazing experience. Students have learned and gained valuable information about further career opportunities in mathematics and pursuing higher studies at premier education institutes in India.

III. Proofs attached:

1. Notice and Permission letter	2. Student list of participation	3. Photos
4. Report	5. Feedback	6.



ANALYSIS OF FEEDBACK (PUT NUMBERS IN RESPECTIVE BOXES)

Details (Mention the Numbers for analysis)	No/Poor	OK	Good	Excellent
1. The title of the program was correct and to the mark?	00	02	06	10
2. The program was declared well in advance	00	00	07	11
3. How was the program?	00	02	07	09
4. Did the program start in time and complete in time?	00	03	05	10
5. Would you like such programs?	00	01	04	13

Total: 18

List of qualitative feedbacks:

Analysis of descriptive feedback

1. This educational trip was highly beneficial for all the students
2. Students have learned a lot about future opportunities and scope for pursuing further studies in mathematics
3. This was an amazing experience for all the students to visit prestigious institute like IIT, Mumbai. They all have inspired and motivated to study in such kind of reputed institute.
4. They also enriched with industrial applications, teaching and research opportunities of mathematics and statistics

A BRIEF REPORT ON ONE DAY EDUCATIONAL TOUR TO BHASKARACHARYA PRATISHTHAN, PUNE ON 15TH JANUARY 2017.

Educational tours are accepted as an essential part of education which gives us ideas likewise opportunities to visit prestigious places that may help to visualize what students are learning at college. Move over, it is important for every student to acquire more knowledge through actual exposure to the different places.

The Department of Mathematics, Poona College has organized an educational tour for T.Y.B.Sc. (Mathematics) students on 15th January 2017 to Pune, Mr. Amjad Shaikh (In charge Teacher) and 18 students (11 Girls and 7 Boys) visited together to Bhaskaracharya Pratishthan, Pune . It was an exciting and worthwhile visit for all of us and team building experience.

Bhaskaracharya Pratishthan is a Pune based Mathematics Institute founded in 1976 by the world famous Indian Mathematician Prof. Shreeram Abhyankar for conducting research in Higher Mathematics. Over the years a number of students studied under the guidance of Prof. Abhyankar and obtained their Ph.D. degree in India or abroad. Since 1992 the Pratishthan has also been a recognized centre for conducting Regional Mathematics Olympiad (RMO) under the National Board for Higher Mathematics (NBHM) for Maharashtra and Goa Region. Besides this the Pratishthan holds annual / biennial conferences/Workshops in some research areas in higher mathematics attended by Indian/Foreign scholars and Professors. The Pratishthan has organised a number of Workshops for research students and college teachers under the aegis of NBHM/NCM.

All the students reached to Bhaskaracharya Pratishthan at 9.30 am. Administrative staff welcomed all of us then at 10.00am Prof. S.A. Katre, Professor, Department of Mathematics, Savitribai Phule Pune University, delivered a lecture on “Isomorphism theorem” from 10.00am to 12.00pm. The lecture started with introduction and functioning of Bhaskaracharya Pratishthan. After this Prof . Katre has explained various concepts of Algebra like solution of equation geometrically, groups , normal subgroup, symmetrical group, abelian and nonabelian group and so on. Prof. Katre also thrown some light on application of groups in coding theory where he explained about how secret messages can be encrypted. Then sir explained about the correlation of Isomorphism theorems in Groups, Linear algebra and Ring theory in which he has clarified that how cosets are identified with points. The lecture concluded with question and answer session.

At the end Mr. Amjad Shaikh the tour In- Charge felicitated Prof. Katre by giving him flowers as a token of love and gratitude from department of mathematics, Poona College, Pune and acknowledged him.

Finally Mr. Rahematullah student of T.Y. B. Sc. Mathematics proposed vote of thanks. Students were very delighted and enjoyed the visits. It was very fruitful and learning experience for all the students. The visit comes to end at 12.30 pm.



Students of TYBSc during educ. tour to bhaskaracharya pratishthan, pune on 15th january 2017

AKI's
POONA COLLEGE OF ARTS, SCIENCE & COMMERCE, PUNE

DEPARTMENT OF MATHEMATICS

NOTICE

Date: 11/01/2017

It is hereby informed to all the students of T.Y. B.Sc.(Mathematics) that Department of Mathematics is organizing an Educational tour to Bhaskaracharya Pratishthan, Pune on 15th January 2017. Dr. S. Katre, Professor, Department of Mathematics, Savitribai Phule Pune University, delivering lecture on "Isomorphism theorem" from 10.00am to 12.00pm. All the students of T.Y. B.Sc. are advised to submit their names to Mr. Amjad Shaikh on or before 14/01/2017.



Head

Department of Mathematics

N.B



BHASKARACHARYA PRATISHTHANA

Bhaskaracharya Institute of Mathematics

Reg. No. MAH/1127/(POONA) (F-967)

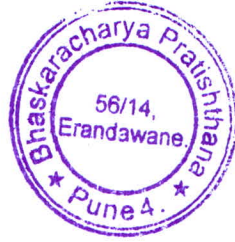
Tel.: 020-25434547 / 25410724

Custodian :

(An Educational and Research Institute in Mathematics)

CERTIFICATE

This is to certify that T. Y. B. Sc. Mathematics Students from Poona College, Pune alongwith Prof. Amjad Shaikh (Incharge) visited Bhaskaracharya Pratishthana on Sunday, 15th January, 2017 and they also attended a lecture on "Isomorphism Theorems" by Prof. S. A. Katre, S. P. Pune University, arranged at Bhaskaracharya Pratishthana, Pune.



(S. A. Katre)

Custodian


Bhaskaracharya Pratishthana


AKI'S
POONA COLLEGE OF ARTS, SCIENCE & COMMERCE, PUNE
DEPARTMENT OF MATHEMATICS
Educational tour to Bhaskaracharya Pratishthan (2016-17)
Attendance Sheet

Class: T.Y. B. Sc.

Date : 15/01/2017

Sr. No.	Name of Student	Roll No.	Sign
1.	Bandarkar Zainab A Salam	K-0951	Zainab
2.	Shaikh Gousia Altaf	K-0952	Gousia
3.	Faqiri Rahmatullah Azizullah	K-0953	Rahmatullah
4.	Ansari Shahabaz Kayum	K-0954	Shahabaz
5.	Attar Saniya Sultan	K-0955	Saniya
6.	Chivilkar Amani M. Mubeen	K-0956	
7.	Tamboli Nishat Mohd. Rafique	K-0957	
8.	Inamdar Sajeda Badsha	K-0958	
9.	Bilagi Arbina Nazir Ahmad	K-0959	Bilagi
10.	Hannure Firdous Lal mohd.	K-0960	
11.	Shaikh Khatija Farooque	K-0961	Khatija
12.	Khan Hanifa K. M. Aslam	K-0962	
13.	Tiwari Swati Ashok	K-0963	Swati
14.	Lalngil Neia Rinsanga	K-0964	Neia
15.	B. Vanlal Ruata	K-0965	Vanlal
16.	Shaikh Sauleha Shueb	K-0966	Sauleha
17.	Kalyani Tabassum Ahmed Ali	K-0967	
18.	Bendre Amruta Nagnath	K-0968	Amruta
19.	Warang Deepali Satyawar	K-0969	Deepali
20.	Khan Supina Nizam	K-0970	Supina
21.	Khundrakpam Amarjit Shamu	K-0971	Amarjit
22.	Korade Gayatree Kisan	K-0972	Gayatree
23.	Vengotolu Nyekha	K-0973	
24.	Medovinu Kengurusie	K-0974	
25.	Ngiazili Azyu Azzau	K-0975	Ngiazili
26.	Phungmi R Shimray	K-0976	Phungmi
27.	Lemtise	K-0977	
28.	Zain Mirza	K-0978	Zain


Mr. Amjad Shaikh
(In-Charge)


Head Department of Mathematics
 Poona College of Arts, Science & Commerce,
 Camp, Pune - 411001

Anjuman Khairul Islam's

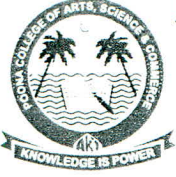
POONA COLLEGE OF ARTS, SCIENCE AND COMMERCE

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K.B. Hidayatullah Road, Camp, Pune - 411001. Maharashtra, India

Tel.: +91-20-26454240 / 26446319. Fax: +91-20-26453707

Email : principal@akipoonacollege.ac.in Website:www.akipoonacollege.ac.in



Date: 14/01/2017

To,
The Director,
Bhaskaracharya Pratishthan,
Educational and Research Institute,
Erandwane, Pune

Subject : Seeking permission to visit your esteemed Institute.

Sir,

The Poona college of Arts, Science & commerce was founded in the year 1970 by the Anjuman Khairul Islam (A.K.I.) Mumbai and is affiliated to Savitribai Phule Pune University, Pune .The college offering education ranging from under graduate program to Doctoral degrees in different disciplines. As a part of the curriculum, the students are required to undertake Institutional Visits to a few institutes of repute. We feel it will be fruitful that the students with academic background have a glimpse of the institutes like yours in order to have a better appreciation.

As per telephonic conversations about confirmation of educational tour to Bhaskaracharya Pratishthan, on 15th January 2017, we are highly grateful to you and would like to send a batch of about 28 students of T.Y.B.Sc. Mathematics class to visit your esteemed institute. Since your institute is conducting lectures on various topics, therefore we seek the permission for our students to attend the lecture of their interest in future. We assure you that our students will observe the rules and regulations that are prescribed by your institute for the visitors and will in no way disturb the functioning of the institute during their visit. Name of faculty member accompanied with students is given below and list of students is enclosed herewith.

Mr. Amjad Shaikh

In- Charge

We shall be grateful for a favorable response.

Thanking You

Mrs. Atiya Khan
Head

Department of Mathematics

Seeween
15-1-17
BHASKARACHARYA PRATISHTHANA

NOTICE

Bhaskaracharya Pratishthana is organising a lecture series for S.Y. B.Sc. and T.Y. B. Sc. students **during August 2017 to January 2018**. The details are as follows:

Class	Day	Time
T.Y. B. Sc.	Every Wednesday	5.00 p.m. to 7.00 p.m.
S.Y. B. Sc.	Every Friday	5.00 p.m. to 7.00 p.m.

(Interested F. Y. B. Sc. students may attend lectures for S. Y. B. Sc. Students.)

Venue : Bhaskaracharya Pratishthana

Additional special lectures may be conducted from time to time.

First lectures in these series will be as follows:

1. T. Y. B. Sc. Wednesday, 9th August 2017. Lecture by Dr. Aditi Phadke.
2. S. Y. B. Sc. Friday, 11th August 2017. Lecture by Prof. Nanasaheb Phatangare.

Topics to be discussed :

T. Y. B. Sc.: Problems in Linear Algebra, Analysis, Group Theory, Differential Equations.

S. Y. B. Sc.: Calculus of One Variable, Theory of Equations, Linear Algebra.

Registration Fee : Rs. 1000/- (to be paid in the office of Bhaskaracharya Pratishthana)

Interested students should give their information in the office of BP or send an email to bpofficepune@gmail.com in the format as below and attend the lectures:

I wish to register for the Lecture Series for S.Y./T.Y. B.Sc. Students organised by Bhaskaracharya Pratishthana in 2017-18. My details are as follows:

CLASS: F.Y. B.Sc. / S.Y. B.Sc. / T.Y. B.Sc.

Name: _____

Mobile No.: _____ **Email ID:** _____

Name of the College: _____

NOTICE

Bhaskaracharya Pratishthana is organising a lecture series for S.Y. B.Sc. and T.Y. B. Sc. students during August 2017 to January 2018. The details are as follows:

Class	Day	Time
T.Y. B. Sc.	Every Wednesday	5.00 p.m. to 7.00 p.m.
S.Y. B. Sc.	Every Friday	5.00 p.m. to 7.00 p.m.

(Interested F. Y. B. Sc. students may attend lectures for S. Y. B. Sc. Students.)

Venue : Bhaskaracharya Pratishthana

Additional special lectures may be conducted from time to time.

First lectures in these series will be as follows:

1. T. Y. B. Sc. Wednesday, 9th August 2017. Lecture by Dr. Aditi Phadke.
2. S. Y. B. Sc. Friday, 11th August 2017. Lecture by Prof. Nanasaheb Phatangare.

Topics to be discussed :

T. Y. B. Sc.: Problems in Linear Algebra, Analysis, Group Theory, Differential Equations.

S. Y. B. Sc.: Calculus of One Variable, Theory of Equations, Linear Algebra.

Registration Fee : Rs. 1000/- (to be paid in the office of Bhaskaracharya Pratishthana)

Interested students should give their information in the office of BP or send an email to bpofficepune@gmail.com in the format as below and attend the lectures:

I wish to register for the Lecture Series for S.Y./T.Y. B.Sc. Students organised by Bhaskaracharya Pratishthana in 2017-18. My details are as follows:

CLASS: F.Y. B.Sc. / S.Y. B.Sc. / T.Y. B.Sc.

Name: _____

Mobile No.: _____ **Email ID:** _____

Name of the College: _____



Y & M Anjuman Khairul Islam's

POONA COLLEGE OF ARTS, SCIENCE AND COMMERCE

(Affiliated to Savitribai Phule Pune University: ID No. PU/PN/ASC/023/1970)

ACTIVITY REPORT

(2016 - 2017)

I. Basic Details:

Name of The Activity: Educational Visit To Water Treatment Plant, Camp Pune			
Date	Faculty	Department/ Committee	Coordinator Name & Phone no.
27/02/ 2017	Science	Zoology	Dr. Kalim Shaikh (7972224513)
Time	Venue	Activity for class/ group & student number	Nature: Academic/co- curricular / extracurricular/ Environmental/ social/ other
10:00 am to 4:00pm	Water Treatment Plant, Camp Pune	T.Y B. Sc. (Zoology) and M.Sc. II (Zoology) 55	co- curricular

II. Brief Information about the Activity (Criterion no -)::

Topic/ Subject of the activity	Educational Visit To Water Treatment Plant, Camp Pune
Objective for conducting the activity	To understand the live process of water purification for public use
Methodology	Live Demonstration
Outcome	Students experienced the whole process of water purification with respect to Coagulation, Flocculation, Sedimentation, Filtration, Disinfection, Sludge Drying, Fluoridation, and pH Correction processes.

III. Proofs attached: letters/ student list of participation/ certificate/ document/photos/ any other

1. Permission letter	2. Student Attendance	3.
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AKI's
Poona College of Arts, Science & Commerce, Camp,
Pune-1

DEPARTMENT OF ZOOLOGY

Educational Visit To Water Treatment Plant, Camp Pune.

The Department of Zoology, organized a field visit to Water Treatment Plant, Camp Pune on 27th February, 2017 to study the various mechanisms of water purification. The total 55 Students of T.Y B. Sc. Zoology and Second Year M.Sc. Zoology along with three staff members were participated in the visit. During visit the technician Shri. Bhandare demonstrated to the students the whole live process of water purification and explained the details about Coagulation, Flocculation, Sedimentation, Filtration, Disinfection, Sludge Drying, Fluoridation, and pH Correction processes which are very important and useful for purification of water.

For the successful visit Dr. Kalim Shaikh, Dr. Shoeb Ahmad and Ms. Noorulain Tadvī took great efforts. The visit was coordinated by Dr. Kalim Shaikh .

**Photography is Strictly Prohibited at Water
Treatment Plant, Camp Pune**

AKI's
**POONA COLLEGE OF ARTS, SCIENCE & COMMERCE, CAMP,
PUNE - 1**

Department of Zoology

Educational Visit To Water Treatment Plant Camp, Pune

Date: 27/02/2017

SR. NO.	ROLL NO.	NAME OF STUDENTS	SIGN
1.	0851	Panday Shubham Beed	<u>Shubham</u>
2.	0852	Shaikh Nidah Aslam	<u>Nidah</u>
3.	0856	Khan Sana Nulbahan	<u>Sana</u>
4.	0861	Khatib Asiya Tahir	<u>As.</u>
5.	0855	Sayyed Samrin Farooq	<u>Samrin</u>
6.	0853	Shaikh Inam Riyaz	<u>Inam</u>
7.	0854	Shaikh Sana Saifya Rabil	<u>Sana</u>
8.	0857	EM Vaishakh EM Muthu	<u>Em</u>
9.	0858	Shaikh Aysha Kulsum	<u>Aysha</u>
10.	0860	Shaikh Arbaz Riyaz	<u>Arbaz Shaikh</u>
11.	0859	Shaikh Mushira Rashid	<u>Mushira</u>
12.	0862	Shaikh Afiya Sajid	<u>Afiya</u>
13.	0863	Kumbh Tashir Rafiq	<u>T. Tashir</u>
14.	0864	Shaikh Afiya Shafik	<u>Afiya Shafik</u>
15.	0865	Baqwan Aalya Riyaz	<u>Afiya</u>
16.	0866	Umme Adiba Mohd. Ashra	<u>Umme</u>
17.	0867	Tajmat Shifa Shafique	<u>Shifa T.</u>
18.	0868	Shaikh Jasmeen Rafique	<u>R. Shaikh.</u>
19.	0869	Ahmed Rukhsar Wiyaz	<u>Ramiyaz</u>
20.	0870	Ansari Samin Akubakkar	<u>A Samin A.</u>
21.	0871	Shaikh Afiya Kulsoom	<u>A. Kulsoom</u>
22.	0872	Chotmal Ashwini Rajendra	<u>Chotmal</u>
23.	0873	Saima Akil Sundke	<u>Saima</u>

24.	874	Tamboli Heena Mohamed	<u>Heena</u>
25.	0875	Fareeda Khan	Fareeda
26.	0876	Shaikh Saleha Gulab	Saleha
27.	0877	Shaikh Sana Zakir H	Sana
28.	0878	Shaikh Alfiya Anif	Alfiya
29.	0879	Shaikh Sahib Anif	Sahib
30.	880	Khare Aishwariya Sanjay	Aishwariya
31.	0881	Shoeb Ahmed	Shoeb
32.	0882	Tikundi Simran K.	Simran
33.	0883	Gupta Prachal	Prachal
34.	0884	Sayed Shifa Shakeel	Shifa Say.
35.	0885	Aga Afroz Jorhaz	Afroz
36.	0886	Shaikh Almas Zeeshan	Almas
37.	0887	Shaikh Afsana Bashir	Afsana
38.	0888	Patthan Alisha Rafique K.	Alisha
39.	0889	Mariyam Khan	<u>Mariyam</u>
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AKI's
**POONA COLLEGE OF ARTS, SCIENCE & COMMERCE, CAMP,
 PUNE - 1**

Department of Zoology

**Educational Visit For M.Sc. Zoology To Water Treatment
 Plant Camp, Pune**

Date: 27/02/2017

SR. NO.	ROLL NO.	NAME OF STUDENTS	SIGN
1.	5738	Nuzhat Naqbal	<i>Nuzhat</i>
2.	5733	Shireen Qudri A. Halif	<i>Shireen</i>
3.	5728	Apurva Tadhar	<i>Apurva</i>
4.	5732	Dipti Kshatruya Krishna	<i>Dipti</i>
5.	5735	Chandni Jaleel Hushye	<i>Jaleel Chandni</i>
6.	5727	Asra Naim Khan	<i>Asm</i>
7.	5734	Monica Kamble	<i>Monica</i>
8.	5739	Insha Naseer Ahmed	<i>Insha</i>
9.	5721	Saniya Wankar Usman	<i>Saniya</i>
10.	5737	Kevinemou Zhosale Soliezou	<i>Kevinemou</i>
11.	5736	Lozima Talukder	<i>Lozima</i>
12.	5730	Swati Sonkamble	<i>Swati</i>
13.	5724	Shifanez Shaikh	<i>Shifanez</i>
14.	5729	Amandeep Kaur. B	<i>Amandeep</i>
15.	5731	Anshu Chandradew Seth	<i>Anshu</i>
16.	5723	Alfiya Tamboli Samal	<i>Alfiya</i>
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Y & M Anjuman Khairul Islam's
**POONA COLLEGE
OF ARTS, SCIENCE AND COMMERCE**

(Affiliated to Savitribai Phule Pune University: ID No. PU/PN/ASC/023/1970)

ACTIVITY REPORT

(2016 - 2017)

I. Basic Details:

Name of The Activity: Educational Visit To Central Bee Research & Training Institute (CBRTI)			
Date	Faculty	Department/ Committee	Coordinator Name & Phone no.
13/01/2017	Science	Zoology	Dr. Kalim M. Shaikh (7972224513)
Time	Venue	Activity for class/ group & student number	Nature: Academic/co- curricular / extracurricular/ Environmental/ social/ other
10:00 am to 4:00 pm	Central Bee Research & Training Institute (CBRTI)	S.Y. B.Sc. Zoology Students 57	co- curricular

II. Brief Information about the Activity (Criterion no -)::

Topic/ Subject of the activity	Educational Visit To Central Bee Research & Training Institute (CBRTI)
Objective for conducting the activity	To Learn techniques of artificial beekeeping
Methodology	Live Demonstration
Outcome	Students came to know about the different caste and division of labour in Bee colony, identification of Queen, Worker and Drone bees on the basis of morphological features.

III. Proofs attached: letters/ student list of participation/ certificate/ document/photos/ any other

1. Permission letter	2. Students attendance	3. Photos
4.	5.	6.



Y & M Anjuman Khairul Islam's

POONA COLLEGE OF ARTS, SCIENCE AND COMMERCE

(Affiliated to Savitribai Phule Pune University: ID No. PU/PN/ASC/023/1970)

DEPARTMENT OF ZOOLOGY

Educational Visit To Central Bee Research & Training Institute (CBRTI) (For S.Y.B.Sc.) BRIEF REPORT

The Department of Zoology organized an educational visit for S.Y.B.Sc. Zoology students. They visited at Central Bee Research & Training Institute, Shivajinagar, Pune on 13/01/2017 (Friday) to study Artificial Beekeeping Management and Practice. About 57 students of S.Y. B.Sc. Zoology were accompanied by teachers Dr. Kalim M. Shaikh & Ms. Anjum M. Pathan. Technical experts of CBRTI, Mr. Pokhre, Mr. Bodke and Mr. Bhillare gave the detail information about artificial beekeeping session wise. In first session, students visited the museum. In second session, Mr. Bodke showed different types of beekeeping equipments and gave information about it. In the last session students were taken to field for practical demonstration of Bee Colonies. Mr. Bhillare showed different caste and division of labour in Bee colony. He also explained about identification of Queen, Worker and Drone bees on the basis of morphological features. The visit was coordinated by Dr. Kalim Shaikh.

Dr. Kalim Shaikh
Coordinator



Y & M Anjuman Khairul Islam's

POONA COLLEGE OF ARTS, SCIENCE AND COMMERCE

(Affiliated to Savitribai Phule Pune University: ID No. PU/PN/ASC/023/1970)

PHOTOGRAPH



S.Y.B.Sc (Zoology) student group along with Teachers, Dr. Kalim Shaikh and Ms. Anjum Pathan at CBRTI, Shivajinagar, Pune.

(Dated: 13.01.2017)

6

Anjuman Khairul Islam's



POONA COLLEGE OF ARTS, SCIENCE AND COMMERCE

(Affiliated to Savitribai Phule Pune University: ID No. PU/PN/ASC/023/1970)

K.B. Hidayatullah Road, Camp, Pune - 411001. Maharashtra, India

Tel.: +91-20-26454240 / 26446319. Fax: +91-20-26453707

Email : principal@akipoonacollege.ac.in Website: www.akipoonacollege.ac.in



Date: 28/12/2016

To
The Director
Apiculture Institute,
Shivaji Nagar,
Pune - 5

Sir,

Our S.Y. B.Sc Zoology students have to visit Apiculture Institute to study Artificial Bee Keeping. The visit is compulsory part of their syllabus. (No. of the students are 60)

Kindly allow us to visit the Institute. We request you to give us suitable date and time as per your convenience.

About 30 students with one staff member will visit the institute on the date allotted as per your permission.

Thanking you,

Yours Faithfully

Dr. Rafique Sarkhawas
Principal

Head
Department of Zoology
Department of Zoology
Poona College of Arts, Science
and Commerce, Camp-Pune-I

Visited on 13.01.2017

Dated 13.01.2017 Time 11.00 A.M.

Chemistry - 11/1/17
Botany - 11/1/17
Geology - 11/1/17

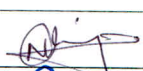




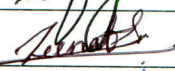


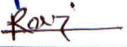
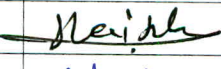


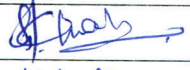

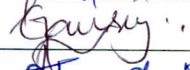

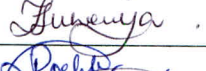
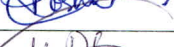

04.01.2017

Shri. B. H. More - 8412065770

AKI's
POONA COLLEGE OF ARTS, SCIENCE &
COMMERCE, CAMP, PUNE - 1

DEPARTMENT OF ZOOLOGY

**Educational Visit of S.Y.B.Sc (Zoology)
To Central Bee Research & Training Institute
(CBRTI) Shivajinagar, Pune**

Date: 13/01/2017			
SR. NO.	ROLL NO.	NAME OF STUDENTS	SIGN
1.	531	Alure Nabiyi Ramzan	
2.	526	Khan Gulafsha N	
3.	609	Shaikh Ratifa	
4.	518	Nasreen Abdullah Shaikh	
5.	509	Khan Sufiya	
6.	617	Sayyed Zeenat	
7.	515	Bushra A. Shaikh	
8.	502	Shaikh Amrin mohd	
9.	503	Shaikh Raziya	
10.	501	Shaikh Fiza	
11.	512	Tanzila Khan	
12.	625	Shaikh Zaid Jameel	
13.	618	Solanki Gausfah	
14.	519	Md. Shafi Alam	
15.	630	Alure Gausiya Sameer	
16.	622	Shaikh Tarannum Rafiq	
17.	619	Sayyed Juveriya W	
18.	631	Sayyed Roshina H	
19.	570	Kamlesh Dhise	

20.	529	Shaikh Saniya Javed	Saniya
21.	530	Sheikh Afiza Yonus	Afiza
22.	522	Tamboli Dama Asif	Tamboli
23.	521	Tamboli Sahil M	S
24.	579	Alcha . F. Hussain	Neha
25.	8628	Sayyed Arshifatina	Arshi
26.	0626	Khan Lubinaas Jarooque	Khan
27.	0611	Swaith Nida Yonus	Nida
28.	616	Khan Bismillah	Khan
29.	621	Khan Maigam	Maigam
30.	620	Shaikh Zama	Shaikh
31.	622	Sayyed Daggaba F.	Sayyed
32.	624	Ansari Shabina	Shabina
33.	528	Kaljikar Masika	Kaljikar
34.	539	Damnekar Saniya	Saniya
35.	523	MRUNALI JADHAV	Mrunali
36.	525	Shaikh Nida Ab. Gani	Nida
37.	513	Shaikh Farha	Farha Shaikh
38.	511	Shaikh Afsha A.b. R	Afsha
39.	514	Shaikh Fauziya N.	Fauziya
40.	504	Gaikwad . Mona . Suresh	Mona
41.	505	Shivani Milind Jadhav	Shivani
42.	508	Salman Shaikh	Salman
43.	540	Shaikh Iramnaz	Iramnaz
44.	615	Khan Ayesha	Ayesha
45.	614	Mulla Hafsar M.R.	Hafsar
46.	581	Wasil . I	Wasil
47.	527	mahin Khan	no
48.	524	Neha Shaikh	Neha
49.	533	Saleha Chougale	Saleha
50.	613	Sunjoy Sarwat	Sunjoy
51.	612	Karwi Wabrah . J.	Karwi
52.	517	Rukhsar Fatima	Rukhsar

53.	534	Bagwan Bushra Aziz	Bagwan
54.	506	Deoley Saika	Deoley
55.	573	Ayesha S. Shaikh	Ayesha
56.	610	Misbah M. Shaikh	Misbah
57.	629	Aiman N. Shaikh	Aiman
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Y & M Anjuman Khairul Islam's

POONA COLLEGE OF ARTS, SCIENCE AND COMMERCE

(Affiliated to Savitribai Phule Pune University: ID No. PU/PN/ASC/023/1970)

ACTIVITY REPORT

(2016 - 2017)

I. Basic Details:

Name of The Activity: Educational visit to District Pollution and Meteorological dept. Shivajinagar Pune			
Date	Faculty	Department/ Committee	Coordinator Name & Phone no.
16/01/2017	Science	Zoology	Ms. Shahjahan Shaikh (9975003065)
Time	Venue	Activity for class/ group & student number	Nature: Academic/co- curricular / extracurricular/ Environmental/ social/ other
10:00am to 4:00pm	District Pollution and Meteorological dept. Shivajinagar Pune	M.Sc.II Zoology students 16	co- curricular

II. Brief Information about the Activity (Criterion no -):

Topic/ Subject of the activity	Educational visit to District Pollution and Meteorological dept. Shivajinagar Pune
Objective for conducting the activity	To understand the working and functioning of Pollution Meteorological Department
Methodology	Live Demonstration
Outcome	Students came to understand the working and functioning of pollution department with respect to gaseous analysis, and working of different equipment's and instruments.

III. Proofs attached: letters/ student list of participation/ certificate/ document/photos/ any other

1. Permission letter	2. Student attendance	3.
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AKI's

POONA COLLEGE

of Arts, Science and Commerce
Camp, Pune – 411001 (MS)

DEPARTMENT OF ZOOLOGY

Educational visit to District Pollution and Meteorological dept. Shivajinagar Pune

With the able guidance of Principal, Dr. Rafique Sarkhwas and Coordinator Science Faculty, Mr. Iqbal N. Shaikh Department of Zoology, conducted an educational visit for M.Sc.II Zoology students to Indian Meteorological Department Shivajinagar Pune. On 16th January 2017. It is an outstanding landmark in the heart of the city of pune. Total 16 students along with Ms. Shahjahan Shaikh visited.

The students visited the pollution department where they saw the live demonstration of the CO₂ and NO₂ analysis. Mr. Bhondve who was the technician and guide of the visitors section greeted the students in the lab and further directed them to the pollution department to explain the gaseous analysis, he also explained the working of different equipment's and instruments.

The students showed interest and curiosity and also asked questions regarding the explanation given by Mr. Bhondve. The visit covered all points required for the students to know about gaseous analysis regarding the syllabus.

***Photography is not allowed at Indian
Meteorological Department, Pune***

7



POONA COLLEGE OF ARTS, SCIENCE AND COMMERCE

(Affiliated to Savitribai Phule Pune University: ID No. PU/PN/ASC/023/1970)

K.B. Hidayatullah Road, Camp, Pune - 411001. Maharashtra, India

Tel.: +91-20-26454240 / 26446319. Fax: +91-20-26453707

Email : principal@akipoonacollege.ac.in Website:www.akipoonacollege.ac.in



Date: 27/12/2016

To,
The Director,
District Pollution Dept,
Meteorological Department,
Shimla Office,
Shivaji nagar,
Pune.

Subject: Permission to Educational visit

Sir,

This is to bring to your kind notice that as a part of curriculum of University of Pune M.Sc Zoology part-II students have to study the analysis of CO, CO₂, NO, other gaseous pollutants at Meteorological Department.

Therefore you are requested to allow our M.Sc Zoology part II students 18 in number with a teacher to visit the institute on suitable date and time. Hope that you will cooperate with us and allow our students to visit institute.

Thanking you in anticipation.

Yours Faithfully

Department of Zoology
Poona College of Arts, Science
and Commerce, Camp-Pune-

सहायक मौसम विज्ञानी - H. M. Rafique Sarkhwas
Assistant Meteorologist Gr-II
मौसम विज्ञान के अपरमहानिदेशक (अनुसंधान), पुणे-5
For Additional Director General of Meteorology
(Research), Pune-5. Principal

date of visit - 13/1/17
Time - 1030 to 130

020-25572243
radiation branch

Recd
4/1/17

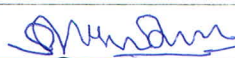


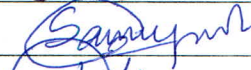

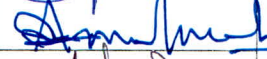





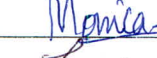




AKI's
**POONA COLLEGE OF ARTS, SCIENCE &
 COMMERCE, CAMP, PUNE - 1**

(7)

Department of Zoology

**Educational Visit of M.Sc.-II (Zoology)
 To India Meteorological Department (IMD), Shivajinagar, Pune**

Date: 16/01/2017

SR. NO.	ROLL NO.	NAME OF STUDENTS	SIGN
1.	5725	Alfiya Tamboli Jamal	
2.	5730	Swati Sonkamble	
3.	5735	Chandni Taleel Hushye	
4.	5721	Saniya Warunkar Usman	
5.	5732	Dipti Kshatriya Krishna	
6.	5729	Amandeep Kaur. B.	
7.	5728	Apurva Jadhav	
8.	5724	Shifanaz Shaikh	
9.	5733	Shireen Qudsi A. hali	
10.	5737	Kevineinow. Zhosek Solrzu	
11.	5727	Asha Naim Khan	
12.	5734	Monica Kamble	
13.	5736	Lezima Talukder	
14.	5739	Zehra Naseem Ahmed	
15.	5738	Nuzhat Magbal	
16.	5731	Ansha Chandradew Seth	
17.			
18.			
19.			
20.			
21.			



Y & M Anjuman Khairul Islam's
POONA COLLEGE
OF ARTS, SCIENCE AND COMMERCE

(Affiliated to Savitribai Phule Pune University: ID No. PU/PN/ASC/023/1970)

ACTIVITY REPORT

(2016 - 2017)

I. Basic Details:

Name of The Activity: Visit to Central Bee Research and Training Institute, Shivajinagar, Pune			
Date	Faculty	Department/ Committee	Coordinator Name & Phone no.
23/02/2017	Science	Zoology	Ms. Shahjahan Shaikh (9975003065)
Time	Venue	Activity for class/ group & student number	Nature: Academic/co- curricular / extracurricular/ Environmental/ social/ other
10:00am to 4:00 pm	Central Bee Research and Training Institute, Shivajinagar, Pune	M.Sc. Part-II (Zoology) 15	co- curricular

II. Brief Information about the Activity (Criterion no -):

Topic/ Subject of the activity	Visit to Central Bee Research and Training Institute, Shivajinagar, Pune
Objective for conducting the activity	To understand the Beekeeping techniques and its economic importance.
Methodology	Live Demonstration
Outcome	Through this visit students were able to learn identification key to identify different species of Honeybees, beekeeping techniques and strategy to establish Apiculture farm.

**III. Proofs attached: letters/ student list of participation/ certificate/
document/photos/ any other**

1. Permission Letter	2. Student Attendance	3.
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Y & M Anjuman Khairul Islam's

POONA COLLEGE OF ARTS, SCIENCE AND COMMERCE

(Affiliated to Savitribai Phule Pune University: ID No. PU/PN/ASC/023/1970)

DEPARTMENT OF ZOOLOGY

Activity Report

Visit to Central Bee Research and Training Institute, Shivajinagar, Pune

(Dated: 23/02/2017)

Department of Zoology has organized an Educational Visit to Central Bee Research and Training Institute, Shivajinagar, Pune for M.Sc. Part-II (Zoology) students on 23rd February, 2017. Ms. Shahjahan Shaikh coordinated this visit and carried total 15 students at CBRTI to learn the beekeeping practices.

The main aim of the visit was to study the different species of Honey bee, different equipments, used in Apiculture and to know techniques used in Apiculture. Technical Assistant of CBRTI demonstrated the bee hive, beekeeping equipment and processing for purification of honey and bee wax. Through this visit students were able to learn identification key to identify different species of Honeybees, beekeeping techniques and strategy to establish Apiculture farm.

Anjuman Khairul Islam's

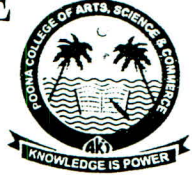
POONA COLLEGE OF ARTS, SCIENCE AND COMMERCE

(Affiliated to Savitribai Phule Pune University: ID No. PU/PN/ASC/023/1970)

K.B. Hidayatullah Road, Camp, Pune - 411001. Maharashtra, India

Tel.: +91-20-26454240 / 26446319. Fax: +91-20-26453707

Email : principal@akipoonacollege.ac.in Website:www.akipoonacollege.ac.in



Date: 15/02/2017

To
The Director
Apiculture Institute,
shivaji Nagar,
Pune - 5

Sir,

Our M.Sc Zoology students have to visit Apiculture Institute to study Artificial Bee Keeping. The visit is compulsory part of their syllabus. (No. of the students are 18)

Kindly allow us to visit the Institute. We request you to give us suitable date and time as per your convenience.

About 18 students with one staff members will visit the institute on the date allotted as per your permission.

Thanking you,

Yours Faithfully

Head
Department of Zoology

Dr. Rafique Sarkhawas
Principal

Visited on
23.02.2017

Shri Bhillare - 8412065770.

23.2.2017

AKI's
**POONA COLLEGE OF ARTS, SCIENCE &
 COMMERCE, CAMP, PUNE - 1**

(8)

Department of Zoology

**Educational Visit of M.Sc (Zoology)
 To Central Bee Research & Training Institute (CBRTI)
 Shivajinagar, Pune**

Date: 23/02/2017

SR. NO.	ROLL NO.	NAME OF STUDENTS	SIGN
1.	6780	Swati Sonkamble	Swati
2.	5735	Chandni Jaleel Hushye	Jaleel Chandni
3.	5731	Anshu Chandradeo Seth	Anshu
4.	5732	Priya Kshatriya Krishna	Priya
5.	5729	Amandeep Kaur	Amandeep
6.	5728	Apurva Tadhar	Apurva
7.	5724	Shifanaz Shaikh	Shifanaz
8.	5733	Shikheen Qudus A. halif	Shikheen
9.	5738	Nushat Magbar	Nushat
10.	5727	Asma Naim Khan	Asma
11.	5721	Saniya Warunka Usman	Saniya
12.	5737	Kerineinole Zosale Soliezu	Kerineinole
13.	5736	Zozima Talukder	Zozima
14.	5725	Alfiya Tamboli Javod	Alfiya
15.	5739	Insha Naseer Ahmed	Insha
16.			
17.			
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19.			
20.			

FDI IN INDIA: OPPORTUNITIES AND ISSUES FOR FINANCIAL SECTOR

***Prof. Jagannath Khandu Mhaske **Dr. Abbas Lokhandwala**

**Dr. Babasaheb Ambedkar Commerce & Maharshi V. R. Shinde Arts College Nana Peth Pune ** Department of Commerce, Poona College of Arts, Science & Commerce, Pune, MS, India.*

Abstract

This paper reviews the some of the various "Theories explaining financial sector FDI", Microeconomic framework, Importance and barriers to FDI and Diverse economic environment. We will also be discussing the Risk management challenges, dynamic foreign exchange rates and the opportunities of developing Retail marketing in India. From the review, of the financial management and Macroeconomic and risk diversification theories would seem particularly well-suited to explain this reality. The financial management importance helps the microeconomic framework to entitle the GDP with the FDI resources.

Keywords: Financial sector, FDI, GDP, Economics

I. INTRODUCTION

For the implementation of the FDI, first of all we need to review the theories which are explaining the financial sector FDI, and once the theory has been implemented in respect with local market then we can implement the same in the retail market in order to magnify the result from the international FDI. The different methods needs to be verified and should be taken in order to implement the FDI in the countries policy. For this there should be a study of Risk Management Challenges, dynamic foreign exchange rates and the opportunities of developing Retail marketing in India.

Post Globalization, some reforms were introduced in the banking sector to strength Indian banks and make them internationally competitive and banks to play a vital role in the economic development of the country. The banking sector was opened up for private participation and the entry of new private banks increased competition. The efficiency of the

banking sector was improved as suggested by indicators such as gradual in cost of intermediation and decline in nonperforming loans. Efficiency in the banking sector was driven by improved technology and competition.

II- THEORIES EXPLAINING FINANCIAL SECTOR FDI

Various theories have been introduced and as per the study the financial sector will be increased once the FDI retail market. A discussion on macroeconomic theories were started only because to praise more emphasis on the potentiality of the financial FDI.

Microeconomic/Behavioral Framework-

"Virtually all existing theoretical paradigms focus on the comparison of benefits and costs of the investment decision. As with any kind of investment, the bank will face uncertainty about the expected profits of such decision, and even expected costs. On the cost side, introduces the widely accepted notion that foreign banks face significant cost disadvantages when compared with local competition. These additional costs can arise as a consequence of cultural differences, legal barriers or increased control problems, just to cite a few examples. Therefore, in order to operate profitably in a foreign market, international banks must be able to realize gains that are unavailable to local competitors." Hymer (1969) Thus the gains were established and realized benefit on operating the financial sector like (i) factors explaining competition (ii) local market non-efficient operations; and (iii) diversification in geographical position.

Comparative advantage-

Most important issue is the availability of information for taking decisions, One of the most well-known ways of exploiting the comparative advantages stemming from private information in a foreign market is to "follow the client". This implies that banks expand in those countries where their corporate clients choose to invest so as to be able to offer them the services they need (Brimmer and Dahl (1975), Gray and Gray (1981), Ball and Tschoegl (1982). Moreover, a bank has a clear interest in keeping other financial institutions away from developing a relationship with its corporate clients, because this can result in the loss of market quota in its home market. In other words, a bank's expansion abroad can sometimes be a defensive reaction to avoid losing important corporate clients at home. This "defensive reaction" hypothesis was first offered by Grubel (1977) for US banks' decision to move overseas (the so called "second wave" of banking internationalization, starting in the 1960s).

Voting Power Methods:

FDI can thus acquire the right power through voting of an enterprise through various methods for an enterprise:

- Starting the own WOS (Subsidiary wholly owned by the company) or company registered elsewhere,
- Investment made in shares of other associate or joint ventures;
- M&A of associates enterprises;

IV-IMPORTANCE AND BARRIERS TO FDI

A research study introduced and as some of the important of FDI are as, "An increase in FDI may be associated with improved economic growth due to the influx of capital and increased tax revenues for the host country. Host countries often try to channel FDI investment into new infrastructure and other projects to boost development. Greater competition from new companies can lead to productivity gains and greater efficiency in the host country and it has

been suggested that the application of a foreign entity's policies to a domestic subsidiary may improve corporate governance standards. Furthermore, foreign investment can result in the transfer of soft skills through training and job creation, the availability of more advanced technology for the domestic market and access to research and development resources. The local population may benefit from the employment opportunities created by new businesses."

In order to avoid the competition with their own products the investing company use to transfer their older production capacity and essential machines to the host country all because of the under development of the updated version and lac of technological updation too.

V-DIVERSE ECONOMIC ENVIRONMENT

It is defined in by the analyst as, "Operating in a globalized environment means being answerable to different countries with different political environments and cultural norms, as well as trade procedures and tax conditions to comply with. In addition, the credit conditions may be totally different from what they are domestically. Anticipate day-to-day financial management challenges when operating internationally and devise ways to maintain healthy equilibrium within this economic framework to ensure your business's continued growth and survival."

Dynamic Foreign Exchange Rates

On the similar note dynamic foreign exchange rates are also essential in financial management system. Thus it is being explained as, "in a globalized economy, the cash that goes in and out of the various countries is subject to fluctuations in exchange rates. This creates uncertainty for financial managers when it comes to the value of the home currency in relation to foreign currencies. Continuous fluctuations in the foreign exchange market could mean slow business for global organizations. If you need part of your financing for projects in emerging economies where you conduct your business,

fluctuating exchange rates can subject you to higher interest rates. You have to monitor the foreign exchange market closely for suitable rates that benefit your organization.”

Opportunities for Retail Development in India

Retail marketing gets various opportunities to grow up in the Indian market. Not only retailing but Manufactures as well as suppliers, and buyers have various opportunities, some of which are mentioned below:

- Ø Provides visibility to bands
- Ø Urbanization
- Ø Nuclear Family
- Ø Plastic Revolution
- Ø Indian consumers
- Ø Indian Farmers
- Ø Inflation control

VI- CONCLUSION:

Thus in light of the above study it has being noted that through dynamic economic environment and foreign exchange rates the FDI and the financial management has been possible in the current scenario. But in order to obtain more opportunities in the retail market it need to light up the opportunities in the field of Urbanization, increasing the workforce of Indian farmer, Indian consumer and then need to control the inflation of the country.

From the above discussions it can be concluded that since India is a developing country and the people who are working in non-government organisations have less social security after their retirement. To encourage the saving habits among them our banking sectors are introducing various schemes. Apart from all the above, since the capital raising capacity in India is very less to take the Indian banking sector to worldwide we require investment from abroad in Indian banking system.

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About Author



Prof. Jagannath Khandu Mhaske

He is working as a Vice Principal and Associate Professor, at Dr. Babasaheb Ambedkar commerce & Maharshi V. R. Shinde Arts College Nana Peth Pune 41103. His areas of interest are Business Administration, Accounting & Finance. He is perusing PhD at Savitribai Phule Pune University, Pune. He has published couple of research papers in National and International Journals.

(E.mail:- mhaskejk.aman@gmail.com)

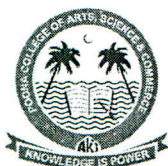
About Author



Dr. Abbas Lokhandwala

His qualification is MMS, PhD now working as Associate Professor, Department of Commerce, Poona College of Arts, Science & Commerce, Pune Research Guide: Savitribai Phule Pune University. His areas of interest are Business Administration, Accounting & Finance. He has guided 03 Ph D students, and published around 30 research papers in National and International Journals, has published 08 books which have been prescribed texts of SPPU.

(Email Id: abbaslokhandwala19@gmail.com)



Y & M Anjuman Khairul Islam's
POONA COLLEGE
OF ARTS, SCIENCE AND COMMERCE

(Affiliated to Savitribai Phule Pune University: ID No. PU/PN/ASC/023/1970)

ACTIVITY REPORT

(2016 - 2017)

I. Basic Details:

Name of The Activity : Concentrix Campus Recruitment Drive at Poona College.			
Date	Faculty	Department/ Committee	Coordinator Name & Phone no.
16 th Feb 2017 Thursday	Commerce	Commerce	Mrs.JahanAara Pathan 9923019227
Time	Venue	Activity for class/ group student number	Nature: Academic/co- curricular / extracurricular/ Environmental/ social/ other
10:00 am	Conf Hall	61 Students	Co - Curricular

II. Brief Information about the Activity (Criterion no - 1)

Topic/ Subject of the activity	Campus Recruitment Drive at Poona College
Objective for conducting the activity	To make Students Employable
Methodology	Campus Recruitment Drive
Outcome	01 Student Have been selected.

**III. Proofs attached: letters/ student list of participation/ certificate/
document/photos/ any other**

1. Report	2. photos	3. Attendance

**AKI's Poona College of Arts, Science and Commerce,
Pune**

A Report on

**“Campus Placement cum Job Fair by Concentrix Daksh
Pvt. Ltd.”**

A Campus Placement cum Job Fair by Concentrix Daksh Pvt. Ltd. was organised for BBA & BCA students of Poona College and MMCC on 16th February 2017 in M4 classroom of PIMSE building by Prof. JahanAaraPathan, guided by Dr. Aftab Anwar Shaikh.

Company name:- Concentrix Daksh Pvt. Ltd., Haryana.



Figure 1 Ms. Balasarawathi conducting the aptitude test

The placements began with felicitation of the guests. Guests were felicitated by Dr. Shakeel Ahmed, Director, PIMSE. Followed by a presentation by Concentrix Daksh.



Figure 2 Senior Manager conducting interviews

First round of interview was an Aptitude test, qualifying which students were interviewed on a one-on-one basis.

Total 15 students got placed in various verticals and Offer Letters were given on-the-spot.

Prof. Shabana, Prof. Aqueel, Prof. Faheem, Prof. Deepika & Prof. Heena were also present throughout.



Figure 3 Faculty Team of BBA & BCA

**Confidential: - Concentrix Campus Recruitment Drive -- Poona College -- Pune ---
Thursday 16th February, 2017**

3 messages

Balasaraswathi V <Balasaraswathi.V1@concentrix.com>

Sat, Feb 11, 2017 at 8:22 PM

To: "cco.poonacollege@gmail.com" <cco.poonacollege@gmail.com>

Cc: Kamalika Chatterjee <kamalika.chatterjee@concentrix.com>, Komal Arora <komal.arora@concentrix.com>, Varun Srivastava2 <varun.srivastava2@concentrix.com>, M Balasubramanian1 <m.balasubramanian1@concentrix.com>, Balasaraswathi V <Balasaraswathi.V1@concentrix.com>, Ankita Sinha <Ankita.Sinha1@concentrix.com>, "dranwarshaikh@gmail.com" <dranwarshaikh@gmail.com>

Dear Ma'am,

Greetings from Concentrix!



Further to the discussions held with **Mrs. Jaharan Pathan**, we are pleased to inform you that we have planned to conduct a campus recruitment drive at your college on **"Thursday 16th February, 2017" at 10:00 am**. During the recruitment process we shall be assessing students from various streams like **B.A / B.Com / B.Sc. / BBA / BCA / MCA / B.Sc. HM / M.A / M.Com / M.Sc.** and other streams for various opportunities in our organization.

About Concentrix:

Concentrix is a leader in high-value global business services. As a leading global company supporting the world's best brands, Concentrix offers infinite possibilities within a diversified, global organization. We provide a clear path to career development at Concentrix and offer support, advice and coaching every step of the way. Concentrix is based in 25 countries with a staff of more than 90,000 who speak more than 40 languages. We offer expertise in ten industries: Banking & Financial Services, Healthcare & Pharmaceutical, Insurance, Technology, Consumer Electronics, Retail & e-Commerce, Government & Public Sector, Media & Communications, Automotive and Travel, Transportation & Tourism.

A brief about the role:

Currently, we require Customer Service Executives for our international domestic processes that operate in a 24X7 working environment. The job role would also let them avail multiple career opportunities within the organization and carve an amazing growth path for themselves.

The recruitment process will include:

- **A presentation to all interested candidates, on the day of the recruitment drive**
- **This would be followed by a series of interviews (HR round, voice and accent round) and multiple choice written assessments on Logical Reasoning, Grammar and Computer skills**

During our visit, we solicit your support in arranging the following

- ✓ **Auditorium/ Seminar Room**
- ✓ **LCD Projector**
- ✓ **5-6 computers with internet to be able to conduct online assessment.**
- ✓ **Sound System (Preferably with 1 cordless and 1 collar MIC)**

✓ **Two Interview Rooms**

We also request you to kindly share the name and contact details of the Placement Officer, who will work with us during the recruitment process. For a seamless recruitment process, please ensure that the following requirements are met:

❖ **Advance registration of interested students:** This has to be shared with us at least 30 days prior to date of recruitment drive. The details required for registration include:

❖ **Student Name**

❖ **Stream**

❖ **Back Paper - Yes/No**

❖ **Phone no**

❖ **Email ID**

In addition, it is mandatory for the participants to carry the following documents during the recruitment drive

- **Updated resume**
- **2 recent passport size photographs**
- **Valid photo ID proof.**
- **Valid proof of address**

We seek your agreement to our recruitment proposal at the earliest and request you to respond via e-mail, confirming the schedule as given above.

In case of any queries, you may reach out to our campus recruitment SPOC whose contact details are mentioned below.

We would also like to bring to your kind notice, that we follow a strict and standardized approach to campus recruitment which is outlined below

- **All interactions/ relationships are conducted directly with the campuses across India if their candidates participate and qualify in our assessment / validation process.**
- **Neither Concentrix nor any authorized third party, who assists in our recruitment process, ever seeks a fee from either colleges or students with respect to placement or recruitment of students with Concentrix.**

Thanks & Warm regards,

Balasaraswathi.V | Sr.Prac Campus Recruitment | Talent Transformation Business Unit

College/Institute Name: POONA COLLEGE
PUNE

Date: 16/02/2017

Subject: Expression of Interest - Campus

Dear SAQIB NIZAMUDDIN KHAN

We are pleased to convey through this Expression of Interest letter that you are being considered for the position of < PRACTITIONER > provided you successfully complete your graduation and fulfill other requirements. This letter is intended only as an overview of the potential offer from **Concentrix Daksh Services India Private Limited** (hereinafter, 'Concentrix/' 'Company'). The detailed terms and conditions of employment will be contained in an offer letter (if any), which may be issued by the Company and may contain additional provisions to those herein.

1. Your initial place of work shall be at the company's discretion and can be at any Concentrix locations.
2. You will be required to bring the following documents at the time of joining: (i) the Original copy of this letter; (ii) the Originals and 2 set of photocopies of the documents mentioned in Annexure 1 (Document Checklist).
3. This Expression of Interest shall remain valid for a period of 30 days from the date of your Final Examination. Considering the candidature beyond the 30 day period would be as per the requirement in the organization.

On submission of the above-mentioned documents, the Company may issue you an Appointment Letter with details of all service terms and conditions and salary structure along with a proposed date of joining. If any information furnished by you in your application or during the selection process is found to be incorrect or false, and/or if you have suppressed material information regarding your qualifications and experience, the Company may withdraw this expression of interest without any notice. We encourage you to contact us at campusplacements@concentrix.com at least a week prior to your coming to our office.



Signature of Authorized Signatory



Signature of Candidate

CNX/REC/ART/AGHR/EOI/3.0

AKI's Poona College of Arts, Science and Commerce







Department of Commerce (B.Com./BBA/BCA)

Campus Placement Drive by Concentrix Daksh Services India
Pvt. Ltd. on 16th February 2017

Attendance Sheet

Sr. No.	Name of the student	Roll No.	Class	Sign
1	Khan Ummehani	5837	SYBCA	<i>[Signature]</i>
2	Anjum Sutar	5838	SYBCA	<i>[Signature]</i>
3	Muhammad Khan	5536	SYBBA	<i>[Signature]</i>
4	Niraj Trakkar	5520	SYBBA	<i>[Signature]</i>
5	Khan Ayesha Shakir	5831	SYBCA	<i>[Signature]</i>
6	Sayyed. Alsha. Kasim	5849	SYBCA	<i>[Signature]</i>
7	Khan Fatema Sheemmi	5863	SYBCA	<i>[Signature]</i>
8	Tanushree T.K Bhunia	5880	SYBCA	<i>[Signature]</i>
9	Shetty Raksha Jayaram	5830	SYBBA(CA)	<i>[Signature]</i>
10	Shaikh Juveria	5804	SYBCA	<i>[Signature]</i>
11	Shaikh Zoya Naheed	5505	SYBBA	<i>[Signature]</i>
12	Memon Sana Aslam	5502	SYBBA	<i>[Signature]</i>
13	Naushad Talib F. Khan	5902	T.Y.B.CA	<i>[Signature]</i>
14	Sultan. Arab	5954	T.Y.B.CA	<i>[Signature]</i>
15	Yasir A. Sheikh	5850	SYBCA	<i>[Signature]</i>
16	AINUR S. SHAIKH	5872	SYBCA	<i>[Signature]</i>
17	Fatima. Z. Shaikh	5873	SYBCA	<i>[Signature]</i>
18	Mangulkar Nasir	5846	SYBCA	<i>[Signature]</i>
19	Shaikh Md. Afshaan. R.	5917	TYBCA	<i>[Signature]</i>
20	Sayyed Safina Khatun Ejaz Ahmed	5930	TYBCA	<i>[Signature]</i>
21	Attarwala Amatulla	5904	TYBCA	<i>[Signature]</i>
22	Fatima Shaikh	5941	TYBCA	<i>[Signature]</i>

Attendance Sheet

Sr. No.	Name of the student	Roll No.	Class	Sign
21	Sumayya. Mehboob. Nagarbawadi.	5906	TYBCA	
22	Sumaiya. M. Shaikh	5907	TYBCA	
23	Sumaiya. R. Shaikh	5908	TYBCA	
24	Shaikh. Heena. Irfan	5986	TYBCA	
25	Shaikh. Tanzil. Nazir	5912	TYBCA	
26	Saquin Khan	K-5606	TXBBA	
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AKI's Poona College of Arts, Science and Commerce

Department of Commerce (B.Com./BBA/BCA)

Campus Placement Drive by Concentrix Daksh Services India
Pvt. Ltd. on 16th February 2017

Attendance Sheet

Sr. No.	Name of the student	MOB NO:	Roll No.	Class	Sign
1	Suraj Nair	9665455649		TYBBA	<i>Suraj</i>
2	ASHWINI. GAJARE	9673959652		TYBBA	<i>ASHWINI</i>
	Shirke Ravika	9168143885		TYBBA	<i>Shirke</i>
4	Meenmun Jain	8805839811		TYBBA	<i>Meenmun</i>
5	Rajal Jain	9422716987		TYBBA	<i>Rajal</i>
6	Nikhil Suryawanshi	8087211652		TYBBA	<i>Nikhil</i>
7	Sidharth Kokalgi	9922915919		TYBBA	<i>Sidharth</i>
8	Navjeet Meittunjay Das	8149233507		TYBBA	<i>Navjeet</i>
9	Yash Rajesh Mody	9028792001		TYBBA	<i>Yash</i>
10	Rohan Samant	9637982047		TYBBA	<i>Rohan</i>
11	Aleha Goudelar	7083148659		TYBBA	<i>Aleha</i>
12	Ravina Kulkarni	9158837907		TYBBA	<i>Ravina</i>
	Nikita Dedkar	8806701087		TYBBA	<i>Nikita</i>
14	Vanshika M. Tadkar	7769962860		TYBBA	<i>Vanshika</i>
15	Tushar S Telbhane	96730 87707		TYBBA	<i>Tushar</i>
16	Shubham Tadhar	9130426483		TYBBA	<i>Shubham</i>
17	Pratibha Keloch	7350912441		TYBBA	<i>Pratibha</i>
18	Pooja Pidiichatti	9075600757		TYBBA	<i>Pooja</i>
19	Lea Sahota	9763147204		TYBBA	<i>Lea</i>
20	Manika Singh	8087226400		TYBBA	<i>Manika</i>
21	Shubham Somani	8698013007		TYBBA	<i>Shubham</i>
22	Komal Oswal			TYBBA	<i>Komal</i>

Attendance Sheet

Sr. No.	Name of the student	Roll No.	Class	Sign
21	OSHIN SINGH	9595-4747-53	TY.BCO.	<i>[Signature]</i>
22	Karan Kalantre	9764349206	T-Y.BCS	<i>[Signature]</i>
23	Atharva Joshi 7850744462		T.Y.BCS	<i>[Signature]</i>
24	Janhavi Kanitkar 8446238618		T.Y.BCS	<i>[Signature]</i>
25	Bhagat Manisha 7350391120		TYBCS	<i>[Signature]</i>
26	Aparna Kashid	901101685	TYBCS	<i>[Signature]</i>
27	Abdulla Qazekhan 9326399476	K-5463	F.Y.B.B.A	<i>[Signature]</i>
28	Shaikh Ruhul	K-5444	F.Y.BBA	<i>[Signature]</i>
29	Shaikh Alshaan	K-5424	F.Y.BBA	<i>[Signature]</i>
30	Kajal Dhotre.	7066926269	TYBCS	<i>[Signature]</i>
31	Prathamesh Temkar	7620961451	TYBCS	<i>[Signature]</i>
32	Snehal S. kumar	7757819800	TYBCS	<i>[Signature]</i>
33	Sanam Jain.	8007410008	TYBBA	<i>[Signature]</i>
34	Harsh Porwal.	7507059037	TYBBA	<i>[Signature]</i>
35	Pratik Bansal	8329026203	TYBBA	<i>[Signature]</i>
36				
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ACTIVITY REPORT

(2016 - 2017)

I. Basic Details:

Name of the Activity: Campus Placement Drive by "MIBH Network LLP"			
Date	Faculty	Department/ Committee	Coordinator Name & Phone no.
20/12/2016	BBA	COMMERCE	Mrs. JahanAaraPathan
Time	Venue	Activity for class/ group student number	Nature: Academic/co- curricular / extracurricular/ Environmental/ social/ other
08:00 am onwards	PIMSE Conf. Hall	23	Co-Curricular

II. Brief Information about the Activity (Criterion no -)::

Topic/ Subject of the activity	Campus Placement Drive by "MIBH Network LLP"
Objective for conducting the activity	To place the students in a media industry
Methodology	Campus Interview, Personal Interview
Outcome	10 students were selected for Media Business Development 03 students were selected for Media Content Management

III. Proofs attached: letters/ student list of participation/ certificate/ document/photos/ any other

1. Report	2. Photos	3. Notice
4. Attendance	5.	6.

AKI's Poona College of Arts, Science and Commerce, Pune

A Report on “Campus Placement by Make It Big Here (MIBH) Media Network LLP”

A Campus Placement was held by Make It Big Here (MIBH) Media Network LLP on 20th December 2016 and organized by **Mrs. JahanAaraPathan** for all BBA students.

The placement drive started with an orientation presentation by the MIBH team, followed by Personal Interviews of the candidates.



Figure 1 Team MIBH with Mrs. JahanAaraPathan

The MIBH Network LLP CEO, **Mr. VirenOswal** and **Mr. Oswal** were leading the team.

Mr. AqueelBajajwala felicitated the guests. Mrs. DeepikaKininge was also present for the drive.

In all 21 students attended the personal interview. Out of which 13 students got selected; 10 for Media Business Development and 3 for Media Content Management post.

Candidates selected for Media Business Development:

Ajaz Shaikh	–	TY BBA
Nabeel Siddiqui	–	TY BBA
Shamsad Chaudhary	–	SY BBA
HamidaAfzali	–	TY BBA
Saquib Khan	-	TY BBA
PrakharPatil	-	TY BBA
MumtazShahgul	-	SY BBA
NazdanaRezaie	-	FY BBA
MuneebKar	-	FY BBA
AzharPangarkar	-	FY BBA

Candidates selected for Media Content Management:

Praveen Singh	-	TY BBA
Rukhsar Shaikh	-	FY BBA
RabiyaIsrar	-	FY BBA



Figure 2 Mr. Oswal presenting

Out of these, 1 joined; Nabeel Siddiqui as Trainee - Media Business Development Manager.

The internship program for Content Managers has been slated to start by 11th January 2017 and for Business Development Managers from 16th January 2017.

Internship of two months with a stipend of Rs. 6000/- was offered to the selected candidates.

Overall it was a great exposure for our students.



JahanAara Pathan <cco.poonacollege@gmail.com>

2015-16

INTERNSHIP CONFIRMATION - MIBH MEDIA NETWORK LLP

2 messages

MIBH MEDIA NETWORK <hrd.mibh@gmail.com>

Fri, Dec 23, 2016 at 1:49 PM

To: cco.poonacollege@gmail.com, Veeren Oswal <veerenoswal@gmail.com>

Hi,

Greetings...

Ma'am, with reference to the campus interview we had on 20th Dec. 2016. We have selected these candidates for internship.

Candidates selected for Media Business Development:

AJAZ SHAIKH
NABEEL SIDDIQUI
SHAMSAD CHAUDHARY
HAMIDA AFZALI
SAQUIB KHAN
PARKHAR PATIL
MUMTAZ SHAHGUL
NAZDANA REZAIE
MUNEEB KAR
AZHAR PANGARKAR

Candidates selected for Media Content Management:

PRAVEEN SINGH
RUKHSAR SHAIKH
RABIYA ISRAR

PFA Letter of Internship herewith. All the selected candidates need to give their confirmation by executing the letter of acknowledgement as attached in the Letter of Internship.

Probable Date of Joining will be 2nd January 2017. Morning 10 am.

Kindly forward the confirmation to selected candidates and Thank you for your wonderful support.

Best Regards,

Veeran Oswal

CEO

MIBH MEDIA NETWORK LLP

8975245454

2 attachments

 **POONA LETTER OF INTERNSHIP MTBD.docx**
938K

 **POONA LETTER OF INTERNSHIP MTCM.docx**
938K

JahanAara Pathan <cco.poonacollege@gmail.com>
: wahid.wafiya@gmail.com

Sat, Oct 14, 2017 at 9:50 AM

Regards,
JahanAara Pathan
Asst. Prof. & Corporate Communications Officer (CCO),
Poona College of Arts, Science & Commerce,
Camp, Pune-01
+91 99230 19227

[Quoted text hidden]

2 attachments

 **POONA LETTER OF INTERNSHIP MTBD.docx**
938K

 **POONA LETTER OF INTERNSHIP MTCM.docx**
938K



MIBH MEDIA NETWORK LLP

OFFICE 3, YASHRAJ COMPLEX,
SASANE NAGAR, HADAPSAR,
PUNE- 411028
hrd.mibh@gmail.com
8975245454

23st December 2016

LETTER OF INTERNSHIP

POST: MANAGEMENT TRAINEE – CONTENT MANAGEMENT.

Hi,

Greetings...

This letter is with reference to your job application for the post of **Management Trainee- Content Management** and also the ensuing round of interview that we had on 20th Dec. 2016. We are happy to inform you that you have been selected for the applied post. You are hereby offered an internship position which will be for a minimum period of 2 months. After this time period we shall assess your performance in the company, post your assessment you will offered a probation period.

Your date of joining is 2nd Jan. 2016. We have already discussed the job description and the same also finds mention herein.

We hope to have a fruitful and long lasting professional relationship with you.

Best Regards,

Veeran Oswal

CEO

MIBH MEDIA NETWORK LLP.

POST: MANAGEMENT TRAINEES

CONTENT MANAGEMENT- ONLINE & OFFLINE

REPORTING - Directly to AGM.

AUTHORITIES:

Fully independent to apply the creative mind and make something **INSANELY GREAT!**

JOB DESCRIPTION:

- Identify online sources.
- Organise online content.
- Identify offline events in the area assigned.
- An eye towards detailing and strong perceiving skills.
- Prepare articles for posting online.
- Verify the content quality.
- Proof read the content.
- Upload content for publishing on App.

FUNCTIONAL AREA:

Internet, Publishing, Editing& Collating Information.

ROLE:

Online & Offline Information and Content Management.

To,

MIBH MEDIA NETWORK LLP,
OFFICE NO. 3, YASHRAJ COMPLEX,
SASANE NAGAR, HADAPSAR,
PUNE 411028

Subject: Acknowledgement to the Internship Letter.

I,, acknowledge that I have received, read through and understood the contents of this letter and fully accept the terms and conditions of my employment and the company's policy on various matters. A self attested copy of the internship letter received is also enclosed herewith as acceptance of the same.

Signature:

Date:



MIBH MEDIA NETWORK LLP

OFFICE 3, YASHRAJ COMPLEX,
SASANE NAGAR, HADAPSAR,
PUNE- 411028
hrd.mibh@gmail.com
8975245454

23st December 2016

LETTER OF INTERNSHIP

POST: MANAGEMENT TRAINEE – BUSINESS DEVELOPMENT.

Hi,

Greetings...

This letter is with reference to your job application for the post of **Management Trainee- Business Development** and also the ensuing round of interview that we had on 20th Dec. 2016. We are happy to inform you that you have been selected for the applied post. You are hereby offered an internship position which will be for a minimum period of 2 months. After this time period we shall assess your performance in the company, post your assessment you will offered a probation period.

Your date of joining is 2nd Jan. 2016. We have already discussed the job description and the same also finds mention herein.

We hope to have a fruitful and long lasting professional relationship with you.

Best Regards,

Veeran Oswal

CEO

MIBH MEDIA NETWORK LLP.

POST:

MANAGEMENT TRAINEES – BUSINESS DEVELOPMENT

REPORTING - Directly to AGM.

AUTHORITIES:

The MT'S will have authority and discretion to apply innovative marketing tactics and expand their business network to meet target.

JOB DESCRIPTION:

- Act as a BDM between the company and its potential markets.
- Identify business opportunities, prospects and servicing of Key accounts.
- Contact prospects, arrange meetings and develop the relationships.
- Negotiate the terms and closing of sales.
- Identify client business needs and business challenges, forecast requirements and work on proposals for customized business solutions.
- Monitor client's requirements, industry trends, market activities and competitors.
- Will be involved in generating sales reports, sales analysis, revenue management, forecast trends, qualify new segments and sales efforts.
- Contribute to team effort by accomplishing related results as planned.
- Maintain professional and technical knowledge by attending events or conferences related to e-Commerce and social media.
- Build and Manage one's own marketing and sales network to meet targets in sync with that of the organization.
- Any other relevant task especially assigned by the management.

FUNCTIONAL AREA:

Marketing , Advertising , MR , PR , Media Planning.

ROLE:

Public Relations & Media Relation Management.

To,

MIBH MEDIA NETWORK LLP,
OFFICE NO. 3, YASHRAJ COMPLEX,
SASANE NAGAR, HADAPSAR,
PUNE 411028

Subject: Acknowledgement to the Internship Letter.

I,, acknowledge that I have received, read through and understood the contents of this letter and fully accept the terms and conditions of my employment and the company's policy on various matters. A self attested copy of the internship letter received is also enclosed herewith as acceptance of the same.

Signature:

Date:

AKI's Poona College of Arts, Science & Commerce, Pune
TY BBA 2016-17 Campus Placement Drive 20th Dec. 2016

Name of the Company: MIBH

Sr. No.	Student Name	Roll No	Student Sign	GD	PI
1	ZAID KIFAYAT AKLEKAR	K-5601			
2	ASIL IBRAHIM NURAJI	K-5602			
3	AJAZ ISMAIL SHAIKH	K-5603	<u>Ajaz</u>		✓
4	MOHSIN FAYAZ SHAIKH	K-5604			
5	NABEEL NISAR SIDDIQUI	K-5605	<u>Nabeel</u>		✓
6	SAQUIB NIZAMUDDIN KHAN	K-5606	<u>Saqui Khan</u>		✓
7	AKSHAY ASHOK SHELAR	K-5607	<u>Akshay</u>		✓
8	PRAVEEN KUMAR SINGH	K-5608	<u>Praveen</u>		✓
9	ANOOP SURENDRAPRASAD TIWARI	K-5609			
10	NAJIB AHMED FARID AHMED SHAIKH	K-5610			
11	MOHAMMAD FAZAL ABDUL RASHID QURESHI	K-5611	<u>Fazal</u>		
12	HUMZA SAIFUDDIN BOXWALA	K-5612			
13	HUSSAIN ABBAS FAIZI	K-5613			
14	NYIKAYO ONYOTI ADIGO	K-5614	<u>Nyikayo</u>		✓
15	NIKITA DIGAMBAR HINGMIRE	K-5615			
16	MUSTAFA JAVED KHAN	K-5616			
17	BURHAN SOEBBHAI HAPPAWALA	K-5617			
18	TEJAS SHIRISH PILLAY	K-5618			
19	PARIJEET SHAMSUNDAR CHAKRANARAYAN	K-5619			
20	IRFAN AMIRKHAN PATHAN	K-5620			
21	ALIASGAR ZAINUDDIN KAPADIYA	K-5621			
22	MOHAMMAD ABDUL SATTAR ARIF	K-5622			
23	KULPREET KAUR LT.JITINDER SINGH BAGGA	K-5623	<u>Kulpreet</u>		✓
24	RIZWANA KASIM KHAN	K-5624	<u>Rizwana</u>		✓
25	MOHAMMAD SHAHRUKH AHSAN ANSARI	k-5625			
26	ACHAN DENG MANJOK BAGAT	k-5626			
27	NAZIA SHOAIB SAYED	k-5627			
28	HIDAYATULLAH MUHAMMAD QASSEM AFZALI	k-5628			
29	UBED SATTAR PUNEKAR	K-5629			
30	DANISH MUKHTAR AMIRUDDIN SHAIKH	k-5630			
31	SAHEL AKIL SHAIKH	k-5631	<u>Sahel</u>		✓
32	JUNAID SHABBIR SAYYED	K-5632	<u>Junaid</u>		
33	ZARAK YAMIN KHAN	K-5633			
34	MOHMEDNAVAB MOIDEEN KALATHIL	K-5634			
35	TARIQUE TANVEER KHAN	K-5635			
36	EJAZ AHMAD ZALMAI ZALMAI	K-5636			
37	PRASAD VASANT CHAVAN	k-5637			
38	HAMIDA ABDUL HAKIM AFZALI	K-5638	<u>Hamida</u>		✓
39	NARGIS JAVID ANSARI	K-5639			
40	ROYEED GHULAM HAZRAT HAZRATI	K-5640			
41	ZUBAIRULLAH KHALIL AHMAD	K-5641			

Examiner's Name:

Examiner's Signature:

Dr. Aftab Anwar Shaikh
Vice-Principal & HOD

AKI's Poona College of Arts, Science & Commerce, Pune
SY BBA 2016-17 Campus Placement Drive 20th Dec. 2016

Name of the ~~COMPANY~~ COMPANY **MTBH**

Sr. No.	Name	Roll No.	Student Sign	GD	PI
1	AQIB NIYAZ BHURE	K-5501			
2	SANA ASLAM MEMON	K-5502			
3	SHIFA FAZAL SHAIKH	K-5503			
4	RAMIN REHAN SHAIKH	K-5504			
5	ZOYA NAHEED SHAIKH	K-5505			
6	ABDUL HAMID SHAMSAD	K-5506	<i>Hamid</i> <i>Shamsad</i>		✓
7	MOHAMMAD ILYAS MOHAMMAD MUSTAFA	K-5507			
8	HUZAIFA HIFZURREHMAN BEWNAK	K-5508			
9	A.MANNAN IMTIYAZ GHARADE	K-5509			
10	SAWOOD GULAM HUSAIN FAKI	K-5510			
11	SALMAN YUNUS MOHAMMED	K- 5511			
12	NIDA AYAZ SAYYED	K-5512			
13	HAFIZA RAFIQUE SHAIKH	K-5513			
14	MOIZ KHAN ZAFFER KHAN GHOURI	K-5514			
15	MOIZ IRFAN GOKAK	K-5515			
16	GAUSIA FAROQUE ADONI	K-5516	<i>Gausia</i>		
17	ALTAMSAH ARSHAD SHAIKH	K-5517			
18	ERAMNAAZ CHAMAN NIZAMUDDIN KHAN	K-5518			
19	SWALIHA NOUSHAD SAGRI	K-5519			
20	NIRAJ VINOD THAKKAR	K-5520			
21	MOHAMMED ZOHERIBHAI BORIYAWALA	K-5521			
22	SHOHEB AMIR SHAIKH	K-5522			
23	BASHIR MUSA MANDAL	K-5523			
24	AZIZ GULAM SHAIKH	K-5524			
25	FARID SHAMSHUDDIN WARUNKAR	K-5525			
26	HAIDER RAFIQUE GAZEKHAN	K-5526			
27	FAIZAN ZAFAR SHAIKH	K-5527			
28	TASNEEM AKHTAR KHAN KALIMULLA KHAN KHAN	K-5528			
29	RAMEEZ KADIR SHAIKH	K-5529			
30	AYESHA ANWAR SHAIKH	K-5530			
31	KAMIL KAYYUM SHAIKH	K-5531			
32	ADNAN KAYYUM SHAIKH	K-5532			
33	KAYYUM NIZAMUDDIN CHOUHAN	K-5533			
34	TABISH NAWAZ HADDADI	K-5534			
35	ABUBAKR AQEEL INAMDAR	K-5535			
36	MERAJ NASEEM ALAM KHAN	K-5536			
37	ABDULMAJEED MASOOD CHANDLE	K-5537			
38	HANZALA HAROON RANGREZ	K-5538			
39	FARHAN ABDUL HAI PESHIMAM	K-5539			
40	MOHAMMAD RAZAN NAWAZ KAZI	K-5540			
41	SWALEHA IMTIYAZ MUJAWAR	K-5541			

42	SHAMEEM MOHAMMED EMEL	K-5542			
43	NAJAM M FASIL	K-5543			
44	ABDUL QADAR SABAOON	K-5544			
45	MUSAB ADNAN NAZIM MOHAMMED	K-5545			
46	QONAIN JAVED SHARIFF	K-5546			
47	MUJAHID ASLAM SHAIKH	k-5547			
48	USAMA MASHUM MOMIN	k-5548			
49	SHABBIR KEZAR BUGADWALA	k-5549			
50	MONICA RAJU MALE	k-5550			
51	HABIBUR REHMAN MD IZHAR ANSARI	K-5551			
52	AZAR GULAMDASTGIR SHAIKH	K-5552			
53	ELYAS AHMED HEZAM ABDO AL-ATHWARI	k-5553			
54	MURTAZA MOIZ SETH	K-5554			
55	ALINA SAROCHE LULE	k-5555			
56	MOHAMMADA JAN HALEEM JAN KAMEENZAI	k-5556			
57	SHAH GUL MOHAMMAD MAHDI MUMTAZ	K 5557	<i>Shah Gul</i>		
58	K UBAID.K SAVAD	K-5558			
59	JUNAID SHAKIR KHAN	5559			
60	SAMI GULAQA RASOOLI	K-5560			
61	OMAR ZAFAR MAPKAR	K-5561			

Examiner's Name:

Examiner's Signature:

Dr. Aftab Anwar Shaikh
Vice-Principal & HOD

AKI's Poona College of Arts, Science & Commerce, Pune
FY BBA 2016-17 Campus Placement Drive on 20th Dec. 2016

Name of the ~~COMPANY~~ COMPANY

MIBH

Sr. No.	Name	Roll No.	Student Sign	GD	PI
1	AZRA ASLAM SHAIKH	5401			
2	USMAN SULEMAN SAYED	5402			
3	HASSAN ILYAS SHAIKH	5403			
4	AMIR SOHAIL IBRAHIM NADAF	5404			
5	SAMID SHAHID JAMDAR	5405			
6	ASAD FARHAN JAMADAR	5406			
7	FAHAD SHABUDDIN SHAIKH	5407			
8	TALAL AZIZ ALVI	5408			
9	RESHMA MOHAMMADHANIF SAYYAD MULANI	5409			
10	MAZHAR NAZIRUDDIN SHAIKH	5410			
11	KAFIL MUKHTAR SHAIKH	5411			
12	RABIYA ISRAR ALI MOHAMMAD	5412	<i>Rabiya</i>		✓
13	SHRIKANT SANJAY CHAVAN	5413			
14	FARAAZ SHAMSUDDIN ANSARI	5414			
15	KHALIQ ABDUL HAMID MOMIN	5415			
16	SIDDIQUE JAVED SHAIKH	5416			
17	MUHAMMADJI ASRAF CULCUTTAWALA	5417			
18	MUJAHD FAROOQ SHAH	5418			
19	UZAIR NISAR SHAIKH	5419			
20	EDWIN HENRY MICHAEL	5420			
21	MIZAN ASIF SHAIKH	5421			
22	FAZIL SHAMSHER KHAN DORYAZI	5422			
23	FARAZ SHAMSHER KHAN DORYAZI	5423			
24	ALSHAAN AZEEM SHAIKH	5424			
25	ABRAR SALIM SHAIKH	5425			
26	WAJID ISHAQUE DESAI	5426			
27	ARBAAZ RAFIQ SHAIKH	5427			
28	MOHAMMADABRAR ZAMIR PATEL	5428			
29	ZUHIB YAKUB SHAIKH	5429			
30	SHAIBAJ SAYYAD SHAIKH	5430			
31	AASHRAF KASAM SHAIKH	5431			
32	ABSARULHAQ YASIN SAYYED	5432			
33	UMAR MOHAMMED NASIR SHAIKH	5433			
34	AFRIDI AJAZ KHAN	5434	<i>Ajaz</i>		✓
35	AZIM ASIF SHAIKH	5435			
36	JOHN LALKHAWPUSIAMA LALDINGLIANA MUALCHIN	5436			
37	AMAANULLA KARAMATULLA KADARI	5437			
38	VAISHAKH PRASAD NAIR	5438			
39	AZHAR NOOR PANGARKAR	5439	<i>Azhar</i>		✓
40	AMAN IQBAL SAYYED	5440			
41	FATEMA NADEEM KHAN	5441			
42	SHOHEL AFZAL MANSOORI	5442			
43	RUKHSAR FEROZ SHAIKH	5443	<i>Rukhsar</i>		✓
44	RAHIL JAVED SHAIKH	5444			

45	ABDUL RAAZIQA FAHIM SHAIKH	5445			
46	MOIN MUNAF CHAUDHARY	5446			
47	NAVID NISAR DAREKHAN	5447			
48	FAISAL AJAZ SHAIKH	5448			
49	IZHAR ABRAR SAYYED	5449			
50	RIYAZ NOORMOHAMMAD TAMBOLI	5450			
51	TANZIL BASIM MOINUDDIN KHAN	5451			
52	SAURABH RATNADEEP PATIL	5452			
53	MUSEB MUSTAFA PARIHAR	5453			
54	KAJAL KRUPALSINGH CHOUDHARY	5454			
55	REHAN IFTEKHAR SHAIKH	5455			
56	KAVITA RAMASHISH YADAV	5456			
57	GULLER BEGENCHGELDI BEGENCHGELDIYEVA	5457			
58	MOHD TASADUQ MASOOD KHAN	5458			
59	HUSAIN NASIR BHATTIWALA	5459			
60	ASHRAF SHAFI SHAIKH	5460			
61	MOHAMMED JUNAID JAWEED SHAIKH	5461			
62	AMAN PIRSAHEB HAVALDAR	5462			
63	ABDULLA ZAKIRAHMED GAZEKHAN	5463			
64	SAMUEL DR.CLEMENT TERON TERON	5464			
65	AHMAD FARZAD SAMI ULDIN	5465			
66	ABDUL KABIR AHMAD ALI	5466			
67	AMEENU RAHMAN KHALEEL KM KM	5467			
68	RAHIL HIDAYATULLA SUNDKE	5468			
69	ZULFIKAR ANWAR SHAIKH	5469			
70	ZAHR RAFIQUE SHAIKH	5470			
71	RESHMA RAJESH NAIR	5471			
72	PRAKHAR RAVINDRA PATIL	5472	<i>Prakhar</i>		✓
73	ABADULLAH AHMADI ABDUL NASIR	5473			
74	ARBAAZ FIROZ SAYYED	5474			
75	ARBAAZ ARIF BAGWAN	5475			
76	HAMID ABASS RAJA	5476			
77	NAZDANA MOHAMMD ALLAH REZAIE	5477	<i>Nazda</i>		✓
78	AFTAB ABID ANSARI	5478			
79	MUNEEB MUSHTAQ KAR	5479	<i>Muneeb</i>		✓
80	AMAN ASHOK KUMAR RAINA	5480			
81	SAFWAN IRFAN MANDRE	5481			
82	SAYARABANU ABDULRAJAK SHAIKH	5482			
83	TAHER HUSSAIN TANDIWALA	5483			
84	AHMAD SEYAR MOHD. GUL	5484			

Examiner's Name:

Examiner's Signature:

Dr. Aftab Anwar Shaikh
Vice-Principal & HOD