

# MCA (Information Science and Management): The Next Generation Interdisciplinary specialization for Social, Business, Health & Mathematical Sciences—A Step for promoting Digital Humanities

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**Abstract**— Information Science is an important domain for building healthy information infrastructure for almost all kind of organization and institutions for almost all kind of organization and institutions and sector. Information and its growing number is the main reason behind the requirement of information and similar domain. Information Science is actually an interdisciplinary domain combines with so many subjects related to information and processing of data and similar facet. Computer is one of the important gradients in Information Science for healthy and sophisticated information system designing and development. In the education sector, there are so many courses available which are related to computers such as Computer Science, Computer Application, Computer Science and Engineering, IT and so on and comes with so many nomenclatures and levels. Information Science is also a computer related subject but having information concentration. MCA is one of the important and popular courses in computing applications in India; which deals with IT applications in the industrial and society problems. This paper talks about MCA in respect of possibilities of Information Science specialization in such programme for better information infrastructure development. Several contents of this paper are directly included in the thesis of the author (*for obtaining research degree*) and the fact is hereby acknowledged. Paper deals with many aspects of Information Science including its need and characteristics, educational situation in India and globally in brief manner and way to introduce this proposal in contemporary Indian MCA programme.

**Keywords**— Information, Information Science, IST, Knowledge, Social Development, Digital Divide, Information Literacy, Information Divide, Information Development, Academics, Information Systems

## I. INTRODUCTION

Information Science is an interdisciplinary Science of Sciences; it is one of the important domains which is responsible for so many information activities such as collection, selection, organization, processing, management and dissemination. Information Science is responsible for information infrastructure building which including conventional workplace of Information Science i.e. Information Foundation and related organizations, public information systems, Medical Information Systems, Chemical and Bio-Information infrastructure buildings and so on (See Fig:2 for more details). [10, 15]. Though for development of such activities building Information Science education is very much important in India. Still, Information Science programme is offered in very minimum institutions and only around 10 institutions [10, 13]. However, MCA course is offered in more than 2,400 Computer Application colleges and Engineering educational institutions. There are provisions and possibilities in which Information Science

aspects may include in BCA/MCA Programmes. Ultimately such initiative will be helpful for Information Systems development which will be powered by modern and up to date Information Technology and Computing Systems [16, 18].

## II. OBJECTIVE

This paper deals with so many aim and objective; which including but not limited to:-

- To know basic about Information Science and its basic characteristics and features.
- To learn about the main component and field of Information Science and allied domain.
- To know about Information Science and relationship and integration with computing and allied domain.

- To get a brief overview on Information Science and the institutions offering educational programmes in India.
- To prepare a model and proposed curriculum of MCA with focus or specialization in Information Science.
- To find out main challenges and issues in relation to MCA [Information Science] programme.

### III. INFORMATION SCIENCE: BASICS

Information Science is a broad field and combination of so many domains such as Information Technology, Computer Science, Information Studies, Knowledge Management, Management Science, and Mathematical Science and so on (See Fig:1 for more details). Information Science is a domain which is responsible for information system and infrastructure building with the help of manual tools, and computational tools [22].

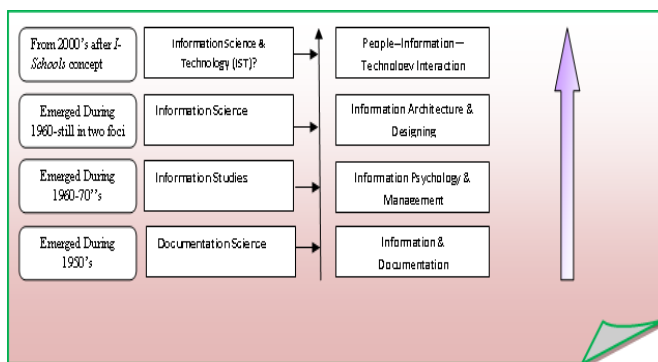


Fig: 1-Generation wise Information Field changes and changing nomenclature at a glance

Initially, Information Science originated from the information field and due to the advancement of technologies comes as an advanced field of Applied Science with the aim of information and side by side technological solution. Information Science is an important domain in today’s age as information is needed in almost all the organizations, and institutions. Information Science curriculum in today’s courses included in such a manner in which computational aspects and fundamentals related to information and society are molded nicely [23].

### IV. COMPUTER APPLICATION AND MCA DEGREE

Computer Application is one of the important domain and nomenclature in Indian academics. Computer Application mainly deals with computer related application and utilization.

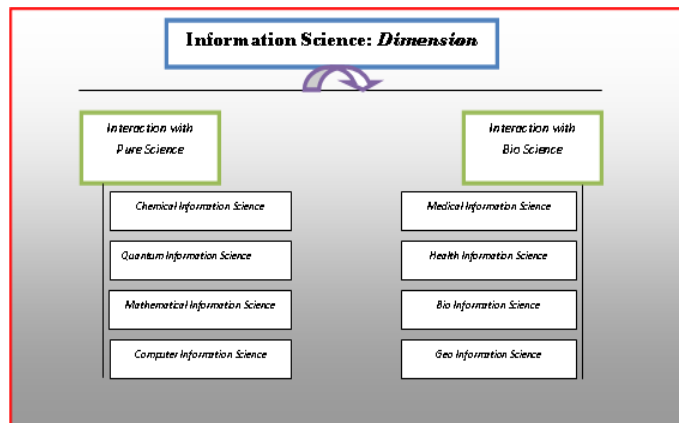


Fig: 2-Depicted Types of Information Science in respect to Domain focus

This programme mainly focuses on Application and packages rather than the development of new hardware systems, tools, and embedded systems [12, 19]. The flagship programme of Computer Application nomenclature is BCA/MCA while out of these two; MCA is most important and valuable.

The proposed MCA Programme is depicted of 3 year duration and within semester approach. The students entering MCA must have completed a Bachelor Degree such as BCA/BSc/BCom/BA degree with Mathematics/ Computer Science as one of the subjects at 10+2 level or graduation. The MCA programme is deemed as equivalent to Engineering degree of computing i.e. BE/BTech-Information Technology/ Computer Science and Engineering programme. The regularity body of MCA is All India Council for Technical Education [AICTE] as far as India is concerned. It is important to note that a proposed and model curriculum is already presented by AICTE and provided with total 25 theoretical papers and 10 as laboratory practice papers. The basic features of the curriculum are as follows-

According to AICTE guidelines, the core papers of IT for the MCA degree is listed as follows-

1. Introduction to Information Technology
2. Computer Organization and Architecture
3. Programming and Data Structures
4. Information Systems. Analysis, Design, and Implementation
5. Operating Systems
6. Data Base Management Systems
7. Computer Communication Networks
8. Object-oriented Analysis and Design
9. Network Programming
10. Software Engineering I
11. Software Engineering II

12. Artificial Intelligence and Applications

However, here total 12 papers had been proposed by the AICTE for MCA course as non-computer science core papers. Out of which 6 papers have deals with Management and 4 are as elective. The list of such specializations have depicted and mentioned in the Table: 1 and here out of six semesters, the last semester (VI Semester) a project work has been proposed.

Core Management Papers [5 Papers]	Elective Management Papers [Any 4 Paper]
1. Introduction of Management Functions	1. Managerial Economics
2. Oral and Written Communication	2. Corporate Planning
3. Accounting and Management Control	3. Foundations of Decision Processes
4. Management Support Systems	4. Investment Technology
5. Organizational Behavior	5. Business Finance
	6. Taxation Practices
	7. MIS Framework and Implementation
	8. Management of Software Projects

Table 1 : List of non-computer science core papers.

V. INFORMATION SCIENCE AND COMPUTER APPLICATION INTEGRATION

Already discussed that Information Science is a domain of interdisciplinary nature and combines with several domains of science, engineering, technology, management as well as humanities (social science gradients) which are related with the *information processing and management* directly or indirectly [12, 18]. The IS and its increasing association in the practicing field and domain created a new nomenclature called '*Information Science and Technology*'. Importantly, Information Science combines and related with following aspects and facets-

**In Engineering-** Computer Engineering, Mechanical Engineering, Electronics and Communication Engineering, Telecommunication

**In Science-** Bio-Science, Physics, Chemistry, Mathematics, Cognitive Science

**In Humanities-** Social Science, Library Science, Documentation

**In Management Science-** Administration and Leadership, Management Science.

The MCA curriculum designed and prepared by the All India Board of Computer Science, Engineering/ Technology and Applications (AIBCSA), which was set up by AICTE, New Delhi. It is important to note that the core of Information Science is positively possible to introduce in the MCA programme. It is a fact that the MCA curriculum already having components of computing/ IT/ Mathematics and Business and Management and thus by the inclusion of few information fundamentals and humanities gradients it is achievable to build Information Science/IST focused MCA programme. Here, in the proposed MCA, we have to include some important gradients of Information Science in such a way that a proper general balancing can be made without ignoring the computing gradients. Here three approaches have been proposed, in the first approach [*which is listed in Table: 2*] the MCA common papers kept as same provided by the committee of AICTE. Here just a few more papers have added related with the Information Science in Elective papers of MCA outline.

However, in second approach (i.e. here *listed in Table: 3*) the Information Science main/core gradients have included and distributed from the beginning of the programme and all the semesters have deals with AICTE's main gradients as well as the fundamentals of the Information Studies, Information and Knowledge Management including the Social Science gradients. Hence, the MCA programme looks like Information Science nature supported by the computing programme [05, 09, 12].

While in the third approach, *which is listed in Table: 4* we have proposed and depicted the same papers, as well as, outline of the main course (as MCA committee recommended) but here many gradients and specialized Information Science as elective programme have provided from the fifth (V) semester which is listed in fig. *Figure-4/A/B/C*. The electives have proposed with the following flavors such as—

- *Medical Information Science.*
- *Geo Information Science.*
- *Chemical Information Science.*

Semester	Papers							
Semester -1	Introduction of IT	Computer Organization and Architecture	Programming and Data Structure	Introduction to Management Function	Mathematical Foundations	IT Lab	Programming Lab	
Semester -2	Information System Analysis Design and Implementation	Operating Systems	Oral and Wireless Communication	Accounting and Management Control	Probability and Combinatorics	Business Programming Lab	Linux and Windows	
Semester-3	Database Management Systems	Computer Communication and Networks	Object Oriented Analysis and Design	Management Support System	Statistical Computing	DBMS Lab	Statistical Lab	
Semester-	Networking	Software	Elective-1	Organizational	Elective-2	Network Lab	CASE Tools	

4	Programming	Engineering-I	Information Science and Services	Behavior	Knowledge Organization-Theory and Practice		Lab	
Semester-5	AI and Applications	Software Engineering-II	Elective-3 Digital Information Systems, and Knowledge Economy	Elective-4 Knowledge Organization-II	Optimization Technique	AI and Application Lab	Optimization Technique Lab	Industrial Lecture, Seminar, small project
Semester-6	Project and seminar	Project and seminar	Project and seminar	Project and seminar	Project and seminar	Project and seminar	Project and seminar	Seminar

Table: 2 MCA papers same as provided by the committee of AICTE but few IS/IST papers have added.

Semester	Papers							
Semester -1	Fundamentals of IST	Computer Organization and Architecture	Knowledge Organization	Introduction to Management Function	Information Services and System	IT Lab	Knowledge Organization Lab	
Semester -2	Information System Analysis Design and Implementation	Operating Systems	Oral and Wireless Communication and Information Networks	Information Systems-Trendz	Knowledge Management and Multimedia System	Business Programming Lab	Linux and Windows	
Semester-3	Database Management Systems	Computer Communication and Networks	Object Oriented Analysis and Design	Management Support System and Information Centres	Social Computing	DBMS Lab	Statistical Lab	
Semester-4	DBMS-2	Intelligent Information Systems and UE	CISCO Systems	Organizational Behavior	Virtual Lan	Network Lab	CASE Tools Lab	
Semester-5	AI and Applications	Software Engineering-II	Computing for People	IT For DSS	Optimization Technique	AI and Application Lab	KO-Lab-2	Industrial Lecture, Seminar, small project
Semester-6	Project and seminar	Project and seminar	Project and seminar	Project and seminar	Project and seminar	Project and seminar	Project and seminar	Seminar

Table: 3 The IS/IST papers have added from the beginning of the semesters.

Semester	Papers							
Semester -1	Fundamentals of IST	Computer Organization and Architecture	Knowledge Organization	Introduction to Management Function	Information Services and System	IT Lab	Knowledge Organization Lab	
Semester -2	Information System Analysis Design and Implementation	Operating Systems	Oral and Wireless Communication and Information Networks	Information Systems-Trendz	Knowledge Management and Multimedia System	Business Programming Lab	Linux and Windows	
Semester-3	Database Management Systems	Computer Communication and Networks	Object Oriented Analysis and Design	Management Support System and Information Centres	Social Computing	DBMS Lab	Statistical Lab	
Semester-4	DBMS-2	Intelligent Information Systems and UE	CISCO Systems	Organizational Behavior	Virtual Lan	Network Lab	CASE Tools Lab	

Table: 4- Model approach where up to fourth semester the core MCA papers and IST papers have proposed with possibilities of domain based specialization at fifth and sixth semester.

Semester	Papers						
Semester -5 Specialization	Human Anatomy	Health Policies	Health IT and DSS	Health Informatics Software-1	Medical 2.0 and Web Designing	Health Informatics Software-1-Lab	

Semester -6 Specialization	Telemedicine and Network designing	Health Informatics Software-2	Knowledge Organization for Medical Literature	Medical Tourism and Computers	Knowledge Organization for Medical Literature-Practice	Health Informatics Software-2-Lab		
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Table: 4/A- Specialization-1 of MCA with Medical Information Science

Semester	Papers							
Semester -5 Specialization	Chemical Informatics-Basics	Chemical Informatics Application	Chemo Informatics Software-Theory and Practice	Biology and IT	Systems and Computers	Textile Science and Informatics		
Semester -6 Specialization	MIS in Chemical Lab	Chemical Compounding	KM for Chemical Documents	Pharmaceutics and Chemo informatics	KM for Chemical Documents-Practice	MIS in Chemical Lab-Practical		

Table: 4/B-Specialization-2 of MCA with Geo Information Science

Semester	Papers							
Semester -5 Specialization	Geo IS-Basics	GIS-Practice-1	GPRS and GPS	Topography and IT	Topographical and Geo Documentation	GIS-Practice-2		
Semester -6 Specialization	Space and IT	Oceanography and GIS	3D Modeling and GIS	Image Processing	Multimedia GIS	Cartographic technique and IT		

Table: 4/C-Specialization-3 of MCA with Chemo Information Science

Thus it is worthy to note that the proposed 3<sup>rd</sup> approach not only able and competent to produce skill of computing based information infrastructure system building as well as able to manage the growing need of sector wise (i.e. discipline wise) information and technologies. Thus, one degree holders shall be able in Health Information System, Geo Information System and classical information management which are in high demand in a contemporary context.

**VI. CHALLENGES AND ISSUES FOR PROPOSED MCA [INFORMATION SCIENCE]**

Building MCA [Information Science] may come with so many possibilities and opportunities but it comes with so many challenges and issues; some of them are as follows-

- MCA [Information Science] needs the core of existing paper and subject prepared by AICTE committee.
- Training of such programme, interdisciplinary teachers are needed as they need to know IT and Computing to Information fundamentals for computational and manual Information System building
- Running such courses needs authorized permission of concerned authorities, body, and association.

- Government support and educational initiative is still a less important issue which is so essential to take care.
- Information Science is an interdisciplinary field and which is needed for Information System building in Information Foundation such as Information Centre, Documentation Centre, Libraries and organizational Information System building and hence Information Science is needed and during preparation of MCA-Information Science it is essential to take care the matter of manual knowledge organization and some aspects such as Information and Communication, Information Society, Information Management, Economic aspects of Information and similar facet inclusion in the perspective proposed programmes.
- Still, Information Science programmes are very much limited in India; only around 10 institutes are offers flagship programme of MSc- Information Science which listed in *Table: 5* and hence if full-fledged programme is not possible to introduce in Information Science then it may be offered as MCA [Information Science].

**VII. SUGGESTION**

- Information Foundations, Association and Computing and IT Association need to collaborate each other for building healthy Information Infrastructure with sophisticated IT support;

- AICTE, Ministry of IT, Education and similar departments are need to take proper initiative to start MCA- Information Science programme;
- During preparation of the programme, it is very much essential that the balancing of Information Fundamentals should be kept in mind;
- Apart from MCA programme such specialization may also be started in MCA- Information Science for producing skilled IT based Information Professionals;
- Initially if During MCA department wants to introduce MCA- Information Science specialization then appointing Adjunct Professor with Information Fundamentals specialization will be a better alternative.

### VIII. CONCLUSION

Information Science is one of the important and valuable domain as sophisticated Information Management backed by the Computing is possible with this domain. India is one of the largest educational hub in the world with near about 30000 higher educational institutions but still, the development of Information Science and the related domain is in very much limited in India [12, 19]. Hence, a better alternative may be introducing Information Science specialization at BCA/BCA or BSc/MSc-IT level. Proper planning, integration of computing and information related departments; associations may be an important alternative to manage Information explosion and future Information Solution.

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