

**PROGRAMME GUIDE**  
**FOR**  
**MASTER OF COMPUTER APPLICATIONS**  
**(MCA)**



**SCHOOL OF COMPUTER AND INFORMATION SCIENCES**  
**INDIRA GANDHI NATIONAL OPEN UNIVERSITY**  
**MAIDAN GARHI, NEW DELHI - 110 068**

[www.ignou.ac.in](http://www.ignou.ac.in)

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*Further information on the Indira Gandhi National Open University courses can be obtained from the University's office at Maidan Garhi, New Delhi-110 068.*

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# CONTENTS

## Page No.

	<b>Message from the MCA Programme Coordinator</b>	4
<b>1.</b>	<b>Basic Information</b>	5
1.1	MCA Programme Objectives	5
1.2	Duration of the Programme	5
1.3	Medium of Instruction	5
1.4	Credit System	5
1.5	MCA Programme Structure	6
1.6	Recognition	6
1.7	Completion of BCS-012	7
1.8	Associate Studentship Scheme	7
1.9	Student Support Services	7
1.10	Newsletter	7
1.11	How to contact the MCA Programme Coordinator	7
<b>2.</b>	<b>Instructional System</b>	8
2.1	Print Material	8
2.2	AudioVideo Material and CDs	8
2.3	Counselling Sessions	9
2.4	Web Based Support	26
<b>3.</b>	<b>Browsing IGNOU's Website</b>	26
3.1	Navigation from Home Page	27
3.2	Navigation from SOCIS Page	28
3.3	Procedure to Browse Through MCA pages	29
<b>4.</b>	<b>MCA Syllabus</b>	29
<b>5.</b>	<b>Evaluation Scheme</b>	73
5.1	Assignments and Term – End Examination	74
5.2	Guidelines for Mini Project (MCS-044)	76
5.3	Instructions for Assignments	75
5.4	Guidelines Regarding the Submission of Assignments	77
5.5	General Guidelines Regarding the Term-End Examination	78
<b>6.</b>	<b>Other Useful Information</b>	82
6.1	Reservation of Seats	82
6.2	Scholarships and Reimbursement of Fee	82
6.3	Change / Correction of Address	82
6.4	Change of Regional centre and Study Centre	83
6.5	Disputes on Admission and Other University Matters	83
<b>7.</b>	<b>Some Useful Addresses</b>	83
<b>8.</b>	<b>Model Question Papers</b>	85
<b>9.</b>	<b>Forms and Enclosures</b>	103
	<ul style="list-style-type: none"><li>• <i>Assignments Remittance-Cum-Acknowledgement Card (Form No.1)</i></li><li>• <i>Non receipt of Study Material(s) / Assignment(s) (Form No.2)</i></li><li>• <i>Application Form for obtaining Duplicate Grade Card / Mark-sheet (Form No.3)</i></li><li>• <i>Change of Address / Study Centre (Form No. 4)</i></li><li>• <i>Re-Registration Form for MCA (Form No. 5)</i></li><li>• <i>Re-evaluation of Answer script (Form No.6)</i></li><li>• <i>Re-admission form for MCA programme (Form No.7)</i></li><li>• <i>Application form for improvement in Division/Class (Form No.8)</i></li><li>• <i>Application Form for obtaining photocopy of the answer script (Form No.9)</i></li><li>• <i>Application/Registration form for appearing Term End Examination (Form 10)</i></li><li>• <i>Application form for early declaration of result or Term-End Examination (Form 11)</i></li><li>• <i>Application form for issue of Official Transcript (Form 12)</i></li></ul>	

## MESSAGE FROM THE PROGRAMME CO-ORDINATOR

Dear student,

Welcome to the family of distance learners and IGNOU's Master of Computer Applications Programme. It is a 3-year programme during which you will study a wide range of topics in computer science and applications. You will receive support from IGNOU through the regional centre, study centre to which you will be allotted and also from IGNOU's website. We expect you to be directly in contact with us and your peers through the Internet also, at the email address given below.

Along with this Programme Guide, you would have received the entire course material and the assignments booklet for the first semester. This consists of 7 courses: MCS-011, MCS-012, MCS-013, MCS-014, MCS-015, MCSL-016 and MCSL-017. Each course contains **only one assignment** that will be assessed by a counsellor at your study centre. All these assignments are to be submitted at your study centre within the stipulated time mentioned against last date of submission.

At your study centre you will be able to avail the counselling for all the courses. You need to have a minimum of 70% attendance for practical counselling sessions to be eligible for appearing for the Term-end Practical Examinations. Also must submit the assignments of any course before the due date to be eligible to appear for the related Term-end Examinations.

It is to be noted that the payments that are mentioned in various proformas/formats are as on date and may be subject to revision from time to time. You are advised to keep checking with the website/study centre/regional centre for any revision/modification. **Some useful forms and formats are also given at the end of this booklet. You may use the photocopies of them.** The programme guide, forms and formats are also available on the website. Please confirm the fees with the Regional Centre / Study Centre / website before you pay.

In case a student needs the assignments, s/he can obtain a copy of the same from the Study centre or Regional centre or may download them from the IGNOU's website with URL [www.ignou.ac.in](http://www.ignou.ac.in).

As a distance learner, you may have several queries. Many of them would be answered in this booklet. **This booklet is a very important guide for you. Read it and preserve it until, you successfully complete the MCA programme.** This Programme Guide contains all the information and forms related to the MCA programme. However, during your studies, if you have any feedback, suggestions and comments to make, please write to us immediately.

Learners are advised to be in touch with their Study centres for advice / timely / day-to-day information or visit the website with URL [www.ignou.ac.in](http://www.ignou.ac.in).

**I wish you all the success in pursuing the MCA programme.**

**MCA Programme Coordinator  
Email: [mca@ignou.ac.in](mailto:mca@ignou.ac.in)**

# 1. BASIC INFORMATION

## 1.1 MCA Programme Objectives

The broad objective of the MCA programme is to prepare graduate students for productive careers in software industry and academia by providing an outstanding environment for teaching and research in the core and emerging areas of the discipline. The programme's thrust is on giving the students a thorough and sound background in theoretical and application-oriented courses relevant to the latest computer software development. The programme emphasizes the application of software technology to solve mathematical, computing, communications / networking and commercial problems.

This Master's Degree Programme has been designed with a semester approach in mind. The first year courses are aimed at skills development in computers using various technologies, the second year is more focused on core courses providing conceptual framework and the third year provides the specialisation and the project work.

## 1.2 Duration of the Programme (Minimum - 3 Years, Maximum - 6 Years)

To fulfil the requirements for acquiring the MCA, a student may clear all the courses in a minimum of three years and a maximum of 6 years. In case the student is unable to pass all the courses of the MCA programme in 6 years, s/he can continue for another two years by seeking Re-admission to the courses which s/he is unable to successfully complete. For the re-admission rules and paying the requisite fee, you may contact the Regional Centre for further information. But, you are advised to pass all the courses successfully in 3 years.

## 1.3 Medium of Instruction

The medium of instruction is only in **English**. The course material is also in English.

## 1.4 Credit System

The University follows the 'Credit System' for its programmes. Each credit is worth 30 hours of student study time, comprising all the learning activities. Thus, a four-credit course involves 120 study hours. This helps the student to understand the academic effort one has to put into successfully complete a course. **Completion of the programme requires successful completion of both assignments and the Term End Examination of each course in the programme.**

## 1.5 MCA Programme Structure

The programme has been divided into two semesters per year (January to June and July to December). Consequently, there will be two examinations every year - one in the month of June for the January to June semester courses and the other in December for the July to December semester courses. The students are at liberty to appear for any of the examinations schedule conducted by the University during the year subject to completing the minimum time framework other formalities prescribed for the programme.

## MCA Programme Structure

I SEMESTER				II SEMESTER		
Year	Course Code	Course Title	Credits	Course Code	Course Title	Credits
I	MCS-011	Problem Solving and Programming	3	MCS-021	Data and File Structures	4
	MCS-012	Computer Organization and Assembly language Programming	4	MCS-022	Operating System Concepts and Networking Management	4
	MCS-013	Discrete Mathematics	2	MCS-023	Introduction to Database Management Systems	3
	MCS-014	Systems Analysis and Design	3	MCS-024	Object Oriented Technologies and Java Programming	3
	MCS-015	Communication Skills	2	MCSL-025	Lab (based on MCS-021, 022, 023 & 024)	4
	MCSL-016	Internet Concepts and Web Design	2			
	MCSL-017	C and Assembly Language Programming Lab	2			
III SEMESTER				IV SEMESTER		
II	MCS-031	Design and Analysis of Algorithms	4	MCS-041	Operating Systems	4
	MCS-032	Object Oriented Analysis and Design	3	MCS-042	Data Communication and Computer Networks	4
	MCS-033	Advanced Discrete Mathematics	2	MCS-043	Advanced Database Management Systems	4
	MCS-034	Software Engineering	3	MCS-044	Mini Project	4
	MCS-035	Accountancy and Financial Management	3	MCSL-045	Lab (UNIX & Oracle)	2
	MCSL-036	Lab (based on MCS-032, 034 and 035)	3			
V SEMESTER				VI SEMESTER		
III	MCS-051	Advanced Internet Technologies	3	MCSP-060	Project	16
	MCS-052	Principles of Management and Information Systems	2			
	MCS-053	Computer Graphics and Multimedia	4			
	MCSL-054	Lab (based on MCS-051 & 053)	2			
	<b>Elective Courses*</b>					
	MCSE-003	Artificial Intelligence and Knowledge Management	3			
	MCSE-004	Numerical and Statistical Computing	3			
	MCSE-011	Parallel Computing	3			

*\* Presently, only 3 elective courses are on offer and student should needs to select all of them. As and when we design the new courses we will inform.*

**Total number of Courses are 31**

**Total number of Credits are 108.**

### 1.6 Recognition

- IGNOU is a Central University established by an Act of Parliament in 1985 (Act No.50 of 1985) IGNOU Degrees/Diplomas/Certificates are recognized by all member Universities of Association of Indian Universities (AIU) and are at par with Degrees/Diplomas/Certificates of all Indian Universities/Deemed Universities/Institutions vide UGC Circular No. F1-52/2000 (CPP-II) dated 5 May, 2004 & AIU Circular No. EV/B (449)/94/177115 dated January 14, 1994.

## **1.7 Completion of BCS-012**

The MCA students who did not have Mathematics at 10+2 level or graduate level, and have opted for BCS-012 are advised to clear them along with the first year of MCA courses. However, all students have to successfully complete the BCS-012 (wherever applicable) before re-registering for MCA 5<sup>th</sup> semester.

## **1.8 Associate Studentship Scheme**

There is a provision of Associate Studentship scheme in MCA wherein the student can register for a minimum of 8 credits and a maximum of 32 credits. This scheme is permissible for any course(s) of any programme offered by IGNOU, subject to the conditions that the students fulfill the minimum eligibility requirements for the respective programme and also should undertake the minimum and maximum credits specified.

Students are not eligible for admission under Associate Studentship scheme to the course(s) of the programme(s) where clearance of an entrance test is mandatory and also to the programmes where the intake is to a limited number of seats.

## **1.9 Student Support Services**

In order to provide individualised support to its learners, the University has created a number of Study Centres throughout the country for this Programme. These are administratively coordinated by the Regional Centres. The Study Centres are the contact points for the students on all major aspects of the Programme. These include counselling sessions, practicals, reference library facilities, disseminating information and advice, facilities for audio-visual training aids and teleconferencing.

The University may not always be able to communicate to all the students individually. All the important communications are sent to the Regional Directors who in turn will intimate them to the Study centre coordinators. The coordinators display such circulars / notifications on their notice boards for the benefit of the students. You are, therefore, advised to be in touch with your Study Centre Coordinator on a more regular basis so as to get the latest information about assignments, submission schedules (assignments and examination forms), declaration of results, etc.

## **1.10 Newsletter**

The IGNOU Newsletter is published twice in a year (April and October) in English and Hindi. This periodical communication is delivered by post to all the students of IGNOU along with course material. Information regarding the examination schedule, new courses to be launched, admissions, telecast schedule, teleconferencing schedule etc., is also provided through the IGNOU newsletter. It covers various activities at IGNOU Headquarters, Regional Centres and Study Centres. It also carries important notifications from time to time.

## **1.11 How to contact the MCA Programme Coordinator?**

Students may contact the MCA Programme Coordinator by sending a communication through post to The MCA Programme Coordinator, SOCIS, Vishveswaraiah Bhavan, C-Block, IGNOU Academic Complex, IGNOU, Maidangarhi, New Delhi – 110068, or can send an Email to [mca@ignou.ac.in](mailto:mca@ignou.ac.in) or by telephone with Tel No: 011-29533436.

## 2. INSTRUCTIONAL SYSTEM

The methodology of instruction in this university is different from that of the conventional universities. The Open University system is more learner-oriented, and the student has to be an active participant in the teaching-learning process. Most of the instruction is imparted through a distance with only a small component of face-to-face communication. The University follows a multi-channel approach for instruction. It comprises a suitable mix of:

- ☞ self-instructional printed material
- ☞ audio / video cassettes and CDs
- ☞ audio-video programmes transmitted through AIR and Doordarshan, and at study centre
- ☞ face-to-face counselling at Study Centres by academic counsellors
- ☞ reference library at study centre
- ☞ web based academic support
- ☞ assignments
- ☞ practicals
- ☞ Gyan Darshan Channel, including teleconferencing, Eklavya exclusively for Technology programmes
- ☞ Gyan Vani.

### 2.1 Print Material

Printed materials are the primary form of instructional materials. These are supplied to the learners in the form of several booklets called blocks. Each block consists of several units. The size of a unit is such that the material given therein may be expected to be studied by a student in a session of about 4 to 6 hours of study. Therefore, you have to concentrate mainly on the print materials, which we send to you. However, the fast pace of computer industry necessitates that students must do some additional readings. Students are advised to study reference books without fail. Studying the printed material alone may not be sufficient to write assignments and prepare for the term-end Examinations. Some reference books are available at your study centre.

### 2.2 Audio-Video Material and CDs

These are video-cassettes meant for clarification and enhancement of understanding. However, audio / video are supplementary material and would not be available in all the courses. The audio-video material supplements the print material. Hence, we advise you to make use of it as that will help you to understand the subject better. However, audio-video material will normally not be supplied to the students individually but will be made available at the Study Centres. You can watch these programmes during counselling sessions. The schedule for screening these films has been synchronised with the progress of relevant written material. Students desirous of buying the audio-video tapes can procure them from:

**The Director  
EMPC, Sanchar Kendra  
IGNOU, Maidan Garhi  
New Delhi-110068  
Ph. 91-11- 29532163, 29532164, 29533065**

The programmes of SOCIS are also telecast on DD-1(National Channel). The telecast schedule of transmission of programmes is communicated through a monthly booklet called **Gyan Darshan**.

You can contact your Study Centre Coordinator to go through it. You may write to the above-mentioned address for a copy of the same or see the schedule on the IGNOU's website.

## 2.3 Counselling Sessions

The details of the theory and practical counselling sessions are given in the following sections.

### 2.3.1 Theory Sessions

In distance education, face-to-face contact between the learners and their tutors/counsellors is relatively less. The purpose of such a contact is to answer some of your questions and clarify your doubts that may not be possible through any other means of communication. It also provides you with an opportunity to meet your fellow students.

There are academic counsellors at the Study Centres to provide counselling and guidance to you in the courses that you have chosen for study. Normally, these sessions will be held at the study centres on Saturdays and Sundays.

You should note that the counselling sessions would be very different from the classroom teaching or lectures. Counsellors will not be delivering lectures as in conventional teaching. They will try to help you to overcome difficulties that you face while studying for the MCA programme. In these sessions, you must try to resolve your subject-based difficulties and any other related problems.

**Before attending the counselling session for each course, please go through your course material as per the session schedule and make a plan of the points to be discussed. Unless you have gone through the Units, there may not be much to discuss and may not be fruitful.**

### 2.3.2 Practical Sessions and Compulsory Attendance

The practical sessions will be held in the computer centres / labs of the Study Centres. In these computer labs, the participants will have the facility to use the computer and software packages relevant to the syllabus. The following points regarding the practical attendance must be noted:

- (i) 70% attendance is compulsory for each lab course. **However, this condition is not applicable for the computer time given for assignment implementation.**
- (ii) This is a pre-requisite for taking the term-end practical examination in the respective lab courses.
- (iii) A student who fails to fulfil the 70% attendance requirements will be allowed to re-register for that lab course. For fee details and the application form, please contact your Regional Centre.
- (iv) Students are required to prepare a separate lab record for each lab course. The practical counsellor should duly sign this lab record after each session.
- (v) Student attendance will be recorded coursewise at the study centre.
- (vi) Strictly follow the guidelines given in the Lab manuals for the respective lab courses.
- (vii) Computer to Student ratio will be 1:2.

### 2.3.3 Counselling Schedule

I SEMESTER						II SEMESTER				
Year	Course Code	Course Title	Credits	No. of Theory sessions (2 hrs each)	No. of Practical sessions (3 hrs each)	Course Code	Course Title	Credits	No. of Theory sessions (2 hrs each)	No. of Practical sessions (3 hrs each)
I	MCS-011	Problem Solving and Programming	3	5	2 <sup>^</sup>	MCS-021	Data and File Structures	4	8	
	MCS-012	Computer Organization and Assembly language Programming	4	8	2 <sup>^</sup>	MCS-022	Operating System Concepts and Networking Management	4	8	2 <sup>^</sup>
	MCS-013	Discrete Mathematics	2	3		MCS-023	Introduction to Database Management Systems	3	5	2 <sup>^</sup>
	MCS-014	Systems Analysis and Design	3	5		MCS-024	Object Oriented Technologies and Java Programming	3	5	2 <sup>^</sup>
	MCS-015	Communication Skills	2	2		MCSL-025	Lab (based on MCS-021, 022, 023 & 024)	4		(10+10+10+10)
	MCSL-016	Internet Concepts and Web Design	2		20					
	MCSL-017	C and Assembly Language Programming Lab	2		(10+10)					
III SEMESTER						IV SEMESTER				
II	MCS-031	Design and Analysis of Algorithms	4	8		MCS-041	Operating Systems	4	8	
	MCS-032	Object Oriented Analysis and Design	3	5	2 <sup>^</sup>	MCS-042	Data Communication and Computer Networks	4	8	2 <sup>^</sup>
	MCS-033	Advanced Discrete Mathematics	2	3		MCS-043	Advanced Database Management Systems	4	8	2 <sup>^</sup>
	MCS-034	Software Engineering	3	5		MCS-044	Mini Project	4		10
	MCS-035	Accountancy and Financial Management	3	8		MCSL-045	Lab (UNIX & Oracle)	2		(10+10)
	MCSL-036	Lab (based on MCS-032, 034 and 035)	3		(10+10+10)					
V SEMESTER						VI SEMESTER				
III	MCS-051	Advanced Internet Technologies	3	5	2 <sup>^</sup>	MCSL-060	Project	16	2 <sup>#</sup>	
	MCS-052	Principles of Management and Information Systems	2	3						
	MCS-053	Computer Graphics and Multimedia	4	8	2 <sup>^</sup>					
	MCSL-054	Lab (based on MCS-051 & 053)	2		(10+10)					
	<b>Elective Courses*</b>									
	MCSE-003	Artificial Intelligence and Knowledge Management	3	5						
	MCSE-004	Numerical and Statistical Computing	3	5						
	MCSE-011	Parallel Computing	3	5						

\* Presently, only 3 elective courses are on offer and student should needs to select all of them. As and when we design the new courses we will inform.

# These sessions should be conducted in the 5<sup>th</sup> semester.

<sup>^</sup> These sessions are meant for Assignment implementation and attendance is not compulsory.

## Semesters and the Number of Sessions:

Semester	No. of Sessions			No. of Hours		
	Theory	Practical	Assignment implementation	Theory	Practical	Assignment implementation
I	23	40	4	46	120	12
II	26	40	6	52	120	18
III	29	30	2	58	60	6
IV	24	30	4	48	90	12
V	31	20	4	62	60	12
VI	2*	-	-	4		
<b>TOTAL</b>	<b>135</b>	<b>160</b>	<b>20</b>	<b>270</b>	<b>480</b>	<b>60</b>

- These sessions should be conducted in the 5<sup>th</sup> semester.

**Total Computer time = Practical time + Assignment implementation time**  
**= 160 Sessions + 20 Sessions**  
**= 480 hours + 60 hours**  
**= 540 hours**

*Note: 70% attendance is compulsory in Practical Lab Sessions. However, this condition is not applicable for the time given for assignment implementation.*

### 2.3.4 Detailed Counselling Schedule for MCA 1<sup>st</sup> to 6<sup>th</sup> Semesters

The following is the detailed counselling schedules for 1<sup>st</sup> to 6<sup>th</sup> Semesters of MCA. The Schedule is applicable for all the students of MCA 1<sup>st</sup> year, 2<sup>nd</sup> year and 3<sup>rd</sup> year. **The respective study centres will communicate you the exact dates of the Schedule.**

#### MCA 1<sup>st</sup> Semester Schedule

##### MCS-011: Problem Solving and Programming

S. No.	Counselling Sessions	Number of Sessions	Comments
1.	Theory Sessions	5	One Session on Block -1 Two sessions each on Block-2 and Block - 3
2.	Practical Sessions	2	These two practical sessions are not compulsory

#### Session Details

Sessions	Session Number	Block to be Covered	Topics to be covered
<b>Theory Counselling</b>	1	Block-1 (Units 1, 2 3 & 4)	Problem Solving, Basics of C, Variables and Constants, Expressions and Operators
	2	Block-2 (Units 5 & 6)	Decision and Loop Control Statements in C and Arrays
	3	Block-2, (Units 7 & 8)	Strings and Functions in C
	4	Block-3, (Units 9 & 10)	Structures & Unions, Pointers
	5	Block-3, Unit 11 & 12	C Preprocessor and Files
<b>Practical Sessions</b>	1&2	Assignment	Design, write and test the MCS-011 assignment problems

## MCS-012: Computer Organisation and Assembly Language Programming

### Counselling Sessions

S. No.	Counselling Sessions	Number of Sessions	Comments
1.	Theory Sessions	8	Two sessions each on each Block
2.	Practical Sessions	2	These two practical sessions may be used for solving assignment problems. These are not compulsory.

### Session Details

Session Type	Session Number	Block to be Covered	Topics to be covered
<b>Theory Counselling</b>	1	Block 1, Unit 1, 2 & 3	von Neumann Architecture, Instruction execution, concept of Interrupts, Fixed point and floating point arithmetic, error detection and other codes, concepts of Gates and Logic Circuits
	2	Block 1, Unit 3 & 4	The Combinational and Sequential circuits, Design of Combinational circuits, examples of combinational circuits, flip flops, sequential circuit design, examples of sequential circuits
	3	Block 2, Unit 1 & 2	The memory hierarchy, Cache, RAM, ROM, DRAM, Flash Memory, secondary storage technologies and Characteristics, RAID and its levels, Cache Organisation, The Memory System of Micro-Computer, Input output interfaces, the concepts of device controllers, Input output techniques, DMA, Device drivers, Input output processors, Interrupt Processing
	4	Block 2, Unit 3 & 4	Hard Drives: Partitioning and Formatting: FAT, Inodes, Drive Speed, Access Time, Rotation Speeds, Hard Drive Interfaces, Removable Storage Options, Video Cards, Liquid Crystal Display (LCD), Modems, Print Resolution, Scanners, Keyboards, Mouse, Power supply
	5	Block 3, Unit 1 & 2	The Instruction format, The Instruction set architecture, The types of Instructions, The types of operands, Addressing modes and their importance, Description of Various types of Registers, Need and importance of registers, The Micro-operation concepts, The Instruction execution and micro-operations
	6	Block 3, Unit 3, 4 & 5	The organization of Arithmetic logic unit, The characteristics of ALU, Design of simple units of ALU, Pipelining, The hardwired control, Wilkes control, The Micro-programmed control, the microinstructions, the execution of micro-program, RISC principles, Large Register file in RISC, RISC pipelining
	7	Block 4, Unit 1, 2 & 3	8086 microprocessor, The Instruction format, The addressing modes, The types of Instructions, The need and use of assembly language, Input output in assembly Language Program, Sample Assembly Programs including Arrays, Counters, Dealing with various simple statements, Use of various addressing modes
	8	Block 4, Unit 4	Modular Programming, Interfacing assembly with HLL, Device drivers in assembly, Interrupts in assembly
<b>Practical Sessions</b>	1&2	Assignment Problem	Design, write and test the MCS-012 assignment problem

## MCS-013: Discrete Mathematics

### Counselling Sessions

S. No.	Counselling Sessions	Number of Sessions	Comments
1.	Theory Sessions	3	One Session on Block -1 Two sessions on Block-2

### Session Details

Sessions	Session Number	Block to be Covered	Topics to be covered
Theory Counselling	1	Block-1 (Units 1, 2 & 3)	Propositional Calculus, Methods of Proof & Boolean Algebra and Circuits
	2	Block-2 (Units 1,2)	Sets, Relations and Functions & Combinatorics – An Introduction
	3	Block-2 (Units 3, 4)	Some more Counting Principles, Partitions and Distributions

## MCS-014: Systems Analysis and Design

### Counselling Sessions

S. No.	Counselling Sessions	Number of Sessions	Comments
1.	Theory Sessions	5	One Session each on Block -1 and Block-2.Two sessions on Block-3 and one session on Block-4.

### Session Details

Sessions	Session Number	Block to be Covered	Topics to be covered
Theory Counselling	1	Block-1 (Units 1, 2 3 & 4)	Introduction to Systems Analysis and Design, Profession of a Systems Analyst, Process of Systems Development and Documentation of systems
	2	Block-2 (Units 5,6 &7)	Process of Systems planning, Modular and Structured Design and System Design and Modeling
	3	Block-3 (Units 8 & 9)	Forms and Reports Design, Physical File Design and Database Design
	4	Block-3 (Unit 10)	CASE tools for systems development
	5	Block-4 (Units 11, 12 & 13)	Implementation and Maintenance of systems, Audit and Security of Computer systems, Management Information Systems

## MCS-015: Communication Skills

### Counselling Sessions

S. No.	Counselling Sessions	Number of Sessions	Comments
1.	Theory Sessions	2	One Session on Block -1 One session on Block-2

**Session Details**

Sessions	Session Number	Block to be Covered	Topics to be covered
Theory Counselling	1	Block-1 (Units 1 to 5)	Process of Communication, Telephonic Techniques, Job Applications and Interviews, Group Discussions & Managing Organizational Structure
	2	Block-2 (Units 6 to 10)	Meetings, Taking notes and preparing minutes, Presentation Skills I & II and Negotiation skills.

**MCSL-016: Internet Concepts and Web Design****Counselling Sessions**

Sessions	Number of Sessions	Comments
Practical Sessions	20	Internet Concepts and web design

**Session Details**

Sessions	Session Number	Block to be Covered	Topics to be covered
Practical Sessions	1	Block -2, Lab Manual (Section -1)	All the problems given in the session - 1, session - 2 and session - 3 of Section -1 of the lab manual are to be executed.
	2	Block -2, Lab Manual (Section - 1)	All the problems given in the session - 4, session - 5 and session - 6 of Section - 1 of the lab manual are to be executed.
	3	Block -2, Lab Manual (Section - 1)	All the problems given in the session - 7 and session - 8 of Section - 1 of the lab manual are to be executed.
	4	Block -2, Lab Manual (Section -1)	All the problems given in the session - 9 and session -10 of Section - 1 of the lab manual are to be executed.
	5	Block -2, Lab Manual (Section - 2)	All the problems given in the session - 1, session - 2 and session - 3 of Section - 2 of the lab manual are to be executed.
	6	Block -2, Lab Manual (Section -2)	All the problems given in the session - 4, session -5 and session-6 of Section - 2 of the lab manual are to be executed.
	7	Block -2, Lab Manual (Section -2)	All the problems given in the session - 7, session - 8 of Section - 2 of the lab manual are to be executed.
	8	Block -2, Lab Manual (Section -2)	All the problems given in the session - 9 and session -10 of Section - 2 of the lab manual are to be executed.
	9	Block -2 ,Lab Manual (Section -3)	All the problems given in the session - 1, session - 2 and session - 3 of Section - 3 of the lab manual are to be executed.
	10	Block -2, Lab Manual (Section -3)	All the problems given in the session - 4, session - 5 and session - 6 of Section - 3 of the lab manual are to be executed.
	11	Block -2, Lab Manual (Section -3)	All the problems given in the session - 7, session - 8 and session - 9 of Section - 3 of the lab manual are to be executed.
	12	Block -2, Lab Manual (Section -3)	All the problems given in the session - 10, session - 11 and session - 12 of Section - 3 of the lab manual are to be executed.
	13	Block -2, Lab Manual (Section -3)	All the problems given in the session - 13, session - 14 and session - 15 of Section - 3 of the lab manual are to be executed.

	14	Block -2, Lab Manual (Section - 4)	All the problems given in the session - 1, session - 2 and session - 3 of Section - 4 of the lab manual are to be executed.
	15	Block -2, Lab Manual (Section - 4)	All the problems given in the session - 4, session -5 and session - 6 of Section - 4 of the lab manual are to be executed.
	16	Block -2, Lab Manual (Section - 4)	All the problems given in the session - 7 and session - 8 of Section - 4 of the lab manual are to be executed.
	17	Block -2, Lab Manual (Section - 4)	All the problems given in the session - 9 and session -10 of Section - 4 of the lab manual are to be executed.
	18	Block -2, Lab Manual (Section -5)	All the problems given in the session - 1, session - 2, session - 3 and session - 4 of Section - 5 of the lab manual are to be executed.
	19	Block -2, Lab Manual (Section -5)	All the problems given in the session - 5, session - 6 and session - 7 of Section - 5 of the lab manual are to be executed.
	20	Block -2, Lab Manual (Section -5)	All the problems given in the session - 8, session - 9 and session -10 of Section - 5 of the lab manual are to be executed.

### MCSL-017: C and Assembly Language Programming

#### Counselling Sessions

Sessions	Number of Sessions	Comments
Practical Sessions	10	Problem Solving and C programming
Practical Sessions	10	Digital Logic Circuits and Assembly Language Programming

#### Session Details

Sessions	Session Number	Block to be Covered	Topics to be covered
Practical Sessions	1 to 10	Lab Manual (Section -1)	All the problems given in the Section - 1 (session- wise) of the lab manual are to be executed.
	11 to 20	Lab Manual (Section -2 & Section-3)	All the problems given in the Section - 2 and Section - 3 (session- wise) of the lab manual are to be executed.

### MCA 2<sup>nd</sup> Semester Schedule

#### MCS-021: Data and File Structures

#### Counselling Sessions

S. No.	Counselling Sessions	Number of Sessions	Comments
1.	Theory Sessions	8	Two sessions on each block

#### Session Details

Sessions	Session Number	Block to be Covered	Topics to be covered
Theory Counselling	1	Block-1	All topics of Unit-1 and Unit-2
	2	Block-1	All topics of Unit-3
	3	Block-2	All topics of Unit-4 and Unit-5
	4	Block-2	All topics of Unit-6
	5	Block-3	All topics of Unit-7
	6	Block-3	All topics of Unit-8 and Unit-9
	7	Block-4	All topics of Unit-10 and Unit-11
	8	Block-4	All topics of Unit-12

## MCS-022: Operating System Concepts and Networking Management

### Counselling Sessions

S. No.	Counselling Sessions	Number of Sessions	Comments
1.	Theory Sessions	8	Two sessions on each Block
2.	Practical Sessions	2	These two practical sessions may be used for solving assignment problems. These sessions are not compulsory.

### Session Details

Session Type	Session Number	Block to be Covered	Topics to be covered
<b>Theory Counselling</b>	1	Block 1, Unit 1 and Unit 2	Graphical User Interface and Introduction to Operating System
	2	Block 1, Unit 3 and Unit 4	Introduction to Networking concept and Internetworking: Concept, Architecture and Protocols
	3	Block 2, Unit 1, Unit 2 and Unit 3	Introduction to Linux OS, Linux Commands and Utilities, Editor
	4	Block 2, Unit 4 and Unit 5	User to User Communication and Unix System Administration
	5	Block 3, Unit 1 and Unit 2	Windows 2000 Networking and Managing Windows 2000 Server
	6	Block 3, Unit 3 and Unit 4	Advanced Windows 2000 Networking and Windows Xp Networking
	7	Block 4, Unit 1 and Unit 2	Security Concepts and Computer Security
	8	Block 4, Unit 3 and Unit 4	Security and Management
<b>Practical Sessions</b>	1&2	Assignment Problems	Design, Implement and test the MCS-022 assignment problem. These sessions are not compulsory.

## MCS-023: Introduction to Database Management Systems

### Counselling Sessions

S. No.	Counselling Sessions	Number of Sessions	Comments
1.	Theory Sessions	5	Two sessions each on first two Blocks and one session on Block 3 & 4
2.	Practical Sessions	2	These two practical sessions may be used for solving assignment problems. These sessions are not compulsory.

### Session Details

Session Type	Session Number	Block to be Covered	Topics to be covered
<b>Theory Counselling</b>	1	Block 1: Unit 1 and Unit 2	The Database system, structure of a database, three level Architecture of databases and its importance, the relational model, the entity relationship model, conversion of ER diagrams to Relational Database.

	2	Block 1: Unit 3 and Unit 4	The concepts of integrity, referential integrity, functional dependency, the normal forms till BCNF, sequential file organization, indexes, index and B tree, multi key file organization.
	3	Block2: Unit 1	The Structured Query Language: data definition and manipulation commands, views, nested queries, examples
	4	Block2: Unit 2, Unit 3 and Unit 4	Transactions, concurrency related problems and control, locks, two phase locking, deadlock. Database recovery techniques, security and integrity, authorization, data access control, The need and advantages of the distributed and client server database systems, data replication and fragmentation, distributed queries.
	5	Block3 and Block 4	Discuss the various issues on the case studies of these blocks. Suggest how these studies can be improved.
<b>Practical Sessions</b>	1&2	Assignment Problem	Design, implement and test the MCS 023 assignment problem.

## MCS-024: Object Oriented Technologies and Java Programming

### Counselling Sessions

S. No.	Counselling Sessions	Number of Sessions	Comments
1.	Theory Sessions	5	One Session on Block -1.Three sessions on Block-2 and Block-3 and one session on Block-4
2.	Practical Sessions	2	These two practical sessions may be used for solving assignment problems. These sessions are not compulsory.

### Session Details

Sessions	Session Number	Block to be Covered	Topics to be covered
<b>Theory Counselling</b>	1	Block-1	Object oriented concepts, JVM, basics of Java, data types, arrays etc.
	2	Block-2	Concept of object, class, inheritance, polymorphism etc.
	3	Block-2, Block-3	Exceptions Handling and Multithreading
	4	Block-3	Different types of I/O operations in java including files handling. String and StringBuffer classes and their methods.
	5	Block-4	Applets programming, GUI components, Layouts and their management, Networking features, Introduction to JDBC, RMI, Java Beans.
<b>Practical Sessions</b>	1&2	Assignment Problem	Design, implement and test the MCS 024 assignment problems.

## MCSL-025: Data Structures, Networking, DBMS and Java Programming

### Counselling Sessions

Sessions	Number of Sessions	Comments
<b>Practical Sessions</b>	10	Data and File Structures Lab
<b>Practical Sessions</b>	10	Operating System and Networking Lab
<b>Practical Sessions</b>	10	DBMS Lab
<b>Practical Sessions</b>	10	Java Programming Lab

**Session Details**

Sessions	Session Number	Block to be Covered	Topics to be covered
<b>Practical Sessions</b>	1 to 10	Lab Manual (Section - 1) Data and File Structures Lab Manual	All the problems given in the Section – 1 (session- wise) of the lab manual are to be executed.
	11 to 20	Lab Manual (Section -2) Operating Systems and Networking Lab	All the problems given in the Section – 2 (session- wise) of the lab manual are to be executed.
	21 to 30	Lab Manual (Section -3) DBMS Lab	All the problems given in the Section – 3 (session- wise) of the lab manual are to be executed.
	31 to 40	Lab Manual (Section - 4) Java Programming Lab	All the problems given in the Section – 4 (session- wise) of the lab manual are to be executed.

**MCA 3<sup>rd</sup> Semester Schedule****MCS-031: Design and Analysis of Algorithms****Counselling Sessions**

S. No.	Couelling Sessions	Number of Sessions	Comments
1.	Theory Sessions	8	

**Session Details**

Sessions	Session Number	Block to be Covered	Topics to be covered
<b>Theory Counselling</b>	1	Block-1	All topics of Unit-1
	2	Block-1	All topics of Unit-2
	3	Block-1	All topics of Unit-3
	4	Block-2	All topics of Unit-1 and Unit-2
	5	Block-3	All topics of Unit-1 and Unit-2
	6	Block-3	All topics of Unit-3 and Unit 4
	7	Block-4	All topics of Unit-1
	8	Block-4	All topics of Unit-2 and Unit-3

**MCS-032: Object Oriented Analysis and Design****Counselling Sessions**

S. No.	Couelling Sessions	Number of Sessions	Comments
1.	Theory Sessions	5	Two Session on Block -1. One sessions each on Block-2 and Block-3 and Block-4
2.	Practical Sessions	2	These two practical sessions may be used for solving assignment problems. These sessions are not compulsory.

**Session Details**

Sessions	Session Number	Block to be Covered	Topics to be covered
<b>Theory Counselling</b>	1	Block-1	Unit 1 and Unit 2
	2	Block-1	Unit 3

	3	Block-2	Unit 1, Unit2, and Unit 3
	4	Block-3	Unit 1, Unit2, and Unit 3
	5	Block-4	Unit 1, Unit2, and Unit 3
<b>Practical Sessions</b>	1&2	Assignment Problem	Design different diagrams discussed in MCS032

### MCS-033: Advanced Discrete Mathematics

#### Counselling Sessions

S. No.	Counselling Sessions	Number of Sessions	Comments
1.	Theory Sessions	3	

#### Session Details

Sessions	Session Number	Block to be Covered	Topics to be covered
Theory Counselling	1	-	Overview of MCS-013
	2	Block-1	All Units
	3	Block-2	All Units

### MCS-034: Software Engineering

#### Counselling Sessions

S. No.	Counselling Sessions	Number of Sessions	Comments
1.	Theory Sessions	5	

#### Session Details

Sessions	Session Number	Block(s) to be Covered	Topics to be covered
Theory Counselling	1	Block-1	All topics of Unit-1 , Unit-2 and Unit-3
	2	Block-1, 2	All topics of Unit-4 of Block-1 and Units-1,2 of Block-2
	3	Block-2	All topics of Unit-3and Unit-4
	4	Block-3	All topics of Unit-1and Unit-2
	5	Block-3	All topics of Unit-3 and Unit-4

### MCS-035: Accountancy and Financial Management

#### Counselling Sessions

S. No.	Counselling Sessions	Number of Sessions	Comments
1.	Theory Sessions	8	

#### Session Details

Sessions	Session Number	Block to be Covered	Topics to be covered
Theory Counselling	1	Block-1	All topics of Unit-1 , Unit-2 and Unit-3
	2	Block-1	
	3	Block-2	All topics of Unit-1 and Unit 2 and Unit-3
	4	Block-2	
	5	Block-3	All topics of Unit-1 and Unit-2

	6	Block-3	All topics of Unit-3 and Unit-4
	7	Block-4	All topics of Unit-1 and Unit 2
	8	Block-4	and Unit-3

**MCSL-036: Laboratory Course (For Object Oriented Analysis and Design, Software Engineering and Accountancy and Financial Management)**

**Counselling Sessions**

Sessions	Number of Sessions	Comments
Practical Sessions	10	Object Oriented Analysis and Design Lab
Practical Sessions	10	Software Engineering Lab
Practical Sessions	10	Accountancy and Financial Management Lab

**Session Details**

Sessions	Session Number	Block to be Covered	Topics to be covered
Practical Sessions	1 to 10	Lab Manual (Section -1) Object Oriented Analysis and Design Lab	All the problems given in the Section – 1 (session- wise) of the lab manual are to be performed in the lab.
	11 to 20	Lab Manual (Section -2) Software Engineering Lab	All the problems given in the Section – 2 (session- wise) of the lab manual are to be performed in the lab.
	21 to 30	Lab Manual (Section -3) Accountancy and Financial Management Lab	All the problems given in the Section – 3 (session- wise) of the lab manual are to be performed in the lab.

**MCA 4<sup>th</sup> Semester Schedule**

**MCS-041: Operating Systems**

**Counselling Sessions**

S. No.	Couelling Sessions	Number of Sessions	Comments
1.	Theory Sessions	8	

**Session Details**

Sessions	Session Number	Block to be Covered	Topics to be covered
Theory Counselling	1	Block-1	All topics of Unit-1 and Unit-2
	2	Block-1	All topics of Unit-3 and Unit - 4
	3	Block-2	All topics of Unit-1 and Unit -2
	4	Block-2	All topics of Unit-3
	5	Block-2	All topics of Unit-4
	6	Block-3	All topics of Unit - 1
	7	Block-3	All topics of Unit - 2
	8	Block-3	All topics of Unit - 3 and Unit - 4

## MCS-042: Data Communication and Computer Networks

### Counselling Sessions

S. No.	Counselling Sessions	Number of Sessions	Comments
1.	Theory Sessions	8	
2.	Practical Sessions	2	These two practical sessions may be used for solving assignment problems. These sessions are not compulsory.

### Session Details

Session Type	Session Number	Block to be Covered	Topics to be covered
<b>Theory Counselling</b>	1	Block-1	All topics of Unit-1 and Unit-2
	2	Block-1	All topics of Unit-3 and Unit-4
	3	Block-2	All topics of Unit-1 and Unit-2
	4	Block-2	All topics of Unit-3 and Unit-4
	5	Block-3	All topics of Unit-1 and Unit-2
	6	Block-3	All topics of Unit-3 and Unit-4
	7	Block-4	All topics of Unit-1 and Unit-2
	8	Block-4	All topics of Unit-3 and Unit-4
<b>Practical Sessions</b>	1&2	Assignment Problems	These two practical sessions may be used for solving assignment problems. These sessions are not compulsory.

## MCS-043: Advanced Database Management Systems

### Counselling Sessions

S. No.	Counselling Sessions	Number of Sessions	Comments
1.	Theory Sessions	8	
2.	Practical Sessions	2	These two practical sessions may be used for solving assignment problems. These sessions are not compulsory.

### Session Details

Session Type	Session Number	Block to be Covered	Topics to be covered
<b>Theory Counselling</b>	1	Block-1	All topics of Unit-1 and Unit-2
	2	Block-1	All topics of Unit-3 and Unit - 4
	3	Block-2	All topics of Unit-1 and Topics relating to transactions management of Unit -2.
	4	Block-2	All topics of Unit-3 and Unit - 4 and topics relating to recovery in Unit 2.
	5	Block-3	All topics of Unit-1 and Unit - 2
	6	Block-3	All topics of Unit - 3 and Unit - 4
	7	Block-4	All topics of Unit - 1 and Unit - 2
	8	Block-4	All topics of Unit - 3 and Unit - 4
<b>Practical Sessions</b>	1&2	Assignment Problems	These two practical sessions may be used for solving assignment problems. These sessions are not compulsory.

## MCS-044: Mini Project

### Counselling Sessions

S. No.	Counselling Sessions	Number of Sessions	Comments
1.	Practical Sessions	10	

### Session Details

Name of the Topic	No. of Practical Sessions (3 hrs each)
Project specification	1
Coding / Implementation	5
Testing	2
Documentation	2

## MCSL-045: UNIX and DBMS LAB

### Counselling Sessions

Sessions	Number of Sessions	Comments
Practical Sessions	10	UNIX lab
Practical Sessions	10	DMBS Lab

### Session Details

Sessions	Session Number	Block to be Covered	Topics to be covered
Practical Sessions	1 to 10	Lab Manual (Section -1) UNIX Lab	All the problems given in the Section – 1 (session- wise) of the lab manual are to be executed.
	11 to 20	Lab Manual (Section -2) DBMS Lab	All the problems given in the Section – 2 (session- wise) of the lab manual are to be executed.

## MCA 5<sup>th</sup> Semester Schedule

### MCS-051: Advanced Internet Technologies

### Counselling Sessions

S. No.	Counselling Sessions	Number of Sessions	Comments
1.	Theory Sessions	5	Two sessions each on Block – 1 and Block – 2 and one session on Block – 3.
2	Practical Sessions	2	These two practical sessions may be used for solving assignment problems. These sessions are not compulsory.

### Session Details

Sessions	Session Number	Block to be Covered	Topics to be covered
Theory Counselling	1	Block-1	All the topics of Unit – 1 and Unit - 2
	2	Block-1	All the topics of Unit – 3 and Unit - 4

	3	Block-2	All the topics of Unit – 1 and Unit - 2
	4	Block-2	All the topics of Unit-3 and Unit - 4
	5	Block - 3	All the topics of Unit –1, 2 and 3
<b>Practical Sessions</b>	1&2	Assignment Problems	To solve MCS-051 assignment problems

### MCS-052: Principles of Management and Information Systems

#### Counselling Sessions

S. No.	Counselling Sessions	Number of Sessions	Comments
1.	Theory Sessions	3	

#### Session Details

Sessions	Session Number	Block to be Covered	Topics to be covered
<b>Theory Counselling</b>	1	Block-1: Management Systems	All topics of unit 1: Organisational overview and Unit 2: management functions and business processes
	2	Block-1: Management Systems	All topics of unit 3: management systems and Unit 4: business values of information system
		Block-2: Information Management	All topics of unit 1: portfolio management and it applications.
	3	Block-2: Information Management	All topics of unit 2: enterprise resource planning system, unit 3: intelligence information systems and unit 4: social, ethical and legal aspects

### MCS-053: Computer Graphics and Multimedia

#### Counselling Sessions

S. No.	Counselling Sessions	Number of Sessions	Comments
1.	Theory Sessions	8	
2	Practical Sessions	2	These two practical sessions may be used for solving assignment problems. These sessions are not compulsory.

#### Session Details

Sessions	Session Number	Block to be Covered	Topics to be covered
<b>Theory Counselling</b>	1	Block-1	All the topics of Unit – 1 Upto Line Drawing Algorithms of Unit -2
	2	Block-1	Rest of the topics of Unit –2 are to be covered All the topics of Unit - 3
	3	Block-2	All the topics of Unit - 1
	4	Block-2	All the topics of Unit-2
	5	Block - 3	All the topics of Unit-1 Upto Depth Buffer method of Unit - 2

	6	Block - 3	Rest of the topics of Unit 2 All the topics upto Shading of Unit 3
	7	Block – 3 Block - 4	Rest of the topics of Unit 3 All the topics upto Simulating Accelerations of Unit -1
	8	Block –4	Rest of the topics of Unit – 1 All the topics of Unit – 2
<b>Practical Sessions</b>	1&2	Assignment Problems	To solve MCS-053 assignment problems

**MCSL-054: Laboratory Course  
(Advanced Internet Technologies & Computer Graphics and Multimedia)**

**Counselling Sessions**

Sessions	Number of Sessions	Comments
Practical Sessions	10	Advanced Internet Technologies Lab
Practical Sessions	10	Computer Graphics and Multimedia Lab

**Session Details**

Sessions	Session Number	Block to be Covered	Topics to be covered
<b>Practical Sessions</b>	1 to 10	Lab Manual (Section -1) Advanced Internet Technologies Lab	All the problems given in the Section – 1 (session- wise) of the lab manual are to be executed.
	11 to 20	Lab Manual (Section -2) Computer Graphics and Multimedia	All the problems given in the Section – 2 (session- wise) of the lab manual are to be executed.

**MCSE-003: Artificial Intelligence and Knowledge Management**

**Counselling Sessions**

S. No.	Counselling Sessions	Number of Sessions	Comments
1.	Theory Sessions	5	Two Units per session

**Session Details**

Sessions	Session Number	Block to be Covered	Topics to be covered
<b>Theory Counselling</b>	1	Block -1	All the topics of Unit – 1 and 2
	2	Block - 1 Block - 2	All the topics of Unit – 3 All the topics of Unit -1
	3	Block - 2	All the topics of Unit-2 and Unit-3
	4	Block - 3	All the topics of Unit-1 and Unit-2
	5	Block – 4	All the topics of Unit- 1 and Unit - 2

## MCSE-004: Numerical and Statistical Computing

### Counselling Sessions

S. No.	Counselling Sessions	Number of Sessions	Comments
1.	Theory Sessions	5	One session on Block – 1 and two sessions each on Block – 2 and Block - 3

### Session Details

Sessions	Session Number	Block to be Covered	Topics to be covered
Theory Counselling	1	Block-1	All the topics of Unit – 1, 2 and 3
	2	Block-2	All the topics of Unit – 1 Upto Newton's Cotes formulae of Unit-2
	3	Block-2	Rest of the topics of Unit – 2 All the topics of Unit-3
	4	Block-3	All the topics of Unit-1 Upto Inversion Method of Unit-2
	5	Block - 3	Rest of the topics of Unit-2 All the topics of Unit-3

## MCSE-011: Parallel Computing

### Counselling Sessions

S. No.	Counselling Sessions	Number of Sessions	Comments
1.	Theory Sessions	5	Two Units per session

### Session Details

Sessions	Session Number	Block to be Covered	Topics to be covered
Theory Counselling	1	Block-1	All the topics of Unit – 1 and Unit - 2
	2	Block-1	All the topics of Unit – 3 and Unit - 4
	3	Block-2	All the topics of Unit-1 and Unit-2
	4	Block-2 Block -3	All the topics of Unit-3 All the topics of Unit - 1
	5	Block - 3	All the topics of Unit-2 and Unit-3

## MCA 6<sup>th</sup> Semester Schedule

### MCSP-060: Project

#### Counselling Sessions

S. No.	Counselling Sessions	Number of Sessions	Comments
1.	Theory Sessions *	2	One session on the project proposal formulation and one session on the project report formulation

Sessions	Session Number	Topics to be covered
Theory Counselling*	1	Detailed discussion on the project proposal formulation
	2	Detailed discussion on the project report formulation

*\* These sessions need to be completed during the 5<sup>th</sup> semester (during Jan-March) of MCA programme as the student needs to submit the project proposal during 1<sup>st</sup> April to 30<sup>th</sup> June in the first slot.*

## 2.4 Web Based Support

The learners can have access to IGNOU's website at the following address (URL): <http://www.ignou.ac.in>. You can download assignments, old question papers, circulars etc. from the website. The Programme guide is also available at the website. The following section gives you how to browse the IGNOU's website.

## 3. BROWSING IGNOU'S WEBSITE

The IGNOU's website is a dynamic source of latest information and will be undergoing continuous updates. IGNOU itself is continuously changing to bring about improvement in quality of its services. There are contents on the site which are open to all, but then there are also areas of restricted access. For example, course materials, FAQs, assignments and related contents are available only to those who have registered for and paid fees for the said course. Some sample courses are open to visitors to have a feel of them, before taking the decision to register with IGNOU.

### 3.1 Navigation from Home Page

The learners can have access to IGNOU's website at the following address (URL) <http://www.ignou.ac.in>. As students get connected to this site, the following page displays the Home Page of IGNOU's web site (Figure 1). Students need to click on various options to get the related information.

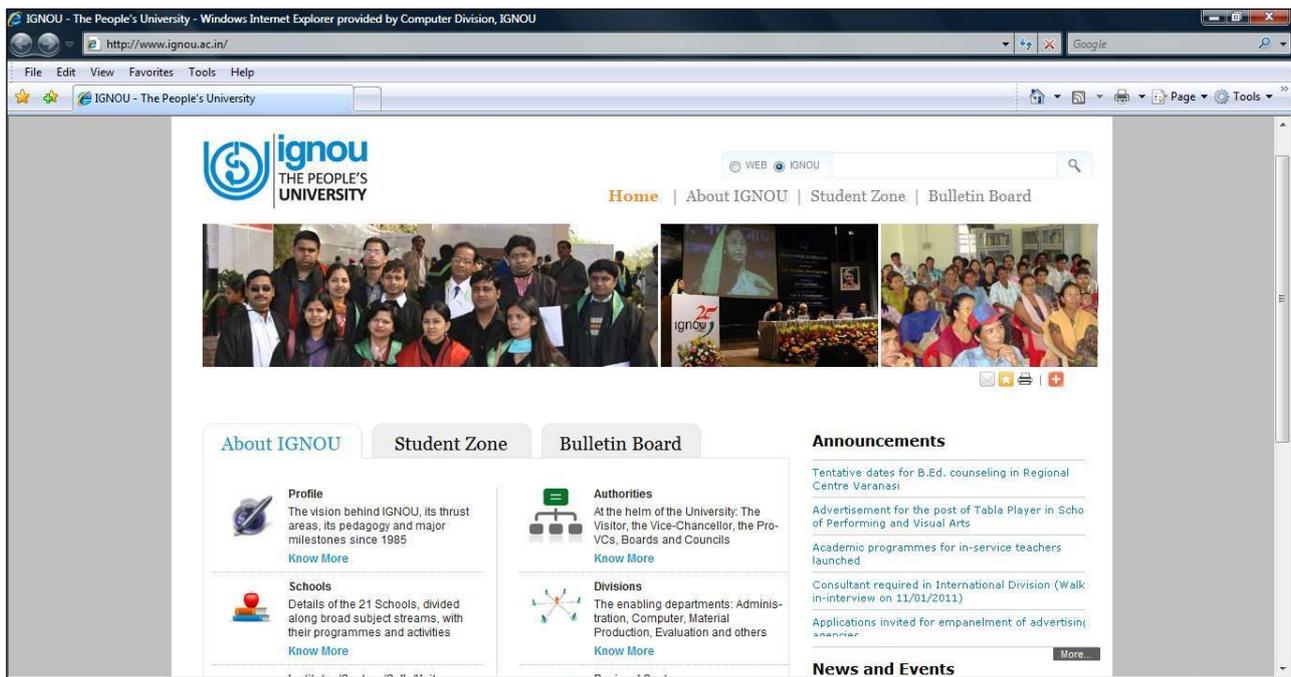


Figure 1

The **For Students** option on the left side menu provides you the latest information such as **results, downloads (assignments and question papers), details of catalogues, queries, submission of examination form online, term end examination date sheet, Special announcements** etc..

Upon clicking on the **Schools** option the page related to the links of various schools is displayed as shown in the Figure 2. From this page students can access the required information as described, briefly, in subsequent pages of School of Computer and Information Sciences.

**SOCIS** School of Computer and Information Sciences offers the Computer Programmes MCA, BCA and CIT.

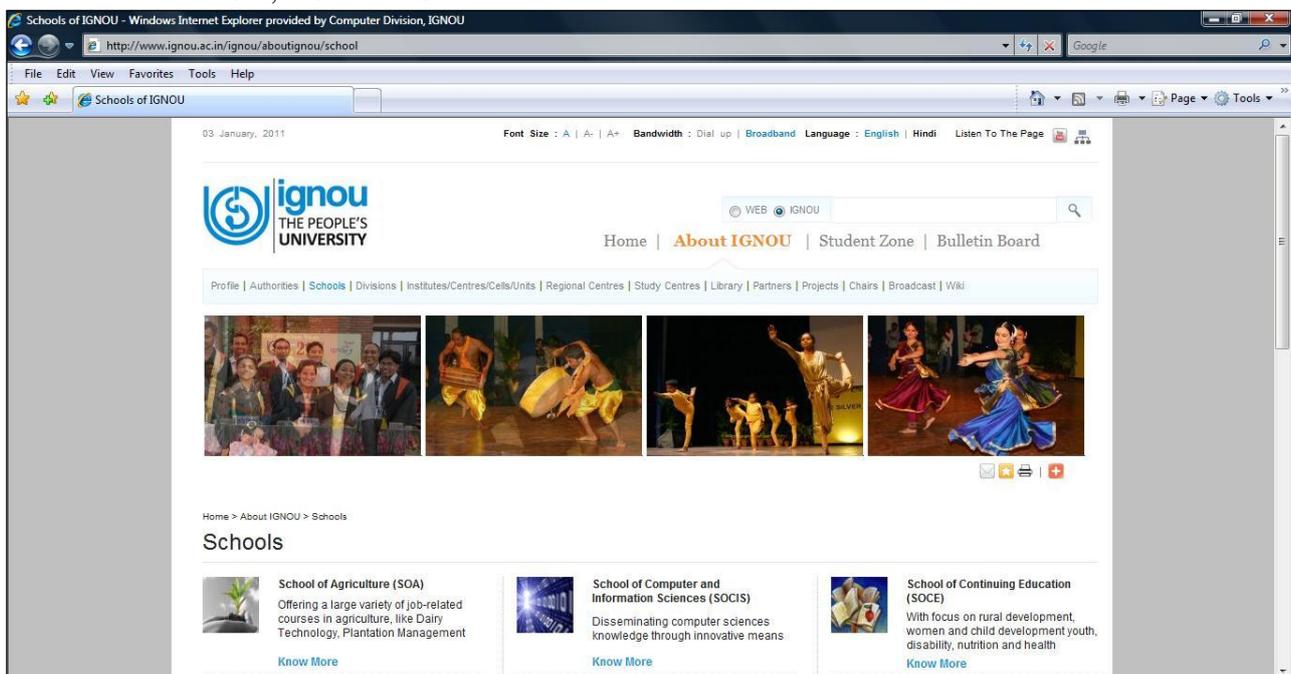


Figure 2

### 3.2 Navigation from SOCIS Page

School of Computer and Information Sciences provides Computer Education Programmes. As soon as School of Computer and Information Sciences link is selected, a page introducing the school is displayed as shown in the Figure 3. The page of School of Computer and Information Sciences looks like this:

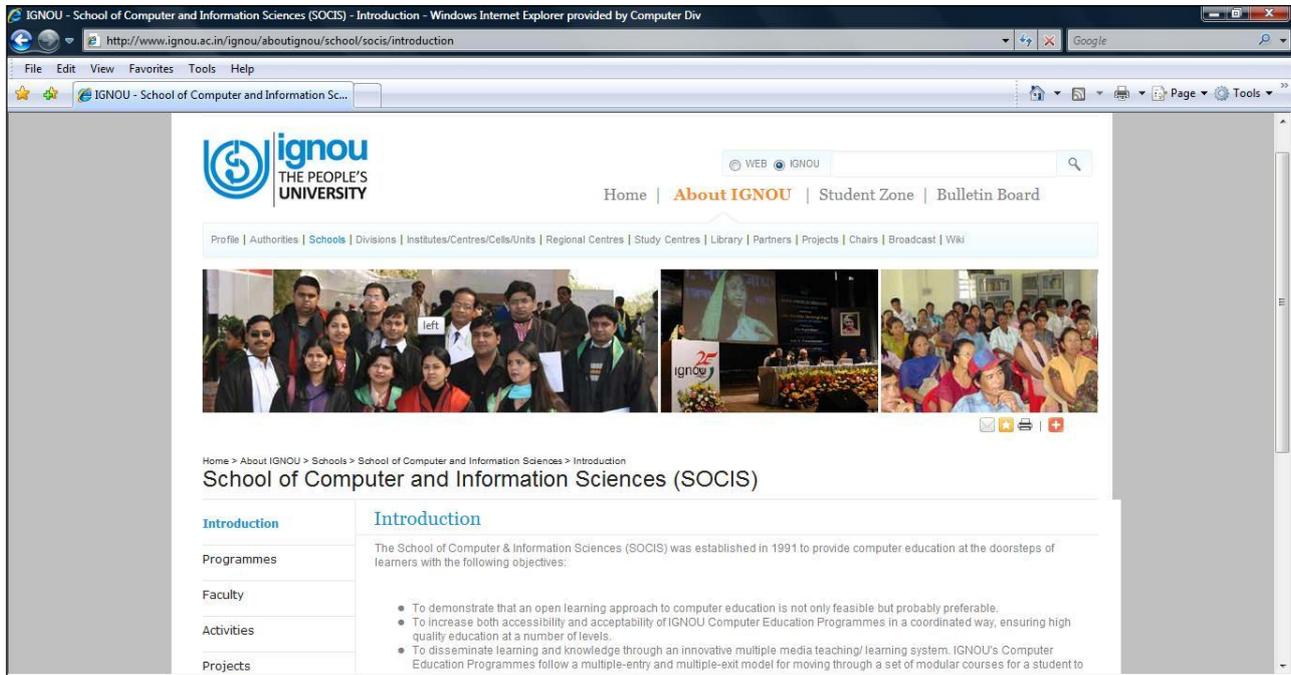


Figure 3

### 3.3 Procedure to Browse Through MCA Pages

By clicking on the Programmes option, you can view the list of SOCIS Programmes, under the Master's Degree option click on **Master of Computer Applications (MCA)** Link. The following page as shown in the Figure 4 will appear.

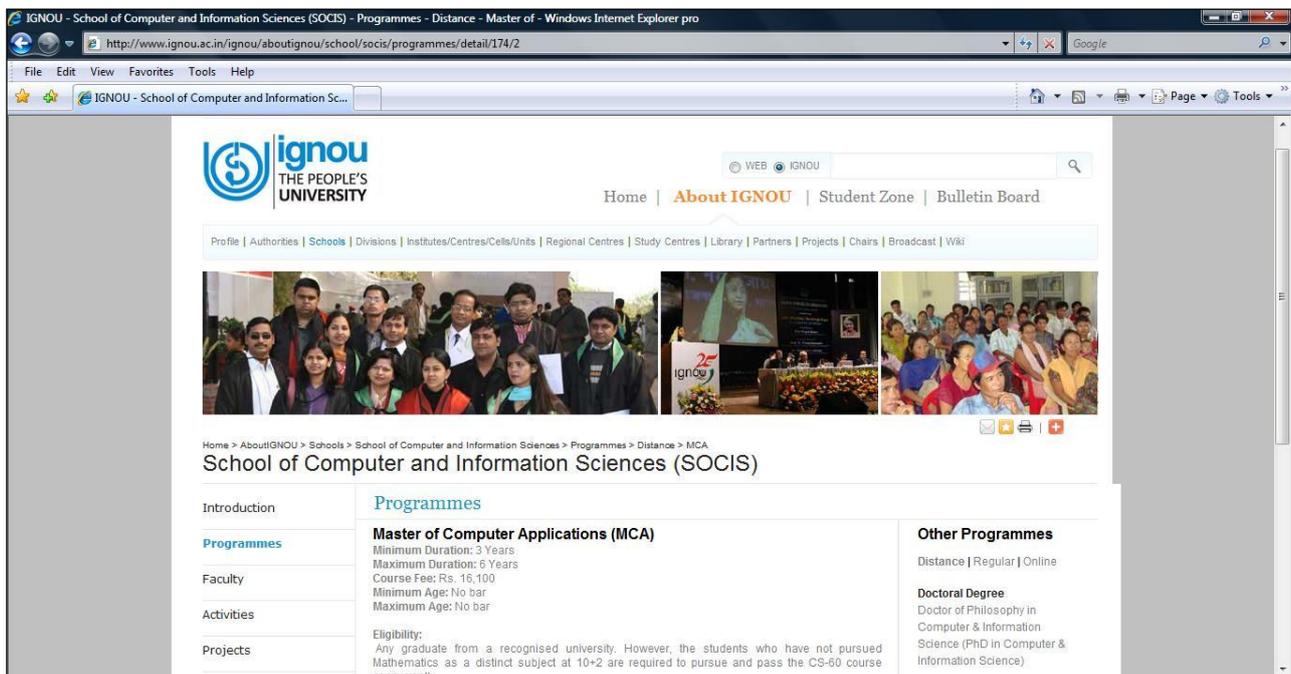


Figure 4

After selecting the Master of Computer Applications link, a page introducing the MCA programme is displayed. At the page various links are provided to get information related to MCA Programme like Courses, Study Centre, Related Information, Programme Guide, Forms, and Apply Now. Students need to click on these to get the related information.

## 4. MCA SYLLABUS

The following is the syllabus for first to fifth semesters of MCA programme. The 6<sup>th</sup> semester is completely spared for project work.

### MCS - 011: Problem Solving and Programming

3 Credits

#### Objectives

The course is aimed to develop problem-solving strategies, techniques and skills that can be applied to computers and problems in other areas which give students an introduction to computer and analytical skills to use in their subsequent course work and professional development. Emphasis of this course is to act as an introduction to the thinking world of computers, to help students develop the logic, ability to solve the problems efficiently using C programming. Knowledge in a programming language is prerequisite to the study of most of computer science courses. This knowledge area consists of those skills and concepts that are essential to problem solving and programming practice independent of the underlying paradigm. The student will learn various concepts and techniques for problem solving and will implement those ideas using C programs.

#### Syllabus

##### BLOCK 1: An Introduction to C

##### Unit 1: Problem Solving

- Problem - Solving Techniques
  - Steps for Problem - Solving
  - Using Computer as a Problem-Solving Tool
- Design of Algorithms
  - Definition
  - Features of Algorithm
  - Criteria to be followed by an Algorithm
  - Top Down Design
- Analysis of Algorithm Efficiency
  - Redundant Computations
  - Referencing Array Elements
  - Inefficiency Due to Late Termination
  - Early Detection of Desired Output Condition
  - Trading Storage for Efficient Gains
- Analysis of Algorithm Complexity
  - Computational Complexity
  - The Order of Notation
  - Rules for using the Big - O Notation
  - Worst and Average Case Behavior
- Flowcharts

- Basic Symbols used in Flowchart Design

##### Unit 2: Basics of C

- What is a Program and what is a Programming Language?
- C Language
  - History of C
  - Salient Features of C
- Structure of a C Program
  - A Simple C Program
- Writing a C Program
- Compiling a C Program
  - The C Compiler
  - Syntax and Semantic Errors
- Link and Run the C Program
  - Run the C Program through the Menu
  - Run from an Executable File
  - Linker Errors
  - Logical and Runtime Errors
- Diagrammatic Representation of Program Execution Process

##### Unit 3: Variables and Constants

- Character Set

- Identifiers and Keywords
  - Rules for Forming Identifiers
  - Keywords
- Data Types and Storage
- Data Type Qualifiers
- Variables
- Declaring Variables
- Initialising Variables
- Constants
  - Integer Constants
  - Floating Point Constants
  - Character Constants
  - String Constants
  - Symbolic Constants

#### **Unit 4: Expressions and Operators**

- Assignment Statements
- Arithmetic Operators
- Relational Operators
- Logical Operators
- Comma and Conditional Operators
- Type Cast Operator
- Size of Operator
- C Shorthand
- Priority of Operators

### **BLOCK 2: Control Statements, Arrays and Functions**

#### **Unit 5: Decision and Loop Control Statements**

- Decision Control Statements
  - The *if* Statement
  - The *switch* Statement
- Loop Control Statements
  - The *while* Loop
  - The *do-while* Statement
  - The *for* Loop
  - The Nested Loop
- The *Goto* Statement
- The *Break* Statement
- The *Continue* Statement

#### **Unit 6: Arrays**

- Array Declaration
  - Syntax of Array Declaration
  - Size Specification
- Array Initialization
  - Initialization of Array Elements in the Declaration
  - Character Array Initialization
- Subscript
- Processing the Arrays

- Multi-Dimensional Arrays
  - Multi-Dimensional Array Declaration
  - Initialization of Two-Dimensional Arrays

#### **Unit 7: Strings**

- Declaration and Initialization of Strings
- Display of Strings Using Different Formatting Techniques
- Array of Strings
- Built-in String Functions and Applications
  - *Strlen* Function
  - *Strcpy* Function
  - *Strcmp* Function
  - *Strcat* Function
  - *Strlwr* Function
  - *Strrev* Function
  - *Strspn* Function
- Other String Functions

#### **Unit 8: Functions**

- Definition of a Function
- Declaration of a Function
- Function Prototypes
- The Return Statement
- Types of Variables and Storage Classes
  - Automatic Variables
  - External Variables
  - Static Variables
  - Register Variables
- Types of Function Invoking
- Call by Value
- Recursion

### **BLOCK 3: Structures, Pointers and File Handling**

#### **Unit 9: Structures and Unions**

- Declaration of Structures
- Accessing the Members of a Structure
- Initializing Structures
- Structures as Function Arguments
- Structures and Arrays
- Unions
- Initializing an Union
- Accessing the Members of an Union

#### **Unit 10: Pointers**

- Pointers and their Characteristics
- Address and Indirection Operators
- Pointer Type Declaration and Assignment
  - Pointer to a Pointer
  - Null Pointer Assignment
- Pointer Arithmetic

- Passing Pointers to Functions
  - A Function Returning More than One Value
  - Function Returning a Pointer
- Arrays and Pointers
- Array of Pointers
- Pointers and Strings

### Unit 11: The C Preprocessor

- *#define* to Implement Constants
- *#define* to Create Functional Macros
- Reading from Other Files using *#include*
- Conditional Selection of Code using *#ifdef*
  - Using *#ifdef* for different computer types
  - Using *#ifdef* to temporarily remove program statements
- Other Preprocessor Commands
- Predefined Names Defined by Preprocessor

- Macros Vs Functions

### Unit 12: Files

- File Handling in C Using File Pointers
  - Open a file using the function *fopen()*
  - Close a file using the function *fclose()*
- Input and Output using file pointers
  - Character Input and Output in Files
  - String Input / Output Functions
  - Formatted Input / Output Functions
  - Block Input / Output Functions
- Sequential Vs Random Access Files
- Positioning the File Pointer
- The Unbuffered I/O - The UNIX like File Routines

## MCS-012: Computer Organisation and Assembly Language Programming 4 Credits

### Objectives

In the modern era, Computer system is used in most aspects of life. You may use many different types of software on a computer system for particular applications ranging from simple document creation to space data processing. But, how does the Software is executed by the Computer Hardware? The answer to this basic question is contained in this Course. This course presents an overview of the Computer Organisation. After going through this course, you will not only acquire the conceptual framework of Computer Organisation and Architecture but also would be able to use the concepts in the domain of Personal Computers. In specific, you will be able to design digital circuits; describe the functions of various components of computers and their construction; and write simple assembly programs.

### Structure

#### BLOCK 1: Introduction to Digital Circuits

##### UNIT 1: The Basic Computer

- The von Neumann Architecture
- Instruction Execution: An Example
- Instruction Cycle
  - Interrupts
  - Interrupts and Instruction Cycle
- Computers: Then and Now
  - The Beginning
  - First Generation Computers
  - Second Generation Computers
  - Third Generation Computers
  - Later Generations

##### Unit 2: The Data Representation

- Data Representation
- Number Systems
- Decimal Representation in Computers
- Alphanumeric Representation

- Data Representation For Computation
  - Fixed Point Representation
  - Decimal Fixed Point Representation
  - Floating Point Representation
  - Error Detection And Correction Codes

##### Unit 3: Principles of Logic Circuits I

- Logic Gates
- Logic Circuits
- Combinational Circuits
  - Canonical and Standard Forms
  - Minimization of Gates
- Design of Combinational Circuits
- Examples of Logic Combinational Circuits
  - Adders
  - Decoders
  - Multiplexer
  - Encoder

- o Programmable Logic Array
- o Read Only Memory ROM

#### **Unit 4: Principles of Logic Circuits I**

- Sequential Circuits: The Definition
- Flip Flops
  - o Basic Flip-Flops
  - o Excitation Tables
  - o Master Slave Flip Flops
  - o Edge Triggered Flip-flops
- Sequential Circuit Design
- Examples of Sequential Circuits
  - o Registers
  - o Counters – Asynchronous Counters
  - o Synchronous Counters
  - o RAM
- Design of a Sample Counter

### **BLOCK 2: Basic Computer Organisation**

#### **Unit 1: The Memory System**

- The Memory Hierarchy
- RAM, ROM, DRAM, Flash Memory  
Secondary Memory and Characteristics  
Hard Disk Drives
  - o Optical Memories
  - o CCDs, Bubble Memories
- RAID and its Levels
- The Concepts of High Speed Memories
  - o Cache Memory
  - o Cache Organisation
  - o Memory Interleaving
  - o Associative Memory
- Virtual Memory
- The Memory System of Micro-Computer
  - o SIMM, DIMM, etc., Memory Chips
  - o SDRAM, RDRAM, Cache RAM
 Types of Memory

#### **Unit 2: The Input/Output System**

- Input / Output Devices or External or Peripheral Devices
- The Input Output Interface
- The Device Controllers and its Structure
  - o Device Controller
  - o Structure of an Input /Output Interface
- Device Drivers
- Input Output Techniques
  - o Programmed Input /Output
  - o Interrupt-Driven Input /Output
  - o Interrupt-Processing
  - o DMA (Direct Memory Access)
- Input Output Processors

- External Communication Interfaces

#### **Unit 3: Secondary Storage Techniques**

- Secondary Storage Systems
- Hard Drives
  - o Characteristics: Drive Speed, Access Time, Rotation Speed
  - o Partitioning & Formatting: FAT, Inode
  - o Drive Cache
  - o Hard Drive Interface: IDE, SCSI, EIDE, Ultra DMA & ATA/66
- Removable Drives
  - o Floppy Drives
  - o CD-ROM & DVD-ROM
- Removable Storage Options
  - o Zip, Jaz & Other Cartridge Drives
  - o Recordable CDs & DVDs
  - o CD-R vs CD-RW
  - o Tape Backup

#### **Unit 4: I/O Technology**

- Keyboard
  - o Keyboard Layout
  - o Keyboard Touch
  - o Keyboard Technology
- Mouse
- Video Cards
  - o Resolution
  - o Colour Depth
  - o Video Memory
  - o Refresh Rates
  - o Graphic Accelerators and 3-D Accelerators
  - o Video Card Interfaces
- Monitors
  - o Cathode Ray Tubes
  - o Shadow Mask
  - o Dot Pitch
  - o Monitor Resolutions
  - o DPI
  - o Interlacing
  - o Bandwidth
- Liquid Crystal Displays (LCD)
- Digital Camera
- Sound Cards
- Printers
  - o Classification of Printers
  - o Print Resolutions
  - o Print Speed
  - o Print Quality
  - o Colour Management
- Modems

- Scanners
  - Resolution
  - Dynamic Range/Colour Depth
  - Size and Speed
  - Scanning Tips
- Power Supply
  - SMPS (Switched Mode Power Supply)

### **BLOCK 3: The Central Processing Unit**

#### **Unit 1: Instruction Set Architecture**

- Instruction Set Characteristics
- Instruction Set Design Considerations
  - Operand Data Types
  - Types of Instructions
  - Number of Addresses in an Instruction
- Addressing Schemes
  - Immediate Addressing
  - Direct Addressing
  - Indirect Addressing
  - Register Addressing
  - Register Indirect Addressing
  - Indexed Addressing Scheme
  - Base Register Addressing
  - Relative Addressing Scheme
  - Stack Addressing
- Instruction Set and Format Design Issues
  - Instruction Length
  - Allocation of Bits Among Opcode and Operand
  - Variable Length of Instructions
- Example of Instruction Format

#### **Unit 2: Registers, Micro-Operations and Instruction Execution**

- Basic CPU Structure
- Register Organization
  - Programmer Visible Registers
  - Status and Control Registers
- General Registers in a Processor
- Micro-operation Concepts
  - Register Transfer Micro-operations
  - Arithmetic Micro-operations
  - Logic Micro-operations
  - Shift Micro-operations
- Instruction Execution and Micro-operations
- Instruction Pipelining

#### **Unit 3: ALU Organisation**

- ALU Organisation
  - A Simple ALU Organization
  - A Sample ALU Design
  - Arithmetic Processors

#### **Unit 4: The Control Unit**

- The Control Unit
- The Hardwired Control
- Wilkes Control
- The Micro-Programmed Control
- The Micro-Instructions
  - Types of Micro-Instructions
  - Control Memory Organisation
  - Micro-Instruction Formats
- The Execution of Micro-Program

#### **Unit 5: Reduced Instruction Set Computer Architecture**

- Introduction to RISC
  - Importance of RISC Processors
  - Reasons for Increased Complexity
  - High Level Language Program Characteristics
- RISC Architecture
- The Use of Large Register File
- Comments on RISC
- RISC Pipelining

### **Block 4: Assembly Language Programming**

#### **Unit 1: Microprocessor Architecture**

- Microcomputer Architecture
- Structure of 8086 CPU
  - The Bus Interface Unit
  - Execution Unit (EU)
- Register Set of 8086
- Instruction Set of 8086
  - Data Transfer Instructions
  - Arithmetic Instructions
  - Bit Manipulation Instructions
  - Program Execution Transfer Instructions
  - String Instructions
  - Processor Control Instructions
- Addressing Modes
  - Register Addressing Mode
  - Immediate Addressing Mode
  - Direct Addressing Mode
  - Indirect Addressing Mode

#### **Unit 2: Introduction to Assembly Language Programming**

- The Need and Use of the Assembly Language
- Assembly Program Execution
- An Assembly Program and its Components
  - The Program Annotation
  - Directives

- Input Output in Assembly Program
  - o Interrupts
  - o DOS Function Calls (Using INT 21H)
- The Types of Assembly Programs
  - o COM Programs
  - o EXE Programs
- How to Write Good Assembly Programs

### Unit 3: Assembly Language Programming (Part – I)

- Simple Assembly Programs
  - o Data Transfer
  - o Simple Arithmetic Application
  - o Application Using Shift Operations
  - o Larger of the Two Numbers
- Programming With Loops and Comparisons
  - o Simple Program Loops
  - o Find the Largest and the Smallest Array Values
  - o Character Coded Data
  - o Code Conversion

- Programming for Arithmetic and String Operations
  - o String Processing
  - o Some More Arithmetic Problems

### Unit 4: Assembly Language Programming (Part – I)

- Use of Arrays in Assembly
- Modular Programming
  - o The stack
  - o FAR and NEAR Procedures
  - o Parameter Passing in Procedures
  - o External Procedures
- Interfacing Assembly Language Routines to High Level Language Programs
  - o Simple Interfacing
  - o Interfacing Subroutines With Parameter Passing
- Interrupts
- Device Drivers in Assembly

## MCS-013: Discrete Mathematics

2 Credits

### Objectives

Discrete mathematics, sometimes called finite mathematics, is the study of mathematical structure that are fundamentally discrete, in the sense of not supporting notion of continuity. A study of discrete sets has become more and more necessary because of many application of Computer Science and various areas of engineering. Regarding computer science concept from discrete mathematics are useful to study or express objects or problems in computer algorithm and programming languages. For instance, to improve the efficiency of a computer programs, we need to study its logical structure, which involves a finite number of steps each requiring a certain amount of time. Using the theory of combinatory and graph theory, major areas of discrete mathematics, we can do this. Therefore, a study of these areas would complement and improve the understanding of courses based on algorithm and problem solving.

This course is designed to give basic concepts of propositions, predicates, Boolean algebra, logic circuit, sets, relations, functions, combinatorics, partitions and distributions.

### Syllabus

#### Block 1: Elementary Logic

##### Unit 1: Propositional Calculus

- Propositions
- Logical Connectives
  - o Disjunction
  - o Conjunction
  - o Negation
  - o Conditional Connectives
  - o Precedence Rule
- Logical Equivalence
- Logical Quantifiers

##### Unit 2: Methods of Proof

- What is a Proof?
- Different Methods of Proof
  - o Direct Proof
  - o Indirect Proofs
  - o Counter Examples
- Principle of Induction

##### Unit 3: Boolean Algebra and Circuits

- Boolean Algebras
- Logic Circuits
- Boolean Functions

**Block 2: Basic Combinatorics****Unit 1: Sets, Relations and Functions**

- Introducing Sets
- Operations on Sets
  - Basic Operations
  - Properties Common to Logic and Sets
- Relations
  - Cartesian Product
  - Relations and their types
  - Properties of Relations
- Functions
  - Types of Functions
  - Operations on Functions

**Unit 2: Combinatorics – An Introduction**

- Multiplication and Addition Principles
- Permutations
  - Permutations of Objects not Necessarily Distinct
  - Circular Permutations
- Combinations
- Binomial Coefficients

- Combinatorial Probability

**Unit 3: Some More Counting Principles**

- Pigeonhole Principle
- Inclusion-Exclusion Principle
- Applications of Inclusion – Exclusion
  - Application to Surjective Functions
  - Application to Probability
  - Application to Derangements

**Unit 4: Partitions and Distributions**

- Integer Partitions
- Distributions
  - Distinguishable Objects into Distinguishable Containers
  - Distinguishable Objects into Indistinguishable Containers
  - Indistinguishable Objects into Distinguishable Containers
  - Indistinguishable Objects into Indistinguishable Containers

**MCS-014: Systems Analysis and Design****3 Credits****Objectives**

The objectives of the course include the enabling of learner to identify the Software projects in an organization after studying various functionalities in the organization. Also, they should be able to structure various requirements, do the design and select the best method to develop the system. They should be able to implement and maintain the system . The learners should also get acquainted with different quality standards as well as learn about Management Information Systems.

**Syllabus****Block 1: Introduction to Systems Development****Unit 1: Introduction to SAD**

- Fundamentals of System
  - Important Terms related to Systems
  - Classification of Systems
  - Real Life Business Subsystems
- Real Time Systems
- Distributed Systems
- Development of a successful System
- Various Approaches for development of Information Systems
  - Structured Analysis and Design Approach
  - Prototype
  - Joint Application Development

- Why do Businesses need Systems Analysts?
- Users
- Analysts in various functional areas
  - Systems Analyst in Traditional Business
  - Systems Analyst in Modern Business
- Role of a Systems Analyst
- Duties of a Systems Analyst
- Qualifications of a Systems Analyst
  - Analytical Skills
  - Technical Skills
  - Management Skills
  - Interpersonal Skills

**Unit 2: Systems Analyst-A Profession****Unit 3: Process of System Development**

- Systems Development Life Cycle
- Phases of SDLC

- Project Identification and Selection
- Project Initiation and planning
- Analysis
- Logical Design
- Physical Design
- Implementation
- Maintenance
- Product of SDLC Phases
- Approaches to Development
  - Prototyping
  - Joint Application Design
  - Participatory Design
- Case Study

#### **Unit 4: Introduction to Documentation of Systems**

- Concepts and process of Documentation
- Types of Documentation
  - System Requirements Specification
  - System Design Specification
  - Test Design Document
  - User Manual
- Different Standard for Documentation
- Documentation and Quality of Software
- Good Practices for Documentation

#### **Block 2: Planning and Designing Systems**

##### **Unit 5 : Process of System Planning**

- Fact finding Techniques
  - Interviews
  - Group Discussion
  - Site Visits
  - Presentations
  - Questionnaires
- Issues involved in Feasibility Study
  - Technical Feasibility
  - Operational Feasibility
  - Economic Feasibility
  - Legal Feasibility
- Cost Benefit Analysis
- Preparing Schedule
- Gathering Requirements of System
  - Joint Application Development
  - Prototyping

##### **Unit 6: Modular and Structured Design**

- Design Principles
  - Top Down Design
  - Bottom Up Design
- Structure Charts
- Modularity

- Goals of Design
- Coupling
- Cohesion

##### **Unit 7: System Design and Modelling**

- Logical and Physical Design
- Process Modeling
  - Data Flow Diagrams
- Data Modeling
  - E-R Diagrams
- Process Specification Tools
  - Decision Tables
  - Decision Trees
  - Notation Structured English
- Data Dictionary

#### **Block 3: More Design Issues and CASE Tools**

##### **Unit 8: Forms and Reports Design**

- Forms
  - Importance of Forms
- Reports
  - Importance of Reports
- Differences between Forms and Reports
- Process of Designing Forms and Reports
- Deliverables and Outcomes
- Design Specifications
  - Narrative Overviews
  - Sample Design
  - Testing and Usability Assessment
- Types of Information
  - Internal Information
  - External Information
  - Turnaround Document
- General Formatting Guidelines
  - Meaningful Titles
  - Meaningful Information
  - Balanced Layout
  - Easy Navigation
- Guidelines for Displaying Contents
  - Highlight Information
  - Using Colour
  - Displaying Text
  - Designing Tables and Lists
- Criteria for Form Design
  - Organization
  - Consistency
  - Completeness
  - Flexible Entry
  - Economy
- Criteria for Report Design

- Relevance
- Accuracy
- Clarity
- Timeliness
- Cost

**Unit 9: Physical File Design and Data base Design**

- Introduction to Database design
  - Flat files vs. Database
  - Steps in Database Design
  - E-R model to Database Design
  - Inputs to Physical Database Design
  - Guidelines for Database Design
- Design of Data Base Fields
  - Types of Fields
  - Rules for Naming Tables and Fields
- Design of Physical Records
- Design of Physical Files
  - Types of Files
  - File Organization
- Design of Database
- Case Study

**Unit 10: CASE Tools for Systems Development**

- Use of CASE tools by organizations
  - Definition of CASE Tools
  - Use of CASE tools by Organizations
  - Role of CASE Tools
  - Advantages of CASE Tools
  - Disadvantages of CASE Tools
- Components of CASE
  - Types of CASE Tools
  - Classification of CASE Tools
  - Reverse and Forward Engineering
- Visual and Emerging CASE tools
  - Traditional systems development and CASE based systems development
  - CASE environment
  - Emerging CASE Tools
  - Objected oriented CASE tools
  - Creating documentation and reports using CASE tools
  - Creating and executable prototype using Object Oriented CASE tools
  - Sequence Diagrams

**Block 4: Implementation and Security of Systems & MIS**

**Unit 11: Implementation and Maintenance of Systems**

- Implementation of Systems

- Conducting System Tests
- Preparing Conversion Plan
- Installing Databases
- Training the end users
- Preparation of User Manual
- Converting to the new System

- Maintenance of Systems
  - Different Maintenance activities
  - Issues involved in Maintenance

**Unit 12: Audit and Security of Computer Systems**

- Definition of Audit
  - Objectives of Audit
  - Responsibility and Authority of the System Auditor
  - Confidentiality
  - Audit Planning
- Audit of Transactions on Computer
  - Transaction Audit
  - Audit of Computer Security
  - Audit of Application
  - Benefits of Audit
- Computer Assisted Audit Techniques
  - Audit Software
  - Test Data
  - Audit Expert Systems
  - Audit Trail
- Computer System and Security issues
  - Analysis of Threats and Risks
  - Recovering from Disasters
  - Planning the contingencies
  - Viruses
- Concurrent Audit Techniques
  - Need for Concurrent Audit Techniques
  - An Integrated Test Facility Techniques
  - The Snapshot Techniques
  - SCARF
  - Continuous and Intermittent Simulation Technique

**Unit 13: Management Information Systems**

- Role of MIS in an organization
- Different kinds of Information Systems
  - Transaction Processing System
  - Management Information System
  - Decision Support System
  - Expert System

## Objectives

This course is aimed to develop the communication skills at the work place. In this course, we concentrate on English at the workplace. You are probably wondering whether business English (as it is also called) is a separate language to general English. Certainly not, business English is not a separate language. It is English used at the workplace using specific vocabulary, and in certain situations having a different discourse. Every profession uses a certain 'jargon' and the business context is no different. While Business English is firmly rooted in general English, nevertheless there are certain distinguishing features which are evident. In this course, you will learn some theoretical inputs into the process of communication, its different types, the difference between written and oral communication. We then concentrate on the structure of conversation – its characteristics and conventions, effectively speaking over the telephone, preparing Curriculum vitae for jobs and interviews, preparing and participating in the Group Discussions, presentation skills, making negotiations and many more.

## Syllabus

### BLOCK 1: Skills Needed at the Work Place - I

#### Unit 1: The Process of Communication

- Introduction: What is Communication?
- The Process of Communication
- Barriers to Communication
- Different Types of Communication
- Written vs. Oral Communication
- Different Types of Face-to-Face Interactions
- Characteristics and Conventions of Conversation
- Conversational Problems of Second/Foreign Language Users
- Difference between Conversation and Other Speech Events

#### Unit 2: Telephone Techniques

- Warm Up
- Speaking and Listening: Commonly Used Phrases in Telephone Conversations
- Reading: Conference Calls
- Vocabulary
- Writing and Listening: Leaving a Message
- Grammar and Usage: The Perfect Tenses
- Pronunciation: Contracted Forms

#### Unit 3: Job Applications and Interviews

- Warm up
- Reading
- Vocabulary: Apply for a Job
- Curriculum Vitae
- Language Focus: Some Useful Words
- Study Skills: Preparing for an Interview
- Listening
- Speaking
- Writing

#### Unit 4: Group Discussions

- Reading
- Writing Skills
- Listening: How to be Successful in a Group Discussion
- Study Skills
- Language Focus
- Vocabulary
- Speaking
- Grammar: Connectives
- Pronunciation

#### Unit 5: Managing Organisational Structure

- Warm Up: Ability to Influence and Lead
- Reading: The Role of a Manager
- Vocabulary: Leadership
- Speaking and Listening
- Language Focus: Degree of Probability
- Grammar: Modals
- Writing: Reports
- Pronunciation

#### Unit 6: Meetings

- Reading: A Successful Meeting
- Speaking: One to One Meetings
- Language Focus: Opening, Middle and Close
- Study Skills: Editing
- Listening: Criteria for Successful Meetings
- Vocabulary
- Grammar: Reporting Verbs
- Writing: Memos
- Pronunciation: Stress According to Part of Speech

**Unit 7: Taking Notes and Preparing Minutes**

- Taking Notes
  - The Note-taking Skill: The Essential Components
  - The Note-taking Skill: An Example
- Preparing Minutes
  - Format of Minutes
  - Language and Style of Minutes
- Grammar: Using the Passive Voice

**Unit 8: Presentation Skills – I**

- Reading: Presentation Skills
- Grammar: Verbs often Required in Presentations
- Language Focus
- Listening: Importance of Body Language in Presentations
- Speaking: Preparing an Outline of a Presentation
- Pronunciation

**Unit 9: Presentation Skills – II**

- Reading: Structure of Presentation
- Study Skills: Visual Aids
- Ending the Presentation
- Language Focus: Talking about Increase and Decrease
- Grammar: Prepositions
- Listening: Podium Panic
- Speaking
- Pronunciation: Emphasizing the Important Words in Context

**Unit 10: Negotiation Skills**

- Language Focus: Idiomatic Expressions
- Study Skills: Process of Negotiations
- Grammar: Phrasal Verbs
- Listening: Effective Negotiations
- Speaking
- Writing

**MCSL-016: Internet Concepts and Web design (Lab Course) 2 Credits**

**Objectives**

The main objective of the course is to introduce the whole range of web technologies starting from HTML, DHTML, Java Script, VBScript, and Dreamweaver. It also gives a brief description on Internet. Through the various examples the course will describe how to design specific page, dynamic web page, forms and frames. It also focuses on the practical aspects of these technologies.

**Syllabus****BLOCK 1: Scripting Languages****Unit 1: The Internet**

- Classification of Networks
- Networking Models
- What is Packet Switching
- Accessing the Internet
- Internet Protocols
  - Internet Protocol (IP)
  - Transmission Control Protocol (TCP)
- Internet Address
  - Structure of Internet Servers Address
  - Address Space
- How does the Internet work
- Intranet & Extranet
- Internet Infrastructure
- Protocols and Services on Internet
  - Domain Name System
  - SMTP and Electronic Mail
  - Http and World Wide Web
  - Usenet and Newgroups

- FTP
- Telnet
- Internet Tools
- Search Engines
- Web Browser

**Unit 2: Introduction to HTML**

- What is HTML
- Basic Tags of HTML
  - HTML Tag
  - TITLE Tag
  - BODY Tag
- Formatting of Text
  - Headers
  - Formatting Tags
  - PRE Tag
  - FONT Tag
  - Special Characters
- Working with Images
- META Tag

**Unit 3: Advanced HTML**

- Links

- Anchor tag
- Lists
  - Unordered Lists
  - Ordered Lists
  - Definition Lists
- Tables
  - TABLE, TR and TD Tags
  - Cell Spacing and Cell Padding
  - Colspan and Rowspan
- Frames
  - Frameset
  - FRAME Tag
  - NOFRAMES Tag
- Forms
  - FORM and INPUT Tag
  - Text Box
  - Radio Button
  - Checkbox
  - SELECT Tag and Pull Down Lists
  - Hidden
  - Submit and Reset
- Some Special Tags
  - COLGROUP
  - THREAD, TBODY, TFOOT
  - \_blank, \_self, \_parent, \_top
  - IFRAME
  - LABEL
  - Attribute for <SELECT>
  - TEXTAREA

#### **Unit 4: Introduction to JavaScript**

- JavaScript Variables and Data Types
  - Declaring Variables
  - Data Types
- Statements and Operators
- Control Structures
  - Conditional Statements
  - Loop Statements
- Object-Based Programming
  - Functions
  - Executing Deferred Scripts
  - Objects
- Message box in Javascript
  - Dialog Boxes
  - Alert Boxes
  - Confirm Boxes
  - Prompt Boxes
- Javascript with HTML
  - Events
  - Event Handlers
- Forms
  - Forms Array

#### **Unit 5: VB Script**

- What is VBScript

- Adding VBScript Code to an HTML Page
  - VB Script Basics
  - VBScript Data Types
  - VBScript Variables
  - VBScript Constants
  - VBScript Operators
- Using Conditional Statements
- Looping Through Code
- VBScript Procedures
- VBScript Coding Conventions
- Dictionary Object in VBScript
  - Methods: VBScript Dictionary Object
  - VBScript Dictionary Object Properties
- Err Object
  - Methods: VBScript Err Object
  - Properties: VBScript Err Object

#### **Unit 6: Dreamweaver**

- Using Dreamweaver
- Create a Site Home Page
- Design a Page in Layout View
- Insert Images
- Insert Text
- Work in Standard View
- View the Site Files
- Link your Documents

#### **BLOCK 2: Lab Manual**

##### **Section 1: HTML (Hypertext Markup Language)**

- Basic of HTML
- How to Create HTML Document
- Steps for Creating a Simple HTML Program

##### **Section 2: Advanced HTML**

- Advanced Topics of HTML

##### **Section 3: JavaScript**

- Script Basics
- Incorporating JavaScript into a Web Page

##### **Section 4: VBScript**

- VBScript Basics
- Incorporating VBScript into HTML Page

##### **Section 5: Dreamweaver**

- How to Work in Dreamweaver??
- How to save your file?
- Adding Layers to the Timeline and Giving Motion to the Layer

- Inserting Scripts
- Inserting External Media in the Web Page
- Adding SSI(Server-side include to the Page)
- Adding CSS Style to your Page
- Adding XML Files to your Page
- To Export a Dreamweaver Document as XML File, checking entries, working in frames, windows control, the Java script URL.

**MCSL -017: Lab (C and Assembly Language Programming) (Lab Course)**

**2 Credits**

**Objectives**

This lab course is completely based on MCS-011 and MCS-012 courses.

The basic objective of the course is to provide the hands on experience on C Programming and Assembly language programming and improve the practical skill set. Also to apply all the concepts that have been covered in the theory courses MCS-011 and MCS – 012. The learner will try to apply the alternate ways to provide the solution to a given problem. The learner will be able to develop the logic for the given problem, recognize and understand the syntax and construction of C code, gains experience of C and Assembly language programming, know the steps involved in compiling, linking and debugging C code, feel more confident about writing the C functions, write some complex programs

**Syllabus**

**Section 1 C Programming Lab**

- Salient Features of C
- C Programming Using Borland Compiler
- Using C with UNIX
- Running C Programs using MS Visual C++
- Program Development Life Cycle
- List of Lab Assignments – Session wise

**Section 2 Digital Logic Circuits**

- Logic Gates Circuit Simulation Program
- Making a Logic Circuit Using Logic

- A Revisit of Steps of Logic Circuit Design
- Session-wise problems

**Section 3 Assembly Language Programming**

- Assemblers
  - Turbo Assembler (TASM)
  - MASM
  - Emu 8086
  - The DEBUG Program
- Assembly Programming File
- Session-wise List of Programs

**MCS-021: Data and File structures**

**4 Credits**

**Objectives**

The learner should be well versed with the fundamentals of Algorithms, learn various data structures, should be able to use them appropriately as per need during development of programs. Also, the learner should know different sorting and searching techniques so that correct techniques can be used in different programs so that the complexity of the program does not increase due the sorting/ search technique employed. The learner should have the knowledge about file structures and finally, s/he should also know the concepts of advanced data structures.

**Syllabus**

**BLOCK 1: Introduction to Algorithms and Data Structures**

**Unit 1: Analysis of Algorithms**

- Mathematical Background
- Process of Analysis
- Calculation of Storage Complexity

- Calculation of Run Time Complexity

**Unit 2 Arrays**

- Arrays and Pointers
- Sparse Matrices
- Polynomials
- Representation of Arrays
  - Row Major Representation
  - Column Major Representation

- Applications

### Unit 3: Lists

- Abstract Data Type-List
- Array Implementation of Lists
- Linked Lists-Implementation
- Doubly Linked Lists-Implementation
- Circularly Linked Lists-Implementation
- Applications

### Block-2: Stacks, Queues and Trees

#### Unit 4: Stacks

- Abstract Data Type-Stack
- Implementation of Stack
  - Implementation of Stack using Arrays
  - Implementation of Stack using Linked Lists
- Algorithmic Implementation of Multiple Stacks
- Applications

#### Unit 5: Queues

- Abstract Data Type-Queue
- Implementation of Queue
  - Array Implementation
  - Linked List Implementation
- Implementation of Multiple Queues
- Implementation of Circular Queues
  - Array Implementation
  - Linked List Implementation of a circular queue
- Implementation of DEQUEUE
  - Array Implementation of a *dequeue*
  - Linked List Implementation of a *dequeue*

#### Unit 6: Trees

- Abstract Data Type-Tree
- Implementation of Tree
- Tree Traversals
- Binary Trees
- Implementation of Binary Tree
- Binary Tree Traversals
  - Recursive Implementation of Binary Tree Traversals
  - Non Recursive Implementations of Binary Tree Traversals
- Applications

### BLOCK 3: Graph Algorithms and Searching Techniques

### Unit 7: Advanced Trees

- Binary Search Trees
  - Traversing a Binary Search Trees
  - Insertion of a node into a Binary Search Tree
  - Deletion of a node from a Binary Search Tree
- AVL Trees
  - Insertion of a node into an AVL Tree
  - Deletion of a node from and AVL Tree
  - AVL tree rotations
  - Applications of AVL Trees
- B-Trees
  - Operations on B-Trees
  - Applications of B-Trees

### Unit 8: Graphs

- Definitions
- Shortest Path Algorithms
  - Dijkstra's Algorithm
  - Graphs with Negative Edge costs
  - Acyclic Graphs
  - All Pairs Shortest Paths Algorithm
- Minimum cost Spanning Trees
  - Kruskal's Algorithm
  - Prims's Algorithm
  - Applications
- Breadth First Search
- Depth First Search
- Finding Strongly Connected Components

### Unit 9: Searching

- Linear Search
- Binary Search
- Applications

### BLOCK 4: File Structures and Advanced Data

#### Structures

#### Unit 10 Sorting

- Internal Sorting
  - Insertion Sort
  - Bubble Sort
  - Quick Sort
  - 2-way Merge Sort
  - Heap Sort
- Sorting on Several Keys

#### Unit 11: Advanced Data Structures

- Splay Trees
  - Splaying steps

- Splaying Algorithm
- Red-Black trees
  - Properties of a Red-Black tree
  - Insertion into a Red-Black tree
  - Deletion from a Red-Black tree
- AA-Trees

### Unit 12: File Structures

- Terminology

- File Organisation
- Sequential Files
  - Structure
  - Operations
  - Disadvantages
  - Areas of use
- Direct File Organisation
- Indexed Sequential File Organisation

## MCS-022: Operating System concepts and Networking Management

4 Credits

### Objectives

This course is intended to introduce the concepts, structure, features, trends and design mechanism of Operating system. The Operating System has seen consistent innovations and developments like other fields of computer science. In this course efforts have been to capture these changes. The trend is towards GUI based free, platform independent, secure and network-based operating system. Linux and Windows 2000 have got very wide coverage in the course. Security and network management, a part of modern Operating System design, have also been taken up.

### Syllabus

#### BLOCK 1: Operating System Fundamentals Networking

##### Unit 1: Graphical User Interface

- What is Graphical User Interface
- Evolution of Human and Machine Interaction
- Common Graphical User Interfaces
- Functionality of Graphical User Interface
- GUI Design Consideration: psychological factors
- GUI Design Consideration: standards
- GUI Example
  - Microsoft Windows
  - Macintosh Toolbox
  - X-windows
  - NeXT

##### Unit 2: Introduction to Operating System

- What is an Operating System?
- Evolution of Operating System
  - Serial Processing
  - Batch Processing
  - Multiprogramming
- Operating System Structure
  - Layered Structure Approach
  - Virtual Machine
  - Client-Server Model
  - Kernel Approach
- Classification of Advanced Operating System

- Architecture Driven Operating System
- Application Driven Operating System

- Characteristics of Modern Operating System
  - Microkernel Architecture
  - Multithreading
  - Symmetric Multiprocessing

##### Unit 3: Introduction to Networking Concepts

- Why Computer Networks
- The Topologies
- Characteristics of the OSI Layers
- OSI Models and Communication between Systems
- Interaction between OSI Model Layers
- Protocols Types of Networks
  - Local Area Network (LANs)
  - Metropolitan Networks (MANs)
  - Wide Area Network (WANs)
- Medium
- Data Flow
- Physical Connection
- Transmission Media
- Connecting Devices
  - Repeaters
  - Hubs
  - Bridges
  - Routers
  - Gateways

#### **Unit 4: Internetworking: Concept, Architecture and Protocols**

- History of internetworking
- Packet Switching
- Internetworking Concepts
- Internet Addresses Object-Based Programming
- Configuring IP Addresses
- TCP/ IP
- Additional TCP/ IP – Related Protocols
- Application Layer Protocols
  - File Transfer Protocols
  - Trivial File Transfer Protocol (TFTP)
  - TELNET
  - Remote login
  - Electronic Mail (Email)
- World Wide Web
- Domain Name System
- SNMP and UDP

#### **BLOCK 2: Linux Operating System**

##### **Unit 1: Introduction to Linux Operating System**

- Features of Linux
- Drawbacks of Linux
- Components of Linux
  - Memory Management Subsystems
  - Linux Process and Thread Management
  - File Management System
  - Device Drivers

##### **Unit 2: Linux Commands and Utilities**

- Entering the Machine
  - User Names and Groups
  - Logging In
  - Correcting Typing Mistakes
  - Format of Linux Commands
  - Changing Your Password
  - Characters with Special Meanings
  - Linux Documentation
- The File System
  - Current Directory
  - Looking at the Directory Contents
  - Absolute and Relative Pathnames
  - Some Linux Directories and Files

##### **Unit 3: Linux Utilities and Editor**

- Some Useful Commands
- Permission Modes and Standard Files
- Pipes, Filters and Redirection
- Shell Scripts

- Graphical User Interface
- Editor

##### **Unit 4: User-to-User Communication**

- On-Line Communication
- Off-Line Communication
- Apache Server Settings
- Network Server Settings
  - Domain Name Server
  - Network File Server

##### **Unit 5: Unix System Administration**

- System Administration
- Installing Linux
  - Choosing an Installation Method
  - Choosing an Installation Class
  - Pre-installation checks
  - Installation
- Booting the System
- Maintaining User Accounts
- File Systems and Special Files
- Backups and Restoration

#### **BLOCK 3: Windows 2000**

##### **Unit 1: Windows 2000 Networking**

- Windows 2000 Operating System Architecture
  - Peer-To-Peer Network
  - Domains
  - Network Protocols
  - File Services
  - Shared Folders
  - Distributed File System
  - Print Services
- Using the Mapped Drive
  - Printing a Mapped Drive
  - Disconnecting a Mapped Drive
  - Viewing Directory Information
  - Creating a Shared Folder
  - Logging off a Client
- A Few Important Facts About Windows 2000 Usages

##### **Unit-2: Managing Windows 2000 Server**

- Using Windows 2000 and Client
- Logging on to the Network
- Browsing Network Resources 1
- Accessing Network Resources Using My Network Places

- Mapping a Folder

### **Unit3: Advanced Windows 2000 Networking**

- Windows 2000 Domains, Workgroups & Trusted Relationships
  - Concept of Domains
  - Trust Relationships
  - Building Domains
- User Administration
- Remote Access

### **Unit 4: Windows XP Networking**

- Introduction to Windows XP Networking
  - TCP/IP Protocol Setting for Windows XP
  - To Select a Network Protocol
  - Virtual Private Networks and Remote Networking
- Windows XP in File System
- Sharing Network Resources in Windows XP
  - Sharing Files in Windows XP
  - Sharing Folders in Windows XP
  - Sharing Drives in Windows XP
- Enabling Offline File Features

### **Block 4: Security and Management**

#### **Unit 1: Security Concepts**

- Goals of Computer Security
  - Integrity
  - Confidentiality
  - Availability
- Security Problem and Requirements
  - Identifying the Assets
  - Identifying the Threats
  - Identifying the Impact
- Threat and Vulnerabilities
- User Authentication
- Security System and Facilities
  - System Access Control
  - Password Management
  - Privileged User Management
  - User Account Management
  - Data Resource Protection
  - Sensitive System Protection
- Cryptography
- Intrusion detection
- Computer-Security Classifications

#### **Unit 2: Computer Security**

- Hardening Operating System and Application Code
- Hardening File System Security

- Hardening Local Security Policies
- Hardening Services
- Hardening Default Accounts
- Hardening Network Activity
  - Malicious Code
  - Firewall
- Fault Tolerant System
- BACKUP and UPS

#### **Unit 3: Security and Management-I**

- Main Issues In Windows Security Management
  - Physical Security Management
  - Logon Security Management
  - Users and Groups Management
  - Managing Local and Global Groups
  - Managing User Accounts
  - Windows NT Domain Management
- Domain Controller
  - The Primary Domain Controller (PDM)
  - Backup Domain Controller (BDC)
- Windows Resources Management
- Registry Management
  - Removing Registry Access
  - Managing Individual Keys
  - Audit Registry Access
- Printer Management
- Managing Windows 2000 Operating System
- Active Directory
  - Logical Structure
  - Physical Structure
- Windows 2000 DNS Management
- Managing Group Policy

#### **Unit 4: Security and Management-II**

- User Authentication Management
  - Subsystems Component Management
  - Kerberos Management
- User and Group Management
  - Configuring User Accounts
  - Creating Domain User Accounts
  - Managing Logon Hours
  - Managing Expiry Date for a User Account
  - Windows 2000 Groups Management
  - Default Group Types
  - Security Configuration Management Tool
- Resource Management
  - Files and Folder Management
  - Files and Folder Permission

- Inheritances and Propagation
- Moving Data and Permission
- Shared Resources Management
- The NULL Session
- Registry Management
- Default Registry Configurations
- Registry Backup Managements
- Printer Security Management
- Windows 2000 Network – Security and Management
  - NAT and ICS
  - RRAS, RADIUS and IAS
  - IPSec
  - Encrypting File System Management
    - Encrypting File System (EFS)
    - EFS and Users Management
    - Data Recovery Management
    - EFS Cryptography Management

**MCS 023: Introduction to Database Management Systems**

**3 Credits**

**Objectives**

Database systems are pervasive. They are present in every segment of commercial, academic and virtual world. They are required as the backbone of any information system, enterprise resource planning, research activities and other activity that require permanence of data storage. This course provides the basic introduction to database system technologies; and concurrency, security and recovery issues of database management systems.

This course also provides the basic conceptual background necessary to design and develop simple database systems. The major focus in this course is the Relational database model; however, it also discusses about the ER model and distributed databases. This course enables you to write good queries using a standard query language called SQL.

**Syllabus**

**BLOCK 1: The Database Management System Concepts**

**Unit 1: The Basic Concepts**

- Need for a Database Management System
  - The file based system
  - Limitations of file based system
  - The Database Approach
- The Logical DBMS Architecture
  - Three level architecture of DBMS or logical DBMS architecture
  - Mappings between levels and data independence
  - The need for three level architecture
- Physical DBMS Architecture
  - DML Precompiler
  - DDL Compiler
  - File Manager
  - Database Manager
  - Query Processor
  - Database Administrator
  - Data files indices and Data Dictionary
- Commercial Database Architecture
- Data Models

**Unit 2: Relational And ER Models**

- The Relational Model
  - Domains, Attributes, Tuple and Relation
  - Super keys Candidate keys and Primary keys for the Relations
- Relational Constraints
  - Domain Constraint
  - Key Constraint
  - Integrity Constraint
  - Update Operations and Dealing with Constraint Violations
- Relational Algebra
  - Basic Set Operation
  - Cartesian Product
  - Relational Operations
- Entity Relationship (ER) Model
  - Entities
  - Attributes
  - Relationships
  - More about Entities and Relationships

- o Defining Relationship for College Database
- E-R Diagram
- Conversion of E-R Diagram to Relational Database

### **Unit 3: Database Integrity and Normalisation**

- **Relational Database Integrity**
  - o The Keys
  - o Referential Integrity
  - o Entity Integrity
- **Redundancy and Associated Problems**
- Single-Valued Dependencies
- Single-Valued Normalisation
  - o The First Normal Form
  - o The Second Normal Form
  - o The Third Normal Form
  - o Boyce Codd Normal Form
- Desirable Properties of Decomposition
  - o Attribute Preservation
  - o Lossless-join Decomposition
  - o Dependency Preservation
  - o Lack of redundancy
- Rules of Data Normalisation
  - o Eliminate Repeating Groups
  - o Eliminate Redundant Data
  - o Eliminate Columns Not Dependent on Key

### **Unit 4: File Organisation in DBMS**

- Physical Database Design Issues
- Storage of Database on Hard Disks
- File Organisation and Its Types
  - o Heap files (Unordered files)
  - o Sequential File Organisation
  - o Indexed (Indexed Sequential) File Organisation
  - o Hashed File Organisation
- Types of Indexes
- Index and Tree Structure
- Multi-key File Organisation<sup>99</sup>
  - o Need for Multiple Access Paths
  - o Multi-list File Organisation
  - o Inverted File Organisation
- Importance of File Organisation in Databases

## **BLOCK 2: Structured Query Language and Transaction Management**

### **Unit 1: The Structures Query Language**

- What is SQL?

- Data Definition Language
- Data Manipulation Language
- Data Control
- Database Objects: Views, Sequences, Indexes and Synonyms
  - o Views
  - o Sequences
  - o Indexes and Synonyms
- Table Handling
- Nested Queries

### **Unit 2: Transactions and Concurrency Management**

- The Transactions
- The Concurrent Transactions
- The Locking Protocol
  - o Serialisable Schedules
  - o Locks
  - o Two Phase Locking (2PL)
- Deadlock and its Prevention
- Optimistic Concurrency Control

### **Unit 3: Database Recovery and Security**

- What is Recovery?
  - o Kinds of failures
  - o Failure controlling methods
  - o Database errors
- Recovery Techniques
- Security & Integrity
  - o Relationship between Security and Integrity
  - o Difference between Operating System and Database Security
- Authorization

### **Unit 4: Distributed and Client Server Databases**

- Need for Distributed Database Systems
- Structure of Distributed Database
- Advantages and Disadvantages of DDBMS
  - o Advantages of Data Distribution
  - o Disadvantages of Data Distribution
- Design of Distributed Databases
  - o Data Replication
  - o Data Fragmentation
- Client Server Databases
  - o Emergence of Client Server Architecture
  - o Need for Client Server Computing
  - o Structure of Client Server Systems
  - o Advantages of Client Server Systems

### **BLOCK 3: Application Development: Development of a Hospital Management System**

- Need to Develop the Hospital Management System (An HMS)
- Creating a Database for HMS
- Developing Front End Forms

- Reports
- Using Queries and Record set

### **BLOCK 4: Study Centre Management System: A Case Study**

- Software Development Process: Analysis
- System Designing
- Issues relating to Software Development, Testing and Maintenance

## **MCS-024: Object Oriented Technology and Java Programming**

**3 Credits**

### **Objectives**

Today almost every branch of computer science is feeling presence of object-orientation. Object oriented technology is successfully incorporated in various fields of computer science. Since its arrival on the scene in 1995, the Java has been accepted as one of the primary programming language.

This course is designed to give you exposure to basic concepts of object-oriented technology. This course will help in learning to write programs in Java using object-oriented paradigm. Approach in this course is to take Java as a language that is used as a primary tool in many different areas of programming work.

### **Syllabus**

#### **BLOCK 1: Object Oriented Technology and Java**

##### **Unit 1: Object Oriented Methodology-1**

- Paradigms of Programming Languages
- Evolution of OO Methodology
- Basic Concepts of OO Approach
- Comparison of Object Oriented and Procedure Oriented Approaches
- Benefits of OOPs
- Introduction to Common OO Language
- Applications of OOPs

##### **Unit 2: Object Oriented Methodology-2**

- Classes and Objects
- Abstraction and Encapsulation
- Inheritance
- Method Overriding and Polymorphism

##### **Unit 3: Java Language Basics**

- Introduction To Java
  - Basic Features
  - Java Virtual Machine Concepts
  - A Simple Java Program
- Primitive Data Type And Variables
  - Java Keywords
  - Integer and Floating Point Data Type
  - Character and Boolean Types
  - Declaring and Initialization Variables

- Java Operators

##### **Unit 4: Expressions, Statements and Arrays**

- Expressions
- Statements
- Control Statements
- Selection Statements
- Iterative Statements
- Jump Statements
- Arrays

#### **BLOCK 2: Object Oriented Concepts and Exceptions Handling**

##### **Unit 1: Class and Objects**

- Class Fundamentals
  - Creating objects
  - Assigning object reference variables
- Introducing Methods
  - Static methods
  - Constructors
- Overloading constructors
  - This Keyword
  - Using Objects as Parameters
  - Argument passing
  - Returning objects
- Method Overloading
- Garbage Collection

- The Finalize ( ) Method

### **Unit 2: Inheritance and Polymorphism**

- Inheritance Basics
- Access Control
- Multilevel Inheritance
- Method Overriding
- Abstract Classes
- Polymorphism
- Final Keyword

### **Unit 3: Packages and Interfaces**

- Package
  - Defining Package
  - CLASSPATH
  - Package naming
- Accessibility of Packages

## **BLOCK 3: Multithreading, I/O and String Handling**

### **Unit 1: Multithreaded Programming**

- Multithreading: An Introduction
- The Main Thread
- Java Thread Model
- Thread Priorities
- Synchronization in Java
- Interthread Communication

### **Unit 2: I/O in Java**

- I/O Basics
- Streams and Stream Classes
  - Byte Stream Classes
  - Character Stream Classes
- The Predefined Streams
- Reading from, and Writing to, Console
- Reading and Writing Files
- The Transient and Volatile Modifiers
- Using Instance of Native Methods

## **BLOCK 4: Applets Programming and Advance Java Concepts**

### **Unit 1: Applets**

- The Applet Class
- Applet Architecture
- An Applet Skeleton: Initialization and Termination
- Handling Events
- HTML Applet Tag

### **Unit 2: Graphics and User Interfaces**

- Graphics Contexts and Graphics Objects
  - Color Control

- Using Package Members
- Interfaces
- Implementing Interfaces
- Interface and Abstract Classes
- Extends and Implements Together

### **Unit 4: Exceptions Handling**

- Exception
- Handling of Exception
  - Using try-catch
  - Catching Multiple Exceptions
  - Using finally clause
- Types of Exceptions
- Throwing Exceptions
- Writing Exception Subclasses

### **Unit 3: Strings and Characters**

- Fundamentals of Characters and Strings
- The String Class
- String Operations
- Data Conversion using Value Of ( ) Methods
- String Buffer Class and Methods

### **Unit 4: Exploring Java I/O**

- Java I/O Classes and Interfaces
- I/O Stream Classes
  - Input and Output Stream
  - Input Stream and Output Stream Hierarchy
- Text Streams
- Stream Tokenizer
- Serialization
- Buffered Stream
- Print Stream
- Random Access File
  - Fonts
  - Coordinate System
- User Interface Components
- Building User Interface with AWT
- Swing-based GUI
- Layouts and Layout Manager
- Container

### **Unit 3: Networking Features**

- Socket Overview
- Reserved Parts and Proxy Servers
- Internet Addressing: Domain
- Naming Services (DNS)
- JAVA and the net: URL

- TCP/IP Sockets
  - Datagrams
- Unit 4: Advance Java**
- Java Database Connectivity
    - Establishing A Connection
    - Transactions with Database
  - An Overview of RMI Applications
    - Remote Classes and Interfaces
- RMI Architecture
  - RMI Object Hierarchy
  - Security
  - Java Servlets
    - Servlet Life Cycle
    - Get and Post Methods
    - Session Handling
  - Java Beans

**MCSL-025: Lab (Data Structures using C, WINDOWS 2000, LINUX / UNIX, Java and MS-ACCESS, My SQL) 4 Credits**

**Objectives**

This lab is based on the courses MCS-021, MCS-022, MCS-023 and MCS-024. This lab course involves the development of the practical skills in Data structures using C programming, Networking, DBMS and Java Programming. Theoretical aspects were already covered in the respective theory courses. This course is an attempt to upgrade and enhance your theoretical skills and provide the hands on experience. By the end of these practical sessions of this course, you will be able to write programs using basic data structures such as Arrays etc. as well as advanced data structures such as trees etc.

**Syllabus**

**SECTION 1: Data and File Structures Lab Manual**

- Arrays
- Structures
- Linked Lists
- Stacks
- Queues
- Trees
- Advanced Trees
- Graphs
- Searching
- Sorting

- LINUX administration
- Unix Networking
- Installation and Configuration of the networking services like TCP/IP, DNS, DHCP, FTP, SMTP

**SECTION 3: DBMS Lab**

- Introduction to MS-Access
- Database Creation
- Use of DBMS Tools/ Client-Server Mode
- Forms and Procedures

**SECTION 2: Operating Systems and Networking Lab**

- Overview of Windows 2000
- Unix and Linux
- Advanced concepts of Local Area Network
- Network administration of Windows 2000

**SECTION 4: Java Programming Lab**

- Programming with Java
- PATH and CLASSPATH Setting
- Example Programs
- List of Lab Assignments

**MCS-031: Design and Analysis of Algorithms**

**4 Credits**

**Objectives**

Algorithm is the central concept of Computer Science. Whole of Computer Science can be thought of as revolving around the concept of algorithm — the machines are designed and fabricated to execute algorithms; the programming languages are defined to describe algorithms so that the machines can understand and execute programs written in programming languages; the foundation/theory of Computer

Science is the study of the limits of algorithmic methods, i.e., the study tells whether a particular task is accomplishable by a computer or not, etc.

Hence, the study of the Design and Analysis of Algorithm has to be an essential part of any Computer Science/Engineering curriculum. Even if, software for solving all types of problems may become available in the future and the user/student may not be required to write an algorithm to solve any problem, still training the students in the skills of designing and analyzing the algorithms will remain essential, because these constitute the fundamental skills for solving problems with computers. It is like teaching of geometry to instill in students the skills of logical reasoning.

The objective of the course is to make the students aware of and well-groomed in the use of the tools & Techniques of designing and analyzing algorithms.

## Syllabus

### BLOCK 1 Introduction to Algorithmics

#### Unit 1: Elementary Algorithmics

- Example of an Algorithm
- Problems and Instances
- Characteristics of an Algorithm
- Problems, Available Tools & Algorithms
- Building Blocks of Algorithms
- Outline of Algorithms

#### Unit 2: Some pre-requisites and Asymptotic Bounds

- Some Useful Mathematical Functions & Notations
- Mathematical Expectation
- Principle of Mathematical Induction
- Concept of Efficiency of an Algorithm
- Well Known Asymptotic Functions & Notations

#### Unit 3: Basics of Analysis

- Analysis of Algorithm – Simple Example
- Well Known Sorting Algorithms
- Best-Case and Worst-Case Analyses
- Analysis of Non-Recursive Control Structures
- Recursive Constructs
- Solving Recurrences
- Average-Case & Amortized Analyses

### BLOCK 2 Design Techniques-I

#### Unit 1: Divide-and-Conquer

- General Issues in Divide-And Conquer

- Integer Multiplication
- Binary Search
- Sorting
- Finding the Median
- Matrix Multiplication
- Exponentiation

#### Unit 2: Graphs Algorithms

- Examples
- Traversing Trees
- Depth-First Search
- Breadth-First Search
- Best-First Search & Minimax Principle
- Topological Sort

### BLOCK 3 Design Techniques - II

#### Unit 1 Dynamic Programming

- The Problem of Making Change
- The Principle of Optimality
- Chained Matrix Multiplication
- Matrix Multiplication Using Dynamic Programming

#### Unit 2 Greedy Algorithms

- Some Examples
- Formalization of Greedy Technique
- Minimum Spanning Trees
- Prim's Algorithm
- Kruskal's Algorithm
- Dijkstra's Algorithm

### Unit 3 Models for Executing Algorithms –I: FA

- Regular Expressions
- Regular Languages
- Finite Automata

### Unit 4 Models for Executing Algorithms –II PDFA & CFG

- Formal Language & Grammar
- Context Free Grammar(CFG)
- Pushdown Automata (PDA)

### BLOCK 4 Complexity & Completeness

#### Unit 1: Models for Executing Algorithms – III :TM

- Prelude to Formal Definition
- Turing Machine: Formal Definition and Examples

- Instantaneous Description and Transition Diagram
- Some Formal Definitions
- Observations
- Turing Machine as a Computer of Functions

#### Unit 2 Algorithmically Unsolvable Problems

- Decidable And Undecidable Problems
- The Halting Problem
- Reduction to Another Undecidable Problem
- Undecidable Problems for CFL
- Other Undecidable Problems

#### Unit 3 Complexity of Algorithms

- Notations for the Growth Rates of Functions

## MCS-032: Object Oriented Analysis and Design

3 Credits

### Objectives

Object oriented analysis and design has emerged as a new paradigm of analysis and design of the systems. This course is designed to help in learning object oriented analysis and design concepts. This course is having coverage of UML diagrams and will help in developing understanding in the area of system analysis and design concepts using object-oriented approach. This course will cover different aspects of OOAD with explaining object modeling dynamic modeling and functional modeling.

### Syllabus

#### Block 1: Object Oriented Modeling and UML

##### Unit 1: Introduction to Object Oriented Modelling

- Object Oriented Modeling
- Characteristics Object Oriented Modeling
  - Class and Objects
  - Links and Association
  - Generalization and Inheritance
- An Object Model
- Benefits of OO Modeling
- Introduction to OOAD tools

##### Unit 2: Object Oriented Analysis

- Object Oriented Analysis
- Problem Statement: an Example
- Differences between Structured Analysis and Object Oriented Analysis
- Analysis Techniques
  - Object Modeling
  - Dynamic Modeling

- Functional Modeling
- Adding Operations
- Analysis Iteration

##### Unit 3: Using UML

- UML: Introduction
- Object Model Notations:
- Basic Concepts
- Structural Diagrams
  - Class
  - Object
  - Composite
  - Package
  - Component
  - Deployment
- Behavioral Diagrams:
  - Use Case
  - Communication
  - Sequence
  - Interaction Overview
  - Activity
  - State

- Modeling with Objects

## **Block 2: Object Oriented Design**

### **Unit 4: System Design**

- System Design: An Object Oriented Approach
- Breaking into Subsystems
- Concurrency Identification
- Management of data store
- Controlling events between Objects
- Handling Boundary Conditions

### **Unit 5: Object Design**

- Object Design for Processing
- Object Design Steps
- Designing a Solution
- Choosing Algorithms
- Choosing Data Structures
- Defining Classes and delegation of Responsibilities to Methods

### **Unit 6: Advance Object Design**

- Control and its Implementation
  - Control as a State within Program
  - Control as State Machine Engine
  - Control as Concurrent Task
- Inheritance Adjustment
- Association: Design
- Object Representation
- Design Optimization
- Design Documentation

## **Block 3: Modeling**

### **Unit 7: Object Modeling**

- Advance Modeling Concepts
  - Aggregation
  - Abstract Class
- Multiple Inheritance
- Generalization as an Extension
- Generalization as a Restriction
- Metadata
- Constraints
- An Object Model

## **Unit 8: Dynamic Modeling**

- Events
- State and State Diagram
- Elements of State Diagrams
- Examples of State Diagrams
- Advance Concepts in Dynamic Modeling
- Concurrency
- A Dynamic model

### **Unit 9: Functional Modeling**

- Functional Models
- Data Flow Diagrams
- Features of a DFD
- Design flaws in DFD
- A Functional model
- Relationship between Object, Dynamic, and Functional Models

## **Block 4: Implementation**

### **Unit 10: Implementation Strategies**

- Implementation
  - Using Programming Languages
  - Using Database System
- Unidirectional Implementation
- Bi-directional Implementation
- Implementing associations
- Implementing Constraints
- Implementing Statecharts
- Persistency

### **Unit 11: Object Mapping with Databases**

- Relational Database Schema for Object Modes
- Object Classes to Database Tables
- Mapping Associations to Tables
- Mapping Generalizations to Tables
- Interfacing to Database
- Object Mapping with Databases: an Example

### **Unit 12: Case Study**

- This unit will cover all the OOAD aspects Covered in previous 11(eleven) units of this course.

**MCS-033 Advanced Discrete Mathematics**

**2 credits**

## **Objectives**

This course assumes the knowledge of the course MCS-013, “Discrete Mathematics”. In the two blocks of this course, we discuss recursion and graph theory, respectively. The first block is aimed at developing the understanding of a very important tool for analyzing recursive programmes, namely, recurrence relations. In

the second block we aim to develop a basic understanding of graph theory, which is a very useful modeling tool for computer programming.

## Syllabus

### BLOCK 1: Recurrences

#### Unit 1: Recurrence Relations

- The Fibonacci Sequences, The Tower of Hanoi, Catalan Numbers
- Related Definitions
- Divide and Conquer Methods

#### Unit 2 Generating Functions

- Definitions and Constructions
- Applications for Finding the Number of Integers Solutions of Linear Equations
- Exponential Generating Functions
- Solving Recurrence Relations using Generating Functions
- Applying Generating Functions for Combinatorial Identities and Partitions

#### Unit 3 Solving Recurrences

- Linear Homogeneous Recurrences
- Linear Non- Homogeneous Recurrences
- Methods of Inspection, Telescoping Sums, Iteration, Substitution

### BLOCK 2: Graph Theory

#### Unit 1: Basic Properties of Graphs

- What Graphs are
- Degree, Regularity and Isomorphism
- SubGraphs

#### Unit 2 Connectedness

- Connected Graphs
  - Paths, Circuits and Cycles
  - Components
  - Connectivity
- Bipartite Graphs

#### Unit 3 Eulerian and Hamiltonian Graphs

- Eulerian Graphs
- Hamiltonian Graphs
- Travelling Salesperson Problem

#### Unit 4 Graph Colourings

- Vertex Colouring
- Edge Colouring
- Planar Graphs
- Map Colouring Problem

## MCS-034: Software Engineering

3 Credits

## Objectives

The objective of the courses is to make the learner efficiently work as software engineer. S/he should be well acquainted with all the phases of Software Development Life Cycle. The learner should be able to apply the concepts learned for doing research.

## Syllabus

### Block 1 : Overview of Software Engineering

#### Unit 1 Software Engineering and its models

- Evolution of Software Engineering
- Software development models
- Capability maturity models
- Software process technology

#### Unit 2: Principles of Software Requirements Analysis

- Engineering the product
- Modeling the system architecture
- Software prototyping and specification

### Unit 3 Software Design

- Data design
- Architectural design
- Interface design
- HCI design
- Modular design

### Unit 4 Software testing

- Testing techniques
- Testing for specialized environments
- Debugging

### BLOCK 2: Software Project Management

#### Unit 5: Software Project Planning

- Different types of project metrics

- Software project estimation
- Models for estimation
- Automated tools for estimation

**Unit 6: Risk management and Project Scheduling**

- Identification of Software risks
- Monitoring of risks
- Management of risks
- Formulating a task set for the project
- Choosing the tasks of software engineering
- Scheduling methods
- The Software project plan

**Unit 7 Software Quality Assurance**

- Formal technical reviews
- Software reliability
- Software quality standards

**Unit 8 Software change management**

- Baselines
- Version control
- Change control\
- Auditing and reporting

**BLOCK 3: Advanced Software Engineering**

**Unit 9: Web Software Engineering**

- Different layers
- Issues of management of web based projects
- Metrics
- Analysis
- Design
- Testing

**Unit 10: Mobile Software Engineering**

- Transition from design to coding of mobile applications
- Elements of mobile applications
- Approaches to the development of mobile applications

**Unit 11: CASE tools**

- Analysis tools
- Design tools
- SQA tools
- UI design tools
- Software testing tools
- Web engineering tools

**Unit 12: Advanced Software Engineering**

- Clean room Software engineering
- Component based Software engineering
- Re-engineering
- Reverse engineering

**MCS-035: Accountancy and Financial Management**

**3 Credits**

**Objectives**

This course aims at introducing the basic accounting procedures and financial management processes. It also focuses on the computerised implementation of the various accounting principles discussed at different levels.

**Syllabus**

**BLOCK 1: Accounting System**

**Unit 1: Accounting and its Functions**

- Scope of Accounting
- Emerging Role of Accounting
- Accounting as an Information System
- Role and Activities of an Accountant
- Accounting Personnel
- Nature of Accounting Function
- Organisation Chart for Accounting and Finance

**Unit 2: Accounting Concepts and Standards**

- Accounting Framework

- Accounting Concepts
- Accounting Standards
- Changing Nature of Generally Accepted Accounting Principles (GAAP)
- Attempts towards Standardisation
- Accounting Standards in India

**Unit 3: Basic Accounting Process: Preparation of Journal, Ledger and Trial Balance**

- Accounting Equation
- Classification of Accounts
- Definitions of Journal and Ledger
  - Journalising Process

- Ledger Posting
- Balancing an Account
- Trial Balance
- Objectives of Preparing Trial Balance
  - Total Method of Preparing the Trial Balance
  - Balance Method of Preparing the Trial Balance
  - Limitations of Trial Balance
- Accounting Cycle

- Short-term Solvency Ratios
- Activity or Turnover Ratios
- Profitability Ratios
- Market Test Ratios

## **BLOCK 2: Understanding and Analysis of Financial Statements**

### **Unit 1: Preparation and Analysis of Final Accounts**

- Trading Account
  - Opening/Closing Stock
  - Net Purchases
  - Direct Expenses
  - Net Sales
- Profit And Loss Account
- Difference between Trading and Profit & Loss Account
- Balance Sheet
- Constructing a Balance Sheet
- Classification of Balance Sheet's Items
- Adjustment Entries
  - Closing Stock
  - Depreciation
  - Bad Debts
  - Provision for Bad and Doubtful Debts
  - Salaries and Wages
  - Outstanding Expenses
  - Prepaid Expenses
  - Accrued Income
  - Income Received in Advance

### **Unit 2: Funds Flow and Cash Flow Statements**

- Statements of changes in Financial Positions
- Fund Flow Statement
- Analysing Changes in Working Capital
- Sources of Funds
- Uses (Applications) of Funds
- Cash Flow Statement
- Sources and Uses of Cash

### **Unit 3: Ratio Analysis**

- Categories of Ratios
  - Long-term Solvency Ratios

## **BLOCK 3: Financial Management and Decisions**

### **Unit 1: Introduction to Financial Management**

- Evolution of Financial Management
- Significance of Financial Management
- Principles of Financial Management
- Economic Value Added
- Agency Relationship
- Changing Financial Landscape

### **Unit 2: Time Value of Money and Investment Decisions**

- Determining The Future Value
  - Shorter Compounding Period
  - Effective versus Nominal Rates
  - Continuous Compounding
- Annuity

### **Unit 3: Working Capital Decisions**

- Characteristics of Current Assets
- Operating Cycle Concepts
- Factors Influences Working Capital Environment
- Estimating working capital Requirement

## **BLOCK 4: Working Capital Management**

### **Unit 1: Cash and Treasury Management**

- Treasury Management
  - Treasury Risk Management
  - Functions of Treasury Department
- Facets of Cash Management
  - Motives for Holding Cash
  - Cash Planning
  - Determining the Optimum Cash Balance
- Methods of Cash Flow Budgeting
- Investing Surplus Cash
- Cash Collection and Disbursements

### **Unit 2: Receivables Management**

- Terms of Payment
- Credit Policy Variables
- Credit Evaluation
- Monitoring Receivables
- Factoring

**Unit 3: Inventory Management**

- Reasons for Holding Inventory
- Objectives of Inventory Management

- Techniques of Inventory Control
- Modern Techniques
- Traditional Techniques

**MCSL-036 Lab****3 credits**

This lab is based on the courses MCS-032, MCS-034 and MCS-035

**MCS-041: Operating Systems****4 Credits****Objectives**

In the second semester student will get exposed to the fundamental concepts of Operating systems in MCS-022. But that course completely provides knowledge from the implementation, networking and from the practical point of view. This is the core course on Operating systems and the main objective of this course is to provide core knowledge of Operating Systems features, functions and techniques. Each and every Operating System function is discussed in detailed. This course also provides an attempt to throw some light on the advanced topics in O/S like Multiprocessors systems and Distributed O/S. Case studies of WINDOWS and LINUX are organized at the end of this course so as to provide the support what ever they had pursued theoretically.

**Syllabus****BLOCK 1 Introduction to Operating Systems, Process Management****Unit 1 Operating System-An Overview**

- What is an Operating System (OS)?
- Goals of an Operating System
- Generations of Operating Systems
- Types of Operating Systems
- Desirable Qualities of OS
- Operating Systems : Some Examples
- Functions of OS

**Unit 2 Processes**

- Concept of Process
- System Calls for Process Management
- Process Scheduling
- Scheduling Algorithms
  - First Come First serve (FCFS)
  - Shortest Job First (SJF)
  - Round Robin (RR)
  - Shortest remaining time next (SRTN)
  - Priority Based Scheduling or Event Driven (ED) scheduling
- Performance evaluation of the Scheduling Algorithms

**Unit 3: Interprocess Communication and Synchronization**

- Interprocess Communication
- Interprocess Synchronization
- Semaphores

- Classical problems in concurrent programming
- Locks
- Monitors and Conditional Variables
- Summary

**Unit 4: Deadlocks**

- Deadlocks
- Characterization of a Deadlock
- A Resource Allocation Graph
- Dealing with Deadlock Situations
  - Deadlock Prevention
  - Deadlock Avoidance
  - Deadlock Detection and Recovery
- Deadlock detection and recovery
- Deadlock Prevention
  - Havender's Algorithm
- Deadlock Avoidance
  - Banker's Algorithm

**BLOCK 2: Memory Management, File Management and Security****Unit 1: Memory Management**

- Overlays and Swapping
- Logical and Physical Address Space
- Single Process Monitor
- Contiguous Memory Methods
- Paging
  - Principles of operation
  - Page allocation
  - Hardware Support for Paging
  - Protection and Sharing
- Segmentation

- Principles of operation
- Address Translation
- Protection and Sharing

**Unit 2: Virtual Memory**

- Virtual Memory
  - Principles of operation
  - Virtual Memory management
  - Protection and sharing
- Demand paging
- Page Replacement policies
- Thrashing
  - Working Set Model
  - Page Fault Rate
- Demand Segmentation
- Combined Systems
  - Segmented paging
  - Paged segmentation

**Unit 3: I/O and File Management**

- Organization of the I/O function
- I/O Buffering
- Disk Organization
- Disk Scheduling
- RAID
- Disk Cache
- Command language user's view of File System
- The System programmer's view of the file System
- The Operating systems' view of file Management
  - Directories
  - Disk Space Management
  - Disk address translation
  - File related system services
  - Asynchronous Input / Output

**Unit 4: Security and Protection**

- Security Threats
- Security Policies and Mechanisms
- Authentication
  - Passwords
  - Alternative Forms of Authentication
- Protection in Computer Systems
- Security Models
  - Access-Control Matrix

- Mandatory Access Control
- Discretionary Access Control
- Rule-Based Access Control
- Role-Based Access Control
- The Take-grant Model
- Multilevel Models

**BLOCK 3: Advanced Topics and Case Studies**

**Unit 1: Multiprocessor Systems**

- Multiprocessor and Processor Coupling
- Multiprocessor Interconnections
  - Bus-Oriented Systems
  - Crossbar-Connected systems
  - Hypercubes
  - Multistage Switch-based systems
- Types of Multiprocessor Operating System
  - Separate Supervisors
  - Master/Slave
  - Symmetric
- Multiprocessor OS Functions and Requirements
- Multiprocessor Synchronization
  - Test and set
  - Compare and swap
  - Fetch and Add

**Unit 2: Distributed Operating Systems**

- History of Distributed Computing
- Distributed Systems
- Key features and Advantages of a Distributed System
- Design Goals of Distributed Systems
- Design Issues Involved in Distributed Systems
- Distributed System Structure
- Mutual Exclusion in Distributed Systems
- Remote Procedure Calls
- Other Middleware Technologies

**Unit 3: Case Study - UNIX**

**Unit 4: Case Study – WINDOWS 2000**

**MCS 042: Data Communication and Networks**

**3 Credits**

**Objectives**

The main objective of the course is to deal with fundamental issues of computer network. The course is designed around the TCP/IP Model. Some of the important topics discussed in the course are: Data Encoding Techniques, MAC Protocols, Routing Techniques, Transport Services, Mechanism and Network Security.

## Syllabus

### **BLOCK 1: Introduction to Data Communication and Computer Network Concepts**

#### **Unit 1: Introduction to Computer Networks**

- What is computer Network
- Network Goals / Motivation
- Application of Networks
- Point to Point or Switched Networks
  - Circuit Switched Networks
  - Packet-Switched Networks
- Broadcast Networks
  - Packet Radio Networks
  - Satellite Networks
  - Local Area Networks
- Network Protocols
- Networking Model
- Examples of Some Networks

#### **Unit 2: Data Transmission**

- Transmission Terminology
  - Simplex, Half duplex & full duplex spectrum and Bandwidth, frequency
- Serial & Parallel Communication
- Analog and Digital Data Transmission
- Bandwidth & Data Rate Throughout
- Transmission Impairments
  - Attenuation and Distortion
  - Delay Distortion
  - Noise
  - Concept of Delays
  - How to reduce delays
- Transmission Media and its Characteristics
  - Twisted Pair
  - IBM Cable
  - Coaxial Cable
  - Twin Axial Cable
  - Optical Fiber
  - Terrestrial Microwave
  - Satellite Microwave
- Wireless Transmission
  - Radio
  - Infra red
  - Wireless LAN

#### **Unit 3: Data Encoding & Communication Technique**

- Pulse Code Modulation (PCM)
- Amplitude Modulation
- Frequency and Phase Modulation

- Asynchronous Transmission
- Synchronous Transmission

#### **Unit 4: Multiplexing and Switching**

- Frequency Division Multiplexing
- Synchronous Time Division Multiplexing
- Statistical Time Division Multiplexing
- Modems
- Switching

### **BLOCK 2: Media Access Control and Data Link Layer**

#### **Unit 1: Data Link Layer Fundamentals**

- Framing
- Basics of Error Detection
- Forward Error Correction
- Cyclic Redundancy Check codes for Error Detection
- Flow Control

#### **Unit 2: Retransmission Strategies**

- Stop-&-Wait ARQ
- Go-Back-NARQ
- Selective Repeat ARQ
- Pipelining

#### **Unit 3: Contention-based Media Access Protocols**

- The advantages of Multiple-Access Sharing of Channel Resource
- Pure ALOHA
- Slotted ALOHA
- Carrier Sense Multiple Access (CSMA)
- CSMA with Collision Detection (CSMA/CD)

#### **Unit 4: Polling-based Media Access Control Protocols**

- Token Ring
- Token Bus

#### **Unit 5: Media Access Control Protocols for High Speed Networks**

- FDDI-I and FDDI-H
- DQDB with Bandwidth Balancing for Fair Access
- Asynchronous Transfer Mode (ATM)

### **BLOCK 3: Network Layer**

#### **Unit 1: Introduction to Layer Functionality and Design Issues**

- Connection Oriented Vs Connectionless Services
- Addressing
- Concept of Congestion
- Routing
- Network Layer in ATM Protocols
- Network Layer Design Issues

#### **Unit 2: Routing Algorithms**

- Shortest Path Routing
- Flooding
- Distance Vector Routing
- Link State Routing
- Hierarchical Routing
- Broadcast Routing
- Multicast Routing

#### **Unit 3: Congestion Control Algorithms**

- General Principles of Congestion Control
- Congestion Prevention Policies
- Congestion Control in Virtual Circuit Subnets
- Load Shedding
- Jitter Control

#### **Unit 4: Internetworking & Network Layer in the Internet**

- Tunneling
- Internetworking Routing
- Fragmentation
- IP Protocol
- IP Addresses
- Internet Control Protocols
- OSPF – The Interior Gateway Routing Protocol
- BGP – The Exterior Gateway Routing Protocol
- Internet Multicasting
- Mobile IP

- IPv6

### **BLOCK 4: Transport Layer and Application Layer Services**

#### **Unit 1: Transport Services and Mechanism**

- Type of Services
- Quality of Services
- Data Transfer
- Connection Management Transport Control Mechanism
- Addressing
- Multiplexing
- Flow Control and Buffering
- Connection Establishment
- Crash Recovery

#### **Unit 2: TCP/UDP**

- Introduction to UDP
- Remote procedure Call
- The Real-Time Transport Protocol
- Introduction to TCP
- TCP Service Model
- TCP Protocol
- TCP Segment Header
- TCP Connection Establishment
- TCP Connection Release
- Modeling TCP Connection Management
- TCP Transmission Policy
- TCP Congestion Control
- TCP Timer Management

#### **Unit 3: Network Security I**

- Cryptography
- Symmetric Key Algorithms
- Public Key Algorithms

#### **Unit 4: Network Security II**

- Digital Signatures
- Management of Public Keys
- Communication Security
- Web Security

### **MCS 043: Advanced Database Management Systems**

**4 Credits**

#### **Objectives**

This course will help the students to acquire the theoretical foundation of Database Management Systems. It includes concepts relating to various advanced database models, and concepts like database mining and warehousing. This course also describes in major details about the advanced concepts of relation database management systems. The course also provides sample database management system architecture. Thus, this is an advanced course, which will further develop the knowledge and skill acquired by the students at the basic level.

## Structure

### **BLOCK 1: Database Design and Implementation**

#### **Unit 1: Relational Database Design**

- Features of good database design
- Enhanced ER tools
  - Subclasses, Super class, and Inheritance
  - Specialization and Generalization
  - Constraints and Characteristics of Specialization and Generalization
- Converting EER diagram to tables
- Functional dependency theory and normalization
- Multi value dependency and 4NF
- Join Dependency and 5NF
- Inclusion Dependencies and Template Dependency
- PJNF/DKNF
- Modeling temporal data

#### **Unit 2: Database implementation and Tools**

- Information system and organization
- Data Design and Implementation in an Organization
- Use of UML and its support for database design specifications
- Representing specialization and generalization in UML Class diagram.
- UML based design tools
- Automated database design tools.

#### **Unit 3: Advanced SQL**

- Assertion and views
- Cursors, triggers and stored procedures
- Embedded SQL, dynamic SQL, SQLJ,
- Advanced Features of SQL
- Examples of above in Oracle

#### **Unit 4: Database System Catalog**

- Catalogs for relational DBMS
- System Catalog in Oracle
- Data dictionary and data repository system
- Catalog in Distributed database and object oriented database systems
- Role of system catalog in administration

### **BLOCK 2: DBMS Advanced Features and Distributed Database**

#### **Unit 1: Query Processing and Evaluation**

- Measures of Query Cost
  - Selection Operation,
  - Sorting
  - Join Operation
  - other Operations
- Evaluation of Expression
- Transformation of Relational Expressions
- Role of Relational Algebra and Relational Calculus in query optimisation
- Estimating Statistics of Expression
- Choice of Evaluation Plans
- Views and query processing
- Storage and query optimization

#### **Unit 2: Transaction Management and Recovery**

- Advanced feature of Transactions
- Enhanced Lock Based and timestamp based Protocols
- Multiple Granularity
- Multi-version Schemes
- Deadlock Handling
- Weak Levels of Consistency
- Concurrency in Index Structures
- Recovery and Atomicity
- Recovery with Concurrent Transaction
- Buffer Management
- Advanced Recovery Techniques
- Remote Backup Systems
- Use of SQL in recovery
- Examples of e-transactions

#### **Unit 3: Database Security and Authorization**

- Levels of database security
- Access control
- Multilevel security
- Statistical database security
- Audit trails in the databases
- Examples of e security

#### **Unit 4: Distributed Databases**

- Centralised versus non centralized Databases
- Homogeneous and Heterogeneous DDBMS and their comparison
- Functions and Architecture

- Distributed database design, query processing in DDBMS
- Distributed concurrency management, deadlock management
- Distributed Commit Protocols: 2 PC and 3 PC
- Concepts of replication servers

### **BLOCK 3: ENHANCED DATABASE MODELS**

#### **Unit 1: Object Oriented Database**

- Limitations of Relational databases
- The need of Object oriented databases
- Complex Data Types
- Structured Types and Inheritance in SQL
- Table Inheritance
- Data types (arrays, multi-set etc) and structure in Object oriented databases using SQL
- Object-Identity and Reference Types in SQL
- ODL and OQL
- Implementing O-R Features
- Persistent Programming Languages
- Object-Oriented versus Object-Relational
- An Example of Object oriented and object relational database implementation

#### **Unit 2: Database and XML**

- Structured Semi structure and unstructured data
- XML hierarchical tree data model
- Documents DTD and XML schema
- XML Documents & Database
- XML query and transformation
- Storage of XML data
- XML database applications

#### **Unit 3: Introduction to data warehousing**

- What is Data Warehousing, DSS and EIS?
- Characteristics and functioning and architecture of Data Warehousing
- Data marts
- Data warehousing Life Cycle
- Data modeling (Multidimensional Database) for data warehousing
- Building of data warehouse
- OLAP, MOLAP, ROLAP
- Data warehouse and views
- Future open issue for data warehouse

#### **Unit 4: Introduction to Data Mining**

- What is data mining Technology and its relationship to Data warehousing
- Association rules
- Classification
- Clustering
- Approaches to data mining problems
- Applications of Data mining problem
- Commercial tools of data mining
- Knowledge Discovery

### **BLOCK 4: Emerging Trends and Example DBMS Architectures**

#### **Unit 1: Emerging Database Models, Technologies and Applications I**

- Multimedia database
- Geography databases, Gnome databases
- Knowledge databases, deductive databases and semantic databases
- Spatial database
- Information visualization

#### **Unit 2: Emerging Database Models, Technologies and Applications II**

- Mobile databases
- Web databases (JDBC, ODBC)
- Personal databases
- Digital libraries
- Data grids
- Wireless networks and databases

#### **Unit 3: PostgreSQL**

- Important features and brief architecture
- User Interfaces
- SQL Variations and Extensions
- Transaction Management
- Storage and Indexing
- Query Processing and evaluation and optimization

#### **Unit 4: Oracle**

- Features and basic architecture
- Database Design and Querying Tools
- SQL Variations and Extensions
- Storage and Indexing
- Query Processing, evaluation and Optimization
- Concurrency Control and Recovery
- Distributed Oracle
- Database administration and other advanced tools

**Objectives**

The project work constitutes a major component in most of the professional programmes and it is to be carried out with due care and should be executed with seriousness by the students. The objective of the project is to motivate them to work in emerging / latest technologies, help the student to develop ability to apply theoretical and practical tools/techniques to solve real life problems related to industry, academic institutions and research laboratories, this project will help the student make ease and provides enough experience to carry out the larger project in the sixth semester. You will receive a block containing the guidelines for the mini project along with the list of project specifications, category-wise.

**MCSL-045 Lab (UNIX & DBMS)****2 Credits****MCS-051: Advanced Internet Technologies****3 Credits****Syllabus****Block 1: Servlet and JSP Programming****Unit 1: Introduction to Servlet**

- Servlet life Cycle
- HTTP Servlet Class
- Request Interface
- Response Interface
- Session Tracking (Cookies VRL)
- Database Connectivity from Servlet
- Interservlet Communication
- Handling Servlet
- Servlet Collaboration

**Unit 2: Database Connection**

- JDBC Drivers
- JDBC APIs
- JDBC Techniques
- Statements & its Types
- Record Sets
- Various Operations (Insertion, Deletion & updation)

**Unit 3: JSP-I**

- Overview of JSP
- Relation of Applets and Servlets with JSP
- Scripting Elements
- JSP Expressions
- JSP Scriptlets
- JSP Declarations
- Predefined Variables
- Creating Custom JSP Tag Libraries Using Nested Tags

**Unit 4: JSP-II**

- Structuring Generated Servlet in JSP Pages
- Including Files and Applets in JSP Documents
- Integrating Servlet and JSP

**Block 2: EJB and XML****Unit 1: Introduction to Beans**

- Types of Beans
- Session Beans
- Counting Beans
- Message Beans
- Context and Naming Convention

**Unit 2: Creating Beans**

- How to Create Beans
- Create Web Application
- Create Application Client

**Unit 3: Deploying Beans**

- Deploying J2EE Applications

**Unit 4: XML**

- Overview of XML
- Overview of SGML
- Differentiate Between SGML and XML
- XML Development Goal
- Structure of XML Document
- Using DTD
- XML Parser
- Using XML Introduction
- XML Entities

### **Block 3: Web Security and Case Study**

#### **Unit 1: Web Security Concepts**

- HTTP Authentication
- Compare and Contrast
- Application Types (BASIC, DIGEST, FORM and Client CERT)

#### **Unit 2: Security Implementation**

- Retrieving Authentication Information
- Security in Servlet
- Form Based Custom Authorisation
- Retrieving SSL Authentication

#### **Unit 3: Case Study**

## **MCS-052: Principles of Management and Information Systems**

**2 Credits**

### **Syllabus**

#### **Block 1: Management Systems**

##### **Unit 1: Organisational Overview**

- Organisation Types
  - Service, Business, Government, Social
  - Industry Types
- Organisational Structure
- Organisational Characteristics
  - Size
  - Location
  - Others
- Organisation functions
- Life cycle of organisation
- Vertical and horizontal organisations

##### **Unit 2: Management Functions and Business Processes**

- Overview of management Levels
- Business Processes
  - Sale and orders
  - Finance
  - Human resource
  - Production
  - Marketing
- Information systems requirements
- Requirement analysis
- Tools and methods for requirement analysis

##### **Unit 3: Management Systems**

- Management Systems Types
- Management Systems Requirements
- Levels of management activities
- Strategic level
- Management level
- Middle Management Level

#### **Unit 4: Business values of Information System**

- Impact of Information Systems
- Empirical studies
- Cost Value Performance
- Total cost of ownership
- Culture for Information Systems
- Decision management with Information Systems

#### **Block 2: Information Systems**

##### **Unit 5: Portfolio Management and IT applications**

- What is portfolio management
- Portfolio management methods
- Design and implementation of portfolio management
- Risk Management
- Disaster Management
- Portfolio management issues and challenges
- Tools and techniques
- Emerging technologies

##### **Unit 6: Enterprise Information Systems**

- Evolution of enterprise information Systems
- Enterprise Resource Planning
- Resource planning management
- ERP Market
- Supply Chain Management
- Customer Relationship Management
- E-CRM Systems
- Emerging technologies

##### **Unit 7: Intelligence Information Systems**

- Knowledge Management in organization

- Creating, developing & sharing Knowledge
- Artificial intelligence in business
- Business Analytics
- Business Intelligence
- Role of Business Intelligence
  - Sale and orders
  - Finance
  - Human resource
  - Marketing
- Business Intelligence Tools
- Business Intelligence reports

## Unit 8: Social, Ethical and Legal Aspects

- Society in information age
- Moral dimensions and information age
- Technology trends and ethical issues
- Ethical principal and dilemma
- Responsibility, accountability and liability
- Information right and acts

## MCS-053 Computer Graphics and Multimedia

4 Credits

### Syllabus

### BLOCK 1: Raster Graphics and Clipping

#### Unit 1: Introduction to Computer Graphics

- What is Computer Graphics?
- Application of Computer Graphics
  - Presentation Graphics
  - Painting and Drawing
  - Photo Editing
  - Scientific Visualization
  - Image Processing
  - Digital Art
  - Education, training,

#### Entertainment and CAD

- Simulation
- Animation and Games
- Graphics Hardware
- Input and Output Devices
  - Touch Panel
  - Light Pens
  - Graphic Tablets
  - Plotters
  - Film Recorders
- Display Devices
- Refreshing Display Devices
  - Raster-Scan
  - Random-Scan
- Plasma Panel and LCD panels

#### Unit 2: Graphics Primitives

- Points and Lines
- Line-drawing Algorithms
  - DDA Algorithm
  - Bresenham's line Algorithm
- Circle-generating Algorithm
  - Properties of Circles
  - Midpoint Circle of Algorithm

- Polygon Filling Algorithm: Scan-Line

#### Unit 3: 2-D Viewing and Clipping

- Point Clipping
- Line Clipping
  - Cohen-Sutherland Line Clippings
  - Cyrus-Beck Line Clipping Algorithm
- **Polygon Clipping: Sutherland Hodgman Algorithm**
- Windowing Transformation

### BLOCK 2: Transformations

#### Unit 4: 2-D and 3-D Transformations

- Basic Transformations
  - Translation
  - Rotation
  - Scaling
  - Shear
- **Composite Transformations**
  - Rotations about a point
  - Reflection about a line
- Homogeneous Coordinate Systems
- 3-D Transformations

#### Unit 5: Viewing Transformation

- Projections
  - Parallel Projection
  - Orthographic & Oblique Projections
  - Isometric Projections
- Perspective Projections

## **BLOCK 3: Modeling & Rendering**

### **Unit 6: Curves and Surfaces**

- Polygon Representation Methods
  - o Polygon Surfaces
  - o Polygon Tables
  - o Plane Equations
  - o Polygon Meshes
- Bezier Curves and Surfaces
  - o Bezier Curves
  - o Properties of Bezier Curves
  - o Bezier Surfaces
- Surface of Revolution

### **Unit 7: Visible – Surface Detection**

- Depth Buffer Method
- Scan-Line Method
- Area-Subdivision Method

### **Unit 8: Polygon Rendering and Ray Tracing Methods**

- Illumination Model
  - o Ambient Reflection
  - o Diffuse Reflection
  - o Specular Reflection
- Shading
  - o Gouraud Shading
  - o Phong Shading

- Ray Tracing
  - o Basic Ray-Tracing Algorithm

## **BLOCK 4: Multimedia and Animation**

### **Unit 9: Computer Animation**

- Basic of Animation
- Types of Animation
- Simulating Accelerations
- Computer Animation Tools
- Applications

### **Unit 10: Multimedia Concepts and Applications**

- Concepts of Hypertext/Hypermedia
- Multimedia Applications
  - o Education
  - o Video Conferencing
  - o Training
  - o Entertainment
  - o Electronic Encyclopedia
- Images
- Audio and Video
  - o Analog and Digital Sound and Video
  - o Mpeg, mpi, wav, etc.
- Multimedia Tools

**MCSSL-054 Lab (Advanced Internet Technologies and Computer Graphics)**

**2 Credits**

**MCSE-003 Artificial Intelligence and Knowledge Management**

**3 Credits**

## **Syllabus**

### **Block 1: Problem Solving & Search Techniques**

#### **Unit 1: Introduction**

- Concepts & definitions of AI
- Brief history of AI
- AI and related fields
- Problems
- Techniques
- Characteristics and underlying assumption of AI
- Turing test Uninformed searches
- Informed searches: generate and test
- Hill-climbing
- best-first search

#### **Unit 2: State Space Representation & Search Techniques**

- A\* algorithm
- Problem reduction
- Constraint satisfaction

#### **Unit 3: Game Playing**

- Overview of One & Two Player Game
- The Min-Max Search Procedure
- Alpha-Beta Cutoffs

### **Block 2: Knowledge Representation**

#### **Unit 1: Propositional & Predicate Logic**

- Syntax and semantics for propositional logic
- Syntax & semantics of First Order Predicate Logic (FOPL)
- Properties of well-formed formula (wff)

- Conversion to clausal form
- Inference rules
- The resolution principle
- Non-deductive inference methods

### **Unit 2: Structured Knowledge Representations**

- Production Rules
- Semantic Nets
- Frames
- Conceptual Dependencies and Scripts

### **Unit 3: AI Programming Languages**

- Introduction to LISP
- Syntax and Numeric Functions
- Basic List Manipulation Functions in LISP Functions
- Predicates and Conditionals
- Input, Output, and Local Variables
- Iteration and Recursion
- Property Lists and Arrays
- PROLOG: List, Operators, Arithmetic
- Cut & Fail
- Backtracking

### **Block 3: Handling Uncertainty**

#### **Unit 1: Handling Inconsistent and Incomplete Knowledge**

- Truth Maintenance Systems

### **MCSE-004 Numerical and Statistical Computing**

**3 Credits**

#### **Syllabus**

#### **Block-1 Numerical Computing-I**

##### **Unit 1 Floating Point Arithmetic and Errors**

- Floating Point Representation
- Sources of Errors
- Propagated Errors

##### **Unit 2 Solution of Non-Linear Equations**

- Bisection Method
- Regula-Falsi Method
- Secant Method
- Newton-Raphson Method
- Successive Iteration Method

- Reasoning Techniques
- Concept of Uncertainty
- Bayes' Theorem
- Certainty Factors and Rule-Based Systems
- Bayesian Networks
- Dempster-Shafter Theory

### **Unit 2: Fuzzy Logic**

- Fuzzy Sets
- Fuzzy Operators & Arithmetic
- Membership Functions
- Fuzzy Relations

### **Block 4: Applications of Artificial Intelligence**

#### **Unit 1: Expert Systems**

- Introduction and Concept of Planning
- Representing and Using Domain Knowledge
- Expert System Shells
- Knowledge Acquisition

#### **Unit 2: Intelligent Agents**

- Agents and environments
- Rationality and other performance measures
- Nature of environments
- Structure of agents

#### **Unit 3 Solution of Linear Algebraic Equations**

##### **Direct Method**

- Gauss Elimination Method (without and with Pivoting)
- LU-Decomposition Method

##### **Iterative Method**

- Jacobi Method
- Gauss Seidel Method
- Successive Over Relaxation Method

#### **Block-2 Numerical Computing-II**

## Unit 1 Interpolation

- Differences – Forward and Backward Differences
- Newton's – Forward and Backward Difference Formulas
- Lagrange's Interpolation

## Unit 2 Numerical Integration

- Newton – Cotes Formulas
- Composite Formulas
- Gaussian Quadrature

## Unit 3 Numerical Solution of ODE

- Euler's Method
- Runge Kutta Method

## Block-3 Statistical Computing

### Unit 1 Probability Distribution

- Discrete Distribution
- Binomial Distribution
- Poisson Distribution

## MCSE-011 Parallel Computing

3 Credits

### Syllabus

#### Block –I Elements of Parallel Computing and Architecture

##### Unit 1 Introduction to Parallel Computing

- Basic concepts about program/process/ thread concurrent Execution Parallel Execution, granularity, Potential of Parallelism
- Need of Parallel Computation
- Levels of parallel processing
- Parallel processing Vs. Parallel computing
- Dataflow Computing concept
- Applications of parallel processing
  - Scientific Applications / Image processing
  - Engineering Application
  - Database query / Answering applications
  - A I Applications
  - Mathematical simulations and modeling

##### Continuous Distribution

- Uniform Distribution
- Exponential Distribution
- Normal Distribution
- Chi-square Distribution

##### Unit 2 Pseudo Random Number Generation

- Uniform Distribution
  - Method of Generation (Discrete Case)
  - Inversion Method (Exponential Distribution)
  - Acceptance and Rejection

##### Unit 3 Regression

- Linear Regression Model
  - Least Square for Parameter Estimation
  - Goodness-of-Fit
  - Residual Analysis
- Non-Linear Regression

##### Unit 2 Classification of Parallel Computers

- Types of Classification
- Flynn's/ Handler classification
- UMA / NUMA /COMA
- Loosely coupled / tightly coupled
- Classification based grain size and Instruction level parallelism

##### Unit 3 Interconnection Network

- Need of Interconnection Network
- Concept Bandwidth Nod degree diameter bisection bandwidth, In degree and Out degree
- Static and Dynamic Interconnection network
- Omega, Parallel Shifter, Bens, permutation, hypercube, butterfly,
- Shuffle exchange Network

##### Unit 4 Parallel Computer Architecture

- Introduction to various computer architecture
- Pipeline processing
- Vector / Array processing
- VLIW and Super scalar architecture
- Associative architecture
  - Multithreaded architecture

- Programming based on message passing
- Programming based on data parallelism
- Programming for shared memory systems
- Example programs for parallel systems

## **Block 2 Parallel Algorithm & Parallel Programming**

### **Unit 1 Parallel Algorithm**

- Introduction to Parallel Algorithms
- Analysis of Parallel Algorithms
- Different models of computation
  - Combinational circuit
  - Permutation Circuit
  - Sorting circuit
  - Matrix computation

### **Unit –2 PRAM Algorithms**

- Message passage programming
  - Shared memory
  - Message passing libraries
  - Data Parallel programming
- Data Structures for parallel algorithms
  - Link list
  - Arrays pointers
  - Hypercube network

### **Unit 3 Parallel Programming**

- Introduction to Parallel Programming
- Types of parallel programming

## **Block –3 Advanced Topics**

### **Unit 1 Operating System for Parallel Computers**

- Basic issues of Operating Systems for Parallel Computers
- Process Management
- Resource Management
- Memory management
- I/O Management
- Inter-Processor Communication
- Vectorisation Compiler

### **Unit 2 Performance Evaluation**

- Introduction to performance evaluation
- Metric of Parallel overhead
- Law Speedup
- Measurement Tools

### **Unit 3 Recent Trends for Parallel Computer**

- Development of last 3 years
- Multicomponent CPU
- Apex architecture IA 64
- Hyperthreading

## **MCSP-060 Project**

**16 Credits**

The objective of the MCA project work is to develop quality software solution by following the software engineering principles and practices. During the development of the project the students should involve in all the stages of the software development life cycle like requirements engineering, systems analysis, systems design, software development, testing strategies and documentation with an overall emphasis on the development of reliable software systems. The primary emphasis of the project work is to understand and gain the knowledge of the principles of software engineering practices, so as to participate and manage a large software engineering projects in future.

Students are encouraged to spend at least six man-months working on a project preferably in a software industry or any research organization. Topics selected should be complex and large enough to justify as a MCA project. The courses studied by the students during the MCA programme provide them the comprehensive background to work on diverse application domains. Student will receive Project Guidelines

along with their 5<sup>th</sup> semester course material. Students should strictly follow and adhere to the MCSP-060 project guidelines.

#### 4.1 Syllabus for BCS-012

##### BCS-012 BASIC MATHEMATICS

The students who haven't studied Mathematics at 10+2 level or at graduation level are required to do BCS-012 in the first semester of MCA programme. You are advised to clear BCS-012 along with the first year of MCA. However, all students have to successfully complete the 1<sup>st</sup> and 2<sup>nd</sup> semester courses, as well as BCS-012 before reregistering for MCA 5<sup>th</sup> semester.

**No assignments need to be submitted for BCS-012.** Also, the University offers no counseling sessions for BCS-012 course. Students need to appear only for the Term End Examination for BCS-012. After completion of BCS-012, they would not get any certificate, however the marks will be reflected in the MCA grade card under the non-credit course column. This course (BCS-012) does not add to the credits of MCA programme and the marks won't be counted in the grand total.

Students need to secure **at least 40% marks in the Term end examination for BCS-012 to be declared as successful.** The syllabus is shown below:

##### BCS-012: Basic Mathematics

###### Block-1: Algebra 1

###### Unit-1: Determinants

Determinants of order 2 and 3, properties and evaluation of determinants. Area of triangles using determinants, cramer's rule.

###### Unit-2: Matrices -1

Definition, equality, addition and multiplication of matrices. Adjoint and inverse of a matrix. Solution of a system of linear equations – homogeneous and non-homogeneous.

###### Unit-3: Matrices -2

Elementary row operations; rank of a matrix, reduction to normal form, Inverse of a matrix using elementary row operations.

###### Unit-4: Mathematical Induction

Principle of mathematical induction

###### Block 2: Algebra 2

###### Unit 1: Sequence and Series

Definition of sequence and series; A.P, G.P, H.P and A.G.P.  $\sum n$ ,  $\sum n^2$  and  $\sum n^3$ , Idea of limit of a sequence.

###### Unit 2: Complex Number

Complex number in the form of  $a+ib$ . Addition, multiplication, division of complex numbers. Conjugate and modulus of complex numbers. De Moivre's Theorem.

###### Unit 3: Equations

Quadratic, cubic and biquadratic equations. Relationship between roots and co-efficient. Symmetric functions of roots.

###### Unit 4: Inequalities

Solution of linear and quadratic inequalities.

###### Block 3 Calculus (Without Trigonometry)

###### Unit 1: Differential Calculus

Concept of limit and continuity; differentiation of the sum, difference, product and quotient of two functions, chain rule. Differentiation of parametric functions. 2<sup>nd</sup> order derivatives.

###### Unit 2: Simple Application of Differential Calculus

Rate of change; monotonicity-increasing and decreasing; maxima and minima.

###### Unit 3: Integration

Integration as an anti-derivative. Integration by substitution and by parts.

###### Unit 4: Application of Integration

Finding area under a curve. Rectification.

###### Block 4 Vectors and Three-Dimensional Geometry

###### Unit 1: Vectors-1

Vectors and scalars, magnitude and direction of a vector. Direction cosines/ratio of vectors. Addition of two vectors. Multiplication of a vector by a scalar. Position vector of a point and section formula.

###### Unit 2: Vector-2

Scalar (Dot) product of vectors, Vector (Cross) product of vectors. Scalar triple product and vector triple product.

###### Unit 3: Three- Dimensional Geometry-1

Introduction, Distance formula. Direction cosines/ratio of a line passing through two points. Equations of a line in different forms; angle between two lines; Coplanar and skew lines. Distance between skew lines.

###### Unit 4: Linear Programming

Introduction, definition and related terminology such as constraints, objective function, optimization. Mathematical Formulation of LPP. Graphical method of

solving LPP in two variables. Feasible and inferring solution (up to three non-trivial constraints)

## 5. EVALUATION SCHEME

Completion of the programme requires successful completion of both assignment component and the Term-end Examination component for each of the course's in the programme. The total numbers of courses in this MCA programme are 31 and the total number of credits is 108.

Evaluation for each course covers two aspects:

- Continuous evaluation through Assignment with a weightage of 25% (please refer to the table below). *Viva-voce is compulsory for all the Assignments for which 20 marks are allocated.*
- Term-end examination with a weightage of 75% (please refer to the table below).

**Note:** A learner should not apply for appearing at the term-end examination of any course without getting registered for the same and that if s/he does so, her/his result would not be declared and the onus shall be on him.

### 5.1 Assignments and Term - End Examination

The main purpose of assignments is to test student's comprehension of learning the materials they receive from the University and also to help them get through the courses by providing feedback to them. The information given in the printed course materials should be sufficient for answering the assignments. However, as the Computer Science is ever enhancing area, the students should make an attempt and work with extra reading material easily available in the study centre / Regional Centre libraries or through websites for working on the assignments. This will enhance your learning capabilities. Mostly the assignments are designed in such a way as to help you concentrate mainly on the printed course material, exploit their personal experiences and apply the knowledge gained from various sources.

#### Assignments:

There will be **only one assignment for each course worth 100 marks (weightage of 25%)**. The set of all the assignments for each semester are given in one booklet that you will get along with your course material as well as the same will be uploaded on the IGNOU's website also.

Table shown below is the detailed marking scheme for the MCA courses.

Semester	Course Code	Course Title	Credits	Continuous Evaluation		Term End Examination		
				Assignment (Weightage – 25%)		Theory OR Practicals* ( for Lab courses only) (Weightage – 75%)		
				Max Marks	Min. Marks	Duration	Max. Marks	Min. Marks
I	MCS-011	Problem Solving and Programming	3	100	40	3	100	40
	MCS-012	Computer Organization and Assembly language Programming	4	100	40	3	100	40
	MCS-013	Discrete Mathematics	2	100	40	2	50	20
	MCS-014	Systems Analysis and Design	3	100	40	3	100	40
	MCS-015	Communication Skills	2	100	40	2	50	20
	MCSL-016	Internet Concepts and Web Design	2	100	40	2	50	20

	MCSL-017	C and Assembly Language Programming Lab	2	100	40	2	50	20
<b>II</b>	MCS-021	Data and File Structures	4	100	40	3	100	40
	MCS-022	Operating System Concepts and Networking Management	4	100	40	3	100	40
	MCS-023	Introduction to Database Management Systems	3	100	40	3	100	40
	MCS-024	Object Oriented Technologies and Java Programming	3	100	40	3	100	40
	MCSL-025	Lab (based on MCS-021, 022, 023 & 024)	4	100	40	3	100	40
<b>III</b>	MCS-031	Design and Analysis of Algorithms	4	100	40	3	100	40
	MCS-032	Object Oriented Analysis and Design	3	100	40	3	100	40
	MCS-033	Advanced Discrete Mathematics	2	100	40	2	50	20
	MCS-034	Software Engineering	3	100	40	3	100	40
	MCS-035	Accountancy and Financial Management	3	100	40	3	100	40
	MCSL-036	Lab(based on MCS-032, 034 and 035)	3	100	40	3	100	40
<b>IV</b>	MCS-041	Operating Systems	4	100	40	3	100	40
	MCS-042	Data Communication and Computer Networks	4	100	40	3	100	40
	MCS-043	Advanced Database Management Systems	4	100	40	3	100	40
	MCS-044	Mini Project	4	100	40		(50+25) ***	40
	MCSL-045	Lab(UNIX & Oracle)	2	100	40	2	50	20
<b>V</b>	MCS-051	Advanced Internet Technologies	3	100	40	3	100	40
	MCS-052	Principles of Management and Information Systems	2	100	40	2	50	20
	MCS-053	Computer Graphics and Multimedia	4	100	40	3	100	40
	MCSL-054	Lab( based on MCS-051 & 053)	2	100	40	2	50	20
	MCSE-003 MCSE-004 MCSE-011	Each Elective Course**	3 each	100	40	2	100	40
<b>VI</b>	MCSP-060	Project	16				(150 + 50)***	60 +20

\* No practical examinations in the non-lab courses. Practical examination will be conducted in the lab courses only. The letter 'L' in the course code represents the lab course. Pass in each and every section in the practical course of Term End Practical Examination is compulsory to in order to declare it successful in the respective course.

\*\* There will be 3 elective courses of 3 credits worth.

\*\*\* The Project consist of 2 components namely project report evaluation and viva. Viva-voce is compulsory and forms part of evaluation. A student in order to be declared successful in the project must secure 40% marks in each component (i) Project Evaluation and (ii) Viva-voce.

All the assignments and term-end exams will be scored on a **numerical marking scheme**. Any component that has not been attempted would be treated as having a score of zero marks. The requirement for passing would be at least **40% in continuous evaluation and 40% in the term-end examinations**, with an **overall average of 40% for a pass in the course**.

**The viva voce is compulsory for the assignment evaluation.** For any course, in case, if a student submitted the assignment and not attended the viva-voce, then the assignment is treated as **not successfully completed** and would be marked as **ZERO**.

**In order to be able to appear for the Term-end examination, it is a requirement that the student submit all the assignments according to the prescribed schedule. All students will be required to give an undertaking to this effect, and should it be later found that they had in fact not submitted the assignments as prescribed; the results for the Term-end examination will be treated as cancelled.**

*Viva-voce is compulsory for all the Assignments for which 20 marks are allocated.*

### Unfair means in attempting the assignments

If the learners copy the assignments, which is an important component of the ODL system, such assignments will be awarded “zero” and direct such students to re-attempt the fresh assignments pertaining to the next year which will indirectly delay the award of degree by a semester / year.

### Additional guidelines for Lab Course Assignments and TEE

The following are the evaluation guidelines for the lab courses.

#### (i) Evaluation of Assignments for Lab Courses

The assignments of lab courses consist of three parts:

- Continuous assessment of practical sessions (lab records) (total 40 marks),
- Assignment questions (total 40 marks)
- A combined comprehensive **viva-voce** worth 20 marks

The marks allotment details for various lab courses are shown in the following table:

<b>Course code</b>	<b>Continuous assessment of practical sessions lab records (40)</b>	<b>Assignment problems (40)</b>	<b>Combine d Viva (20)</b>	<b>Total marks (100)</b>
MCSL-016	40	40	20	100
MCSL-017	Section –1(20) Section –2(20)	Section –1(20) Section –2(20)	20	100
MCSL-025	Section –1(10) Section –2(10) Section –3(10) Section –4(10)	Section –1(10) Section –2(10) Section –3(10) Section –4(10)	20	100
MCSL-36	Section –1(13) Section –2(13) Section –3(14)	Section –1(13) Section –2(13) Section –3(14)	20	100
MCSL-45	Section –1(20) Section –2(20)	Section –1(20) Section –2(20)	20	100

It is to be noted that minimum passing marks are overall (lab records + problems + viva) **40% in each assignment.**

#### (ii) Evaluation of Term-end practical exam for Lab Courses

The term-end examination of these practical courses consists of several sections. Each section will be evaluated separately. The viva-voce for each section will also be separate. The following table shows the details:

(Practical questions –80 % and Viva-voce – 20 %)

Course Code	Duration of term-end practical exam. (Each section gets equal time)	TERM END PRACTICAL EXAMINATION AND VIVA-VOCE			
		Marks Section-1	Marks Section-2	Marks Section-3	Marks Section-4
MCSL-016 (2 credits)	2 hours	40(P) + 10 (V) = 50 marks	#	#	#
MCSL-017 (2 credits)	2 hours	20 (P) +5(V) = 25 marks	20(P) + 5(V) = 25 marks	#	#
MCSL-025 (4 credits)	3 hours	20(P) + 5(V) = 25 marks	20(P) + 5(V) = 25 marks	20(P) + 5(V) = 25 marks	20(P) + 5(V) =25 marks
MCSL-036 (3 credits)	3 hours	25 (P) + 5(V) = 30 marks	25(P) + 5(V) = 30 marks	30(P) + 10(V) = 40 marks	#
MCSL-045 (2 credits)	2 hours	20 (P) + 5(V) = 25 marks	20(P)+ 5(V) = 25 marks	#	#

P- problems given in the exam paper, V –Viva-voce for that section.

A student needs to obtain a minimum of 40% in **each section** of the term-end practical examination for successful completion of that particular section. In case a student does not secure the minimum passing marks in a section, s/he needs to appear for the term-end practical examination for **only** that section again.

## 5.2 Guidelines for MCS-044 (Mini Project)

The mini project is designed to help students develop practical ability and knowledge about practical tools/techniques in order to solve real life problems related to the industry, academic institutions and computer science research. The course Mini Project is one that involves practical work for understanding and solving problems in the field of computing. Every year, the list of problem definitions will change and will be sent as a separate booklet along with the course material / Assignments.

### (i) Project Proposal

Project proposal should be presented to, reviewed by and agreed upon in consultation with the project counselor to provide constructive feedback on the proposal and planned programme of the project work. No need of any formal approval to be taken on any proforma for MCS-044 project.

### (ii) Mini Project (MCS-044) Report

The project report of MCS-044 will contribute to the assessment and your marks. The format of this report will follow the format, guidelines and suggestions given in the block, but details should also be discussed with your counsellor. The final reports of students doing **the project in a group should not be identical. Each student should emphasise on his/her role and responsibilities in the project work.**

### (iii) Submission of the Project Report

One copy of the original MCS-044 project report is to be submitted to the Study Centre concerned. A photocopy of the same project report must be retained by the student and should carry with him/her at the time of the viva voce.

#### (iv) Evaluation Scheme of MCS-044

MCS-044 course has three main evaluation components consisting of assignment (25 marks), project report (50 marks) and viva-voce (25marks). **A student is required to score 40% marks in each of these components separately for successful completion of the course.**

The project will be assessed by a written report and a combined presentation and viva voce (viva voce). To help the students we have given some guidelines about evaluation and assessment in the next section. If, the examiner finds that the project is lacking in any key areas then, the student will be asked to re-submit the project by selecting a new topic in the next session.

#### (v) Resubmission of the project by the failed students

If the student fails in project report evaluation or viva-voce or in both, the students needs to redo the entire process by selecting a new problem from the list of problems which will be updated every year.

#### (vi) Assignment / Continuous Evaluation

25% of total marks are allotted to assignment/continuous evaluation. The assignment questions are given in the MCA 4<sup>th</sup> semester assignment booklet.

If the student failed only in assignment component and successfully passed in project report evaluation and viva-voce, s/he needs to submit the fresh assignment of the current year, as is done in the normal courses.

#### (vii) Final Evaluation

The Term End Practical Examination of Mini Project will be conducted at the study centre concerned. 75% of total marks are evaluated in the final evaluation. Out of these 75 marks, 50 marks are allotted for the project report evaluation and 25 marks are allotted for the viva voce.

### 5.3 Instructions for Assignments

While answering Assignments, the following guidelines are required to be followed:

#### 1. Tips for assignments

The word limits for answering most of the questions are mentioned with them if no word limit is prescribed, and then assume it to be about 300 words. You will find it useful to keep the following points in mind:

- (i) **Planning:** Read the assignment carefully. Go through the units on which they are based. Make some points regarding each question and rearrange these in logical order.
- (ii) **Organisation:** Be a little more selective and analytical before drawing up a rough outline of your answer. In an essay-type question give adequate attention to your introduction and conclusion. The introduction must offer brief interpretation of the question and how you propose to develop it. The conclusion must summarize your response to the question. Make sure that your answer:
  - (a) is logical and coherent;

- (b) has clear connection between sentences and paragraphs;
- (c) is written correctly giving adequate consideration to your expression, style and presentation;
- (d) does not exceed the number of words indicated (if any) in your questions.

(ii) **Presentation:** Once you are satisfied with your answers, you can write down the final version for submission, writing each answer neatly and underlining the points you want to emphasize.

2. The following format is to be followed for submission of the assignment:

The top of the first page of your response sheet for each assignment should look like this:

---

PROGRAMME TITLE : .....	ENROLMENT No. : .....
COURSE CODE : .....	NAME : .....
COURSE TITLE : .....	ADDRESS: .....
ASSIGNMENT CODE : .....	SIGNATURE : .....
STUDY CENTRE : .....	DATE : .....

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- 4. Read instructions for submission of assignments given here. The assignments response sheets should be hand written. However the s/w coding, snapshots, test cases etc. can be in the printed form. **Students should not reproduce their answers from the units sent to them by the University. If they reproduce from the units, they will get poor marks for the respective question.**
- 5. The students should write each assignment separately. All the assignments should not be written in continuity.
- 6. **The students should write the question number with each answer. Photocopy of the submitted assignment is to be retained by the student for his or her own record and future reference, if any.**
- 7. The students should use only A4 size paper for their response and tag all the pages carefully. Avoid using very thin paper. They should allow a 4-cm. margin on the left and at least 4 lines in between each answer. This may facilitate the evaluator to write useful comments on the margins at appropriate places.
- 8. **The students should not copy the assignments from others. If copying is noticed, the assignments of such students will be rejected, and disciplinary action will be taken against the students as per rules of the University.**
- 9. **The completed assignment response should be sent to the Coordinator of the Study Centre. Under no circumstances should they be sent to the (SR&E) Division or the School at Headquarters,** for evaluation. After submitting the assignment at the Study Centre in person, the students should get the acknowledgement from the Co-ordinator on the prescribed assignment-cum-acknowledgement card (**Form No. 1**) otherwise, the assignment response should be sent under certificate of posting through post. The students should get back evaluated assignments from their study centres within one month of its submission for the feedback and for their future guidance.
- 10. In case the student has requested for a change of Study Centre, s/he should submit her/his Assignments only to the original Study Centre until the University effects the change of Study Centre.

#### 5.4 Guidelines Regarding the Submission of Assignments

1. It is compulsory for the students to submit all the prescribed assignments. They will not be allowed to appear for the term-end examination of a course if they do not submit the specified number of assignments in time for that course.
2. Whenever the students receive a set of assignments, they should check them immediately and ask for missing pages, if any, from Registrar (MPDD), IGNOU, Maidan Garhi, New Delhi-110 068 or the Co-ordinator of the study centre or else download them from the website.
3. The assignment responses should be complete in all respects. Before submission, the students should ensure that they have answered all the questions in all assignments. Incomplete answer sheets bring poor grades.
4. The Coordinator of the Study Centre has the right to reject the assignments received after the due date. Therefore, the students are advised to submit their assignments before the due date.
5. Students should enclose a self-addressed stamped assignment remittance-cum-acknowledgement card (**Form No. 1**) with each assignment response to ensure the delivery of assignments before the last dates prescribed for submission of assignments.
6. In case any student fails to submit the assignments or fails to score minimum qualifying marks, s/he has to wait for fresh assignments meant for the current batch of students. The request for the new assignments in the prescribed form (**Form No. 2**) is to be addressed to the Registrar, MPDD, Indira Gandhi National Open University, Maidan Garhi, New Delhi-110068.
7. For their own record, students should retain a photocopy of all the assignment responses, which they submit to the Co-ordinator of their Study Centre. If they do not get back their duly evaluated ASSIGNMENT within a month after submission, they should try to get it from their Study Centre personally. This may help them to improve upon future assignments.
8. As per the University norms, once the student's scores pass marks in an assignment, they can not re-submit it for improvement of marks.
9. Assignments are not subject to re-evaluation except for factual errors, if any. The discrepancy noticed by the students in the evaluated assignments should be brought to the notice of the Co-ordinator of the Study Centre, so that he forwards the correct score to the SR&E Division at the Headquarters.
10. The students should not enclose or express doubts for clarification, if any, along with the assignments. They should send their doubts in a separate cover to the Registrar, SR&E Division, Indira Gandhi National Open University, Maidan Garhi, New Delhi - 110 068. While doing so they should give their complete Enrolment number, name, address, programme code.

**Note : Please submit your Assignments on or before the due date at your study centre.**

11. In case of not successfully completed or missed; the assignments should be demanded only, if your registration for that course is valid.
12. Assignments should not be demanded to improve your score if you have secured minimum qualifying score in a course.

13. Please do not submit your assignment responses twice either at the same Study Centre or at different Study Centres for evaluation.

### 5.5 General Guidelines Regarding the Term-End Examination

1. To be eligible to appear the Term-end Examination in any course, the students are required to fulfil the following conditions:
  - (a) they should have paid the fee due for that semester
  - (b) they should have opted and pursued the prescribed course
  - (c) they should have submitted the examination form in time along with the requisite fees.
  - (d) they should have submitted the required number of assignments within due dates before taking the examination
  - (e) their registration for the programme should be valid.
2. The University conducts term-end examinations twice a year, in June and December. The student can take the examination only after the minimum period prescribed for the course of study has elapsed.
3. Examination date schedule indicating the date and time of examination for each course is sent to all the study centres in advance. The same is also notified through IGNOU Newsletter from time to time and also will be displayed on the IGNOU's website also.
4. The examination form can be obtained from the concerned Regional Centre/Study Centre. Also the student can submit the on-line examination form. The fees and the guidelines are given below:

#### Guidelines and instructions for submission of online examination form

- i) Students are required to pay examination fee @**Rs.50/- per course** if the student is appearing for the first time or failed earlier examinations for theory as well as practical. **A late fee of Rs.100/- from 1st October to 20th October also needs to be included if submitted during this period.** Payment can be made through Credit Card, Cash deposit at any branch of AXIS Bank (UTI Bank) or through Demand Draft. Please choose the suitable option for payment.
- ii) No Examination Fee is required to be paid for the courses, where results of Term-end examination are awaited on the date of submission of examination form. Results of Term-end examination are available on University website [www.ignou.ac.in](http://www.ignou.ac.in). Please see result status before filling up the examination form.
- iii) Select and enter Programme code and Examination Centre Code from the options available. If the centre opted by the student is not activated as examination centre or not allotted for any other reason, alternative examination centre will be allotted.
- iv) Select courses carefully. Courses for theory as well as practical needs to be selected separately from the list appearing on the screen.
- v) If you wish to submit on-line form and make payment through Credit Card, please note the auto generated control No. for reference.
- vi) In case, you wish to submit on-line form and deposit payment by cash deposit at any of the AXIS (UTI) branches, please fill on-line examination form and submit after selecting this option. You are required to take [printout of challan](#) automatically generated and deposit required amount at AXIS Bank along with the challan. You need not send anything by post.

OR

In case, you wish to submit on-line form and make payment through a bank draft, please select this option. Please keep the bank draft particulars ready with you before starting to fill the form and enter same at the appropriate place and submit. Students can purchase Demand Draft from any branch of AXIS Bank (UTI Bank) without any commission charge. Please keep note of computer generated control number for your reference for any correspondence. You are required to send demand draft to Registrar, SRE Division, Block-12, IGNOU, Maidan Garhi, New Delhi- 110 068 by Registered Post or Speed Post. You must mention your Enrol. No., Programme Name, and Computer generated control No. on the back side of the Demand Draft. Demand Draft is to be drawn in favour of IGNOU and payable at New Delhi only.

- vii) You will receive an acknowledgement with control number at the E.mail address given in the application form
- viii) You may visit [SEARCH OPTION](#) after 24 hours of submission of your form (leaving the day of submission except Saturday & Sunday) to see the details of particulars submitted by you. In case you find the particulars are not available, you may submit the form again.
- ix) University issues hall-ticket to the students two weeks before commencement of Term-end Examination and also uploads the information on the University website. If you do not receive hall-ticket one week before commencement of examination, please download the hall-ticket from the website and report to the Examination Centre with your Identify Card issued by the University.
- x) Students will be allowed to appear in Term-end Examination for those courses only whose registration is valid and have completed the prescribed minimum duration of study.

## 5. Date of Submission of Examination Forms

The dates for submission of Examination forms for June and December Term-end Examinations are mentioned hereunder:

FOR JUNE TEE	LATE FEE	FOR DEC TEE	LATE FEE	SUBMISSION OF EXAM FORM
1 March to 31 March	NIL	1 September to 30 September	NIL	ONLY AT THE CONCERNED REGIONAL CENTRE UNDER WHICH YOUR EXAMINATION CENTRE FALLS
1 April to 20 April	300/-	1 October to 20 October	300/-	
21 April to 30 April	500/-	21 October to 31 October	500/-	
1 May to 15 May	1000/-	1 November to 15 November	1000/-	

6. Please see the instructions printed overleaf the examination form before filling it.
7. Students should carry their **Identity Card and intimation slip** (received from SR&E Division indicating Centre & Date of Examination) to the Examination Centre.
8. In case a student fails to receive the intimation slip 15 days before the commencement of the examination, they should get in touch with the Study Centre/Regional Centre/SR&E at Headquarters indicating their enrolment no., name, address and programme.
9. The students will be entitled to appear for the examination only at the study centre **OR** at the examination centre allotted to them and **NOT** at any other centre without specific permission from the University. The Examination Centre once opted for in a form shall not be changed.
10. All the Study Centres/Regional Centres concerned will get a copy of the term-end examination result and also you can download it from our website under the "Student Support" Option.
11. Although all efforts will be made to declare the results in time, there will be no binding on the University to declare the results of the last examination before the commencement of next examination. The students may, therefore, fill up the examination form without necessarily waiting for the result and get it cancelled at a later date, if so desired. In case the student gets result after filling up the exam form, s/he should not re-appear in the course qualified by her/ him with a view to improve the qualified score.
12. The students can get their Term-end Examination result reevaluated. They should apply in prescribed form (**Form No. 3**) and (**Form No.4**). Fee at the rate Rs.300/- for reevaluation is charged per course. This amount is refunded if there is a mistake in checking of answer-book.
13. Duplicate Grade Card/marks sheet will be issued on a request from the students in prescribed form (**Form No. 4**) against payment of Rs. 100/- by Demand Draft drawn on IGNOU, New Delhi. The duplicate grade card will be sent by Post to the student.
14. Students who fail to complete the minimum required number of course(s) prescribed for the Programme within the allotted period of study shall cease to be on the rolls of this University for that programme till they re-enroll themselves, if they wish to do so. For completing re-registration students are advised to get in touch with the Regional Director concerned.
15. **Early Declaration of Results**

In order to facilitate the students who have got offer of admission and or selected for employment etc and are required to produce marks-sheet/grade card by a specified given date may apply for early process of their answer-scripts and declaration of the results for this purpose. The students are required to apply in the specified format available on the University website (also enclosed **Form No.11**) with a fee of Rs.500/- per course through Bank Draft drawn in favour of IGNOU along with the attested photocopy of the offer of admission/employment offer. The students can submit their requests for early declaration before the commencement of the Term-end Examination i.e., before 1<sup>st</sup> June and 1<sup>st</sup> December respectively. The University in such cases will make arrangements for processing the answer-scripts and declare the results as a special case.

16 **Re-evaluation of Answer-script(s)**

The University has replaced the scheme of rechecking with the re-evaluation where by the answer-scripts will be re-evaluated by another Evaluator in case the students are not satisfied with the marks/grades secured by them in Term-end Examination. Such students can apply for re-evaluation within one month from the date declaration i.e. the date on

which the results are made available on the University Website on payment of Rs.300/- per course in the prescribed application form available on the University Website.

The better of the two courses or original marks/grades and re-evaluated marks/grades will be considered and the revised marks/grades shall be incorporated in the students' record as applicable and the revised grade card/marks sheet will be sent to the students within one month from the receipt of application. Re-evaluation is not permissible for Projects, Practical, Assignments and Seminars etc.

#### **17 Improvement of Division/Class**

Keeping the interest of students who have completed their Bachelors Degree and Masters Degree Programmes, but falling short of 2% marks for securing 1<sup>st</sup> Division/2<sup>nd</sup> Division the university has made a provision for allowing such students to improve their performance. The improvement is permissible only in theory papers and the students may apply for improvement of their performance on the prescribed application format along with a fee of Rs.300/- per course through a Bank Draft drawn in favour of IGNOU payable at Delhi and submit the application and fee to the Registrar, SRE Division, IGNOU, Maidan Garhi, New Delhi.

The improvement is not permitted to those students who have completed their maximum duration of the programme including the re-admission period has expired. The students will be given only one opportunity to improve the marks/grades and they can apply for improvement a maximum of 25% of the credits for successful completion of the respective programme. However, the sealing for the number of courses in which the student can improve is five courses. The better of the two examinations i.e., marks already awarded and the marks secured in the improvement examination will be considered.

#### **18 Photocopy of the Evaluated Answer Scripts for the Term End Examination**

In order to ensure greater transparency in the evaluation, photocopy of the evaluated answer scripts for the Term End Examination shall be provided to the students who apply (**Form No 9**) for the same. The following rules shall be applicable for this scheme:

- 1) Photocopy of the answer scripts shall be provided to the students from December, 2008 Term End Examination (TEE), onwards.
- 2) The fee for photocopy of the answer script shall be Rs. 100/- (Rupees One Hundred only) which may be changed from time to time. Fee shall be paid in the form of a Demand Draft drawn in favour of IGNOU and payable at New Delhi.
- 3) Application form without self attested photocopy of the IGNOU Identity Card of the student will not be entertained.
- 4) Students desiring to apply for photocopy shall submit their application in the prescribed Proforma (copy attached).
- 5) Student's application for photocopy of the answer scripts shall reach the Registrar, Student Evaluation Division (SED) along with the prescribed fee within 45 days from the date of declaration of results. The date of receipt of application in Student Evaluation Division (SED) for June Term End Examination shall be 15 October and for December TEE shall be 15 April or within 45 days from the date of declaration of the result on the University Website whichever is later.

- 6) Registrar, SED shall send the photocopy of the answer scripts to the student within 15 days from the date of receipt of request. While doing so, particulars and signature of evaluator shall not be disclosed.
- 7) The last date for submission of application for the re-evaluation shall remain unchanged i.e. 30 days from the date of declaration of results.
- 8) The students who intend to apply for photocopy of the answer scripts should simultaneously apply for re-evaluation, if they so desire. The last date for submission of application for re-evaluation will not be extended to facilitate students to point out discrepancy in the evaluation.
- 9) Students, who find that any portion of the answer was not evaluated or any totaling error is noticed, may point out the same and submit their representation to Registrar (SED) along with a copy of the answer scripts supplied to them within 15 days. No other query regarding evaluation of answer script shall be entertained.

## **19 Issue of Transcript**

The students may also obtain 'Official Transcript' for submission to the overseas or Indian Institutes/ Universities on request. They may apply in the prescribed form (**Form No.12**) by paying the requisite fee as under by means of demand draft in favour of 'IGNOU' and payable at 'New Delhi':

1. Rs.200/- per transcript, if it is to be sent to the student/institute in India.
2. Rs.400/- per transcript, if required to be sent to the Institute out side India by the University.

A sample prescribed application form with rules and regulations in detail for this purpose is given in the students hand book & prospectus and also made available at Univeristy's website [www.ignou.ac.in](http://www.ignou.ac.in).

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## **6. OTHER USEFUL INFORMATION**

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### **6.1 Reservation of Seats**

The University provides reservation of seats for Scheduled Castes, Scheduled Tribes and Physically Handicapped students as per the Government of India rules.

### **6.2 Scholarships and Reimbursement of Fee**

Reserved Categories, viz., Scheduled Castes, Scheduled Tribes and Physically Handicapped students etc. have to pay the fee at the time of admission to the University along with other students. Physically Handicapped students admitted to IGNOU are eligible for Government of India scholarships. They are advised to collect scholarship forms from the respective State Government Directorate of Social Welfare or Office of the Social Welfare Officer and submit the filled-in forms to them **through the Regional Director of IGNOU concerned.**

Similarly, SC/ST students have to submit their scholarship forms to the respective State Directorate of Social Welfare or Office of the Social Welfare Officer, **through the Regional Director of IGNOU concerned for suitable reimbursement.**

### **6.3 Change / Correction of Address**

There is a proforma (**Form No. 6**) for change / correction of address available in this programme guide. This form duly filled in is to be submitted to the **Regional Director**

**concerned.** Students are advised not to write letters to any other officer in the University in this regard. Normally, it takes 4-6 weeks to effect the change. Therefore, the students are advised to make their own arrangements to redirect the mail to the changed address during this period.

#### 6.4 Change of Regional Centre and Study Centre

Counselling facilities are not available for all the programmes at all the study centres. As such, students are advised to make sure that counselling facilities are available, for the subject s/he has chosen, at the new centre opted for. Request for change of Study Centre is acceded to subject to availability of seats for the programme at the new centre asked for only on compelling grounds. Students are required to get a NOC from the Regional center where they are willing to get themselves transferred in view of the practical sessions involved in MCA.

When a student wants transfer from one region to another, s/he has to write to that effect to the Regional Centre from where s/he is seeking a transfer marking copies to the Regional Centre where s/he would like to be transferred to and also to Registrar (SR & E), IGNOU, Maidan Garhi, New Delhi-110 068. Further, s/he has to obtain a certificate from the Co-ordinator of the Study Centre from where s/he is seeking transfer from, regarding the number of assignments submitted. The Regional Director from where the student is seeking the transfer will transfer all records including details of fee payment to the Regional Centre where the student is going, under intimation to the Registrar (SR & E) and the student. The transfer will be permitted only if seats are available at the new Study Centre.

#### 6.5 Disputes on Admission and other University Matters

In case of any dispute, the place of jurisdiction for filing of a suit/plaint/petition will be only at New Delhi / Delhi.

## 7. SOME USEFUL ADDRESSES

For your information, the following officers deal with different educational aspects:

(i) Student Registration Related issues	Registrar (SRD) Indira Gandhi National Open University , Maidan Garhi New Delhi -110068, 011-29532741 (SRD), 1302/1316 (SRD), Email: <a href="mailto:sre@ignou.ac.in">sre@ignou.ac.in</a>
(ii) Exam Centres, Results, Rechecking of answer scripts, Discrepancies in Result, marks update etc.	Registrar (SED), Indira Gandhi National Open University , Maidan Garhi New Delhi -110068, Phone No: 011-29535828/2482 (SED), Intercom No. 2204/2205(SED), FAX No.011-29534429
(iii) Study aterial and Assignments, Admission , Fees, Scholarship,Change of Addres/Study Centre/Regional Centre,Change of Course/Programme,Issue of Bonafide Certificate,Migration Certificate,Duplicate identity card	Regional Director of the Regional Centre concerned.
(iv) Academic Matters	MCA Programme Coordinator SOCIS, C-Block, New Academic Complex IGNOU, Maidan Garhi New Delhi - 110 068 Phone: 011-29533436 and Fax no.011-29534542, Email: <a href="mailto:bca@ignou.ac.in">bca@ignou.ac.in</a>

(v) Administrative and counselling matters missing score of TMAs/Project assignments/Practical assignments, Assessment Sheets	Co-coordinator of your Study Centre/Regional Director of the Regional Centre concerned
(vi) Issue of Degree/ Diploma/ Certificate, Dispatch of returned Degrees, Verification of Degree	Dy. Registrar (Exam-I) Examination -I Phone No.011-29535438 Intercom No.2224/2213
(vii) Issue of Provisional Certificates and Grade Cards	Dy Registrar (Exam-III) Examination -II Phone No: 011-29536743 Intercom No. 2202
(viii) Issue of duplicate hall tickets, Addition and deletion of course(s) in the hall ticket, non receipt of hall tickets for term end examination, change of examination centre, etc.	Asstt. Registrar (Exam-II) Phone No: 011-29536743 Intercom No. 2202 E-mail: <a href="mailto:seemagoswami@ignou.ac.in">seemagoswami@ignou.ac.in</a>
(ix) Declaration of pending results of TEE, incorporation of practical marks, Verification of provisional certificate and grade card, Issue of transcripts	Dy. Registrar (Exam-III) Phone No: 011-29536103/6743 Intercom No. 2201/2211 E-mail: <a href="mailto:kramesh@ignou.ac.in">kramesh@ignou.ac.in</a>
(x) Non incorporation of assignment marks	Assistant Registrar (Assignment) Phone No: 011-29532294 Intercom No. 1312/1319/1325 E-mail: <a href="mailto:assignments@ignou.ac.in">assignments@ignou.ac.in</a>
(xi) Online students grievances Cell	Phone No: 011-29532294 Intercom No. 1313 E-mail: <a href="mailto:sregrievance@ignou.ac.in">sregrievance@ignou.ac.in</a>
(xii) Students' General Enquiries	Front Office (May I help you), SED/SRD Phone No: 011-29535924-32 Intercom No. 2218

Telephone numbers of the Divisions/ Schools are also provided on the website under the “Contact Us” option. Students are advised to be in touch with their Study Centres for advance / timely / day-to-day information or visit the website with URL [www.ignou.ac.in](http://www.ignou.ac.in)

## 8. MODEL QUESTION PAPERS

For your reference, model question papers for first two semesters are given below. If you want to download the previous year's question papers, download them from the option “For Students” then select “download” and select the “question papers” on the home page of University's website with the URL [www.ignou.ac.in](http://www.ignou.ac.in).

# MCA FIRST SEMESTER MODEL QUESTION PAPERS

**MCA**  
**Term-End Examination**  
**June, 2005**  
**MCS-011: PROBLEM SOLVING AND**  
**PROGRAMMING**

Time: 3 hours  
100

Maximum Marks:  
(Weightage 75%)

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**Note:** Question no. 1 is **compulsory**. Answer any three from the rest.

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1. (a) Write an algorithm and draw a corresponding flowchart to find the greatest number and its position among the 6 given numbers. 10  
(b) Write a program in C language to add, subtract, multiply and divide two complex numbers. (Use a Switch statement to select the operation) 10  
(c) Design an algorithm, draw a corresponding flowchart and write a program in C to reverse a given string and find whether it is a palindrome or not. 10  
(d) Write a program in C, to multiply two matrices. 10
2. (a) Write the steps involved in the top-down design process with the help of a diagram. 10  
(b) Write a program in C (using files) to open the “file1”, read the content and copy the same into “file2”. 10
3. (a) Mention any three advantages of use of pointers over arrays. Also, write a program (using pointers) to insert and delete an element in an ordered list. 10  
(b) Write a program to do the following without the use of any string functions like strcat and strlen:  
10
  - (i) Concatenate two strings
  - (ii) To find the length of any given string
4. (a) What is a preprocessor directive? Write the syntax for the following preprocessor conditional statements:  
10 (i) #if def (ii) #if n def  
(iii) #else (iv) #program  
Also, mention an example for each.  
(b) Design an algorithm and draw corresponding flowchart to convert a decimal number to its binary equivalent. 10
5. (a) Mention the rules for using the Big-O Notation. 05

- (b) What is a variable? What are the rules to be followed to name a variable in “C” ?  
Write the syntax to declare the variables. Also, mention how to initialize a character variable with the help of an example. 06
- (c) Write a program to sort the given list of 10 numbers in ascending order. 09

**MCA**  
**Term-End Examination**  
**June, 2005**

**MCS-012: COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE PROGRAMMING**

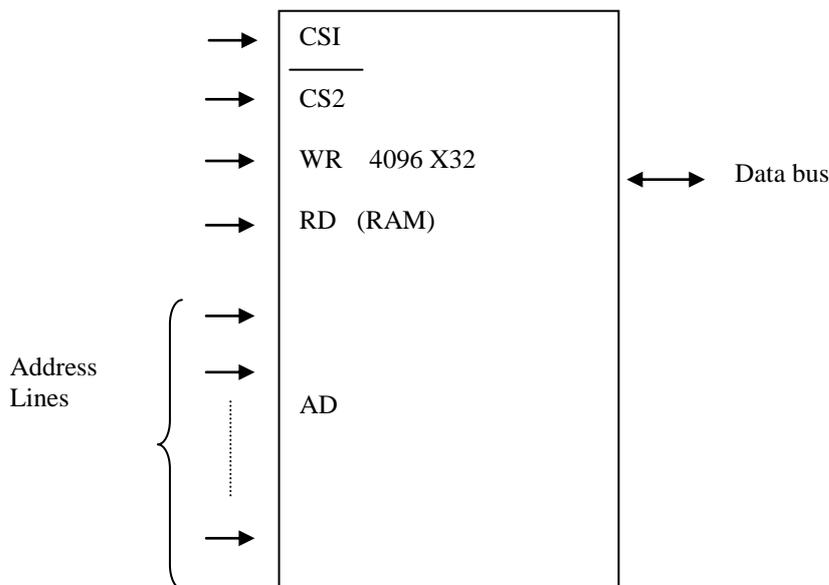
Time: 3 hours  
100

Maximum Marks:  
(Weightage 75%)

**Note:** Questions number 1 is **compulsory** and carries 40 marks. Answer any three questions from the rest.

1. (a) Simplify the following Boolean function in SOP form using K-map:  
 $F(A, B, C, D) = (0, 2, 4, 6, 8, 9, 10, 11, 12, 14)$  5

- (b) A memory chip (RAM) is shown below:



Give the answer of the following questions: 10

- (i) How many address lines are there in this chip?  
 (ii) How many data lines are there in this chip?  
 (iii) What is the word size of RAM chip?  
 (iv) What is the capacity of RAM chip in bytes?
- (c) An instruction is stored at location 300 with its address field at location 301. The address field has the value 400. A processor register R1 contains the number 200. Evaluate the effective address if the addressing mode of the instruction is:

- (i) Direct 6  
 (ii) Register Indirect  
 (iii) Relative  
 (iv) Index with R1 as index register

- (d) Find the range of a number for the following floating point representation: 5  
 Base is 2  
 Exponent - 8 bits, bias of 8 is used  
 Sign bit = 1

Significant = 23 bits

Assume the normalized mantissa representation

- (e) Starting from the initial value of  $R = 11011101$ , determine the sequence of binary values in  $R$  after a logic shift-left, followed by a circular shift-right, following by a logical shift-right and a circular shift-left. 4
- (f) What is a micro-instruction? Do we need all  $2^N$  combinations of control Signals for  $N$ -bit micro-instruction? If no, then specify the reasons. Also, differentiate between uuencoded and highly encoded micro-instruction. 10
2. (a) What is master-slave flip flop? Construct a master-slave flip flop using D flip flop and explain its working. 5
- (b) What is RAID? List three features of RAID level 2. In Raid technology, what are the important performance considerations? Explain briefly. 5
- (c) Give two reasons why a RISC processor is better than a CISC processor. 5
- (d) What is the purpose of queue in the bus interface unit of 8086 micro-processor? Find out the physical addresses for the following segment register: offset. 5
- (i)  $SS : SP = 0100h : 0020h$
- (ii)  $DS : BX = 0200h : 0100h$
- (iii)  $CS : IP = 4200h : 0123h$
3. (a) Explain content addressable memory with the help of block diagram. 5
- (a) Show how the division of floating point numbers is done with the help of an example. 5
- (b) Briefly explain the working of two-pass assembler. 5
- (c) What is the difference between hand-wired control and micro-program control? What are the advantages and disadvantages of each method? 5
4. (a) Draw the state table and logic circuit for a 2-bit binary counter using D flip-flop. 5
- (b) Give the difference between memory mapped I/O and isolated I/O. 5
- (c) What is interrupt? Briefly explain the four-interrupt conditions. 5
- (d) Write an assembly program for adding two five-byte numbers using arrays. 5
5. (a) How can the subtraction operation on binary numbers be achieved by the sequence of addition operation? Draw block diagram and then explain. 5
- (b) Explain the use of the following: 5
- (i) Set-associative memory
- (ii) SD RAM
- (c) What is a register? Explain the need of registers in the instruction execution. 5
- (d) What is instruction pipelining? Explain the working of instruction pipelining in a RISC system. 5

**MCA**  
**Term- End Examination**  
**June, 2005**  
**MCS-013: DISCRETE MATHEMATICS**

Time: 2 hours

Maximum Marks: 50

**Note :** *There are five questions in this paper. Questions number 1 is **compulsory**. Attempt any three questions from the rest.*

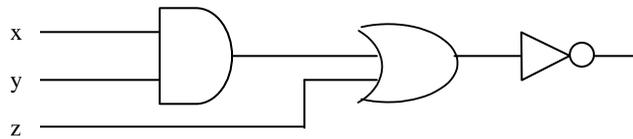
1. (a) What is a conditional proposition? Give the truth table of such a statement. Further, give one example each of a conditional statement and a statement which is not conditional.

4

- (b) Using mathematical induction, show that  $2n < n!$  for  $n \geq 4$ .

4

- (c) Find the Boolean expression, corresponding to the following circuit:



Also obtain the CNF of this expression.

4

- (d) What is a Cartesian product? Give the geometric representation of the Cartesian product of A and B, where  $A = \{2, 3, 4\}$  and  $B = \{1, 4\}$ .

4

- (e) Give all partitions of 6 and find  $P_6^3$ .

4

2. (a) Out of a set of 7 men and 6 women, a high level committee of four persons is to be formed

consisting of one President, two Vice Presidents and one Secretary. In how many ways can this committee be formed in each of the following situations?

- (i) At least one Vice President should be a woman.  
(ii) Only one out of the President and the Secretary should be a man.  
(iii) The president should be a woman.

5

- (b) Explain the difference between a pair of mutually exclusive events and a pair of independent events. Your explanation should include an example of each kind.

5

3. (a) For any two propositions p and q show that

2

$$\sim (p \vee q) \equiv \sim p \wedge \sim q$$

- (b) Which of the following statements are true? Give reasons for your answer.

(i)  $\{0, \phi, \text{IGNOU}\}$  is a set.  
8

(ii)  $P(m + n, r) = P(m, r) + P(n, r)$  for  $m, n, r \in \mathbf{N}$ .

(iii) The Pigeon-hole principle states that  $r + 1$  objects can be placed in  $r$  boxes only.

(iv) The contrapositive of the statement “if Manju is unwell, she will not go to school”, is “if Manju is well then she will go to school”.

4. (a) Prove or disprove that  $\sqrt{11}$  is rational.

5

(b) What is duality principle? Find the dual of

(i)  $\sim (x \wedge y) \vee z$ ;  
5

(ii)  $(x \vee y) \wedge (x \vee z)$ .

5. (a) Make a logic circuit of elementary gates corresponding to the Boolean expression:  
 $(x \vee y \wedge z)' \wedge (r \vee z) \vee x$

3

(f) If there are 5 men and 4 women, how many circular arrangements are possible in which women don't sit adjacent to each other?

2

(g) In how many ways can 15 students of MCA and 10 students of BCA be grouped into 4 groups?

5

**MCA**  
**Term- End Examination**  
**June, 2005**  
**MCS-014: SYSTEM ANALYSIS AND DESIGN**

Time: 3 hours  
100

Maximum Marks:  
(Weightage 75%)

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**Note:** Questions number 1 is **compulsory**. Answer any three questions from the rest.

---

1. (a) Explain the role of System Analyst. Also mention what kind of qualities s(he) should possess.  
10
- (b) Explain the two different types of finding the requirements of a system.  
10
- (c) Explain the process of designing the forms and reports.  
10
- (d) Explain at least five types of System testing.  
10
  
2. (a) Define *Modularity*. Write at least goals of a good design. Also, write at least four guidelines for achieving the goals mentioned.  
10
- (b) Define the term *Record*. Write at least five activities that will enable the queries to run faster. Explain the process of Denormalisation of Tables.  
10
  
3. (a) Write the formula for the computation of Degree of Security. Explain the Information Security architecture with the help of a figure.  
10
- (b) Define an Expert system. Mention its characteristics. With the help of an example of expert system, explain various components of it.  
10
  
4. (a) Explain the five types of coupling with an example for each.  
10
- (b) Define SRS. Explain the seven characteristics of SRS.  
10
  
5. (a) Explain the five steps of Database Design with the help of a figure.  
10
- (b) Explain at least four concurrent audit techniques.  
10

**MCA**  
**Term-End Examination**  
**June, 2005**

**MCS-015: COMMUNICATION SKILLS**

*Time: 2 hours*  
*Marks: 50*

*Maximum*

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**Note:** Answer **all** questions

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1. Read the following passage and answer the questions given after it:

If your desk is piled high with letters, faxes, forms, memos, reports, print-outs and sticky-backed message slips, you might believe all this paperwork is a sign of how busy you are. But according to Declan Treacy, cluttered desks lead to lost information, distractions, missed opportunities, high stress and not a little procrastination. He founded and runs the Clear Your Desk Organisation and organizes the annual International Clear Your Desk Day which this year is being held on April 24.

His argument for uncluttered desks are strong. "We pile between 300 and 500 pieces of paper on the desk at any time, a load equivalent to a 40-hour backlog of work. With 45 minutes a day wasted on frustrating searches for lost paperwork on and around the desk, it is unfortunate that the cluttered desk is the accepted norm in most organizations," he says. Treacy holds seminars to help companies organize their own Clear Your Desk days, when everyone from the senior managers to secretaries learn how to tackle paperwork more effectively.

What you shouldn't do is add to the pile of paper that's already there, says Treacy: "Eighty per cent of all paperwork is eventually discarded, but it causes an awful lot of trouble before that happens. Unfortunately, most executives believe the myth that an empty desk is the sign of an unproductive mind. How wrong can you be? Companies cannot afford to let people work from cluttered desks. Hours of valuable time are wasted in searching for vital pieces of paper, and in being distracted by the constant stream of faxes, memos and reports which land in our in-trays when we should be devoting time to more important work."

- (i) A desk which is piled high with letters, reports, sticky-backed messages, etc. indicates how busy one is. Do you agree or disagree with this statement? Give reasons from the passage.  
4

- (ii) In most businesses a/an \_\_\_\_\_ desk is considered perfectly acceptable.  
1

- (a) cluttered
- (b) untidy
- (c) tidy
- (d) clean

**(Select the right choice)**

- (iii) How does paperwork cause loss of time?  
2

(iv) What is the fate of most paperwork?

1

(v) International Clear Your Desk Day is held every \_\_\_\_\_

1

(vi) Give a suitable title to the passage.

1

**2.** Choose the word or phrase that best completes each sentence, from the options following each:

5

(i) There has been a \_\_\_\_\_ in the sales of new houses since home loans are more difficult to obtain.

- (a) dive
- (b) slump
- (c) downfall
- (d) crash

(ii) We can expect to treble our turnover once the July sales get into full \_\_\_\_\_ .

- (a) force
- (b) flight
- (c) speed
- (d) swing

(iii) The government has spent Rs.1Crore on an advertising \_\_\_\_\_ to encourage energy conservation.

- (a) campaign
- (b) promotion
- (c) operation
- (d) enterprise

(iv) I advise you to take \_\_\_\_\_ to ensure that all your property is adequately covered by insurance.

- (a) means
- (b) actions
- (c) steps
- (d) dealings

(v) Have you thought what the \_\_\_\_\_ might be if you don't win your case in court?

- (a) applications
- (b) bearings
- (c) implications
- (d) connotations

**3.** Complete the customer's part in the following dialogue:

10

*Shopkeeper* : Good morning, Madam, may I help you?

*Customer* : \_\_\_\_\_ .

*Shopkeeper* : I see, well, what exactly is the problem?

*Customer* : \_\_\_\_\_ .

*Shopkeeper* : Well, how long ago did you buy it?

*Customer* : \_\_\_\_\_ .

*Shopkeeper* : Could you let me see your receipt, please?

*Customer* : \_\_\_\_\_ .

*Shopkeeper* : Well I'm afraid you'll have to produce it.

*Customer* : \_\_\_\_\_ .

4. Change the voice in the following sentences from active to passive, mentioning the agent only if necessary.

10

- (i) He spends money for his children every month.
- (ii) They inspect the factory every week.
- (iii) The security man checks every visitor at the gate.
- (iv) Droughts upset the economy of the country.
- (v) She looked after the children well.
- (vi) They are demolishing unauthorized buildings.
- (vii) Will they declare Friday a holiday?
- (viii) He has completed his assignments.
- (ix) They are doing good work.
- (x) Thieves broke into the house.

5. (a) You use 3,000 cellophane boxes a month and you need to order some more from your supplier. You can buy enough boxes for several months at once if she/he gives you a large enough discount. Find out what she/he is offering and attempt to negotiate a deal in a letter of about 200 words.

10

- (b) Suppose you are applying for the job of a software engineer. Prepare your curriculum vitae.

5

**MCA**  
**Term-End Practical Examination**  
**June, 2005**

**MCSL-016: INTERNET CONCEPTS AND WEB DESIGN**

**Time allowed: 2 hours**

**Maximum Marks: 50**

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**Note:** *There are two questions in this paper carrying 20 marks each 10 marks are for viva-voce.*

---

1. Write an HTML code to develop a web page having two frames that divide the web page into two equal rows and then divide the first row into two equal columns. Fill each frame with a different background colour. Also create a button in the first column of the first frame and two text boxes in the second and third columns. After clicking the button, texts should be displayed in the second frame (second row).

20

2. Create a form in HTML containing the following fields and then perform the validation of each field using JavaScript.

20

Name	:	textbox
Address	:	textbox
Date of birth	:	a combo box (one for each day, month and year)
e-mail	:	textbox

**MCA**  
**Term-End Practical Examination**  
**June, 2005**

**MCSL-017: C AND ASSEMBLY LANGUAGE PROGRAMMING**

**Time allowed: 2 hours**  
**50**

**Maximum Marks:**

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**Note:** *There are two parts (C Programming and Assembly Language Programming) in this paper. Each part is for 1-hour duration. Attempt only that part(s) in which you are not successful as yet.*

---

**PART I**  
**C Programming**

*Note: Answer the following question. It carries 20 marks and the viva-voce is for 5 marks.*

1. Write an interactive program in C to count number of vowels, consonants and spaces in a given string.

20

**PART II**  
**Assembly Language Programming**

*Note: Answer the following question. It carries 20 marks and the viva-voce is for 5 marks.*

1. Write an assembly program, which will read two decimal numbers and performs the following operations:

20

(i) Addition    (ii) Subtraction    (iv) Multiplication    (iv) Division

## MCA SECOND SEMESTER MODEL QUESTION PAPERS

**MCA (Revised)**  
**Term-End Examination**  
December, 2005  
**MCS-021: Data and File Structures**

Time: 3 hours

Maximum Marks: 100  
(Weightage 75%)

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**Note:** Question no. 1 is **compulsory**. Attempt any three questions from the rest. All algorithms should be written nearer to 'C language'.

---

---

1. (a) Write an algorithm for the multiplication of two polynomials in one variable. 10
- (b) Define a Queue. Explain the operations that can be performed on a queue. How is a circular queue implemented using arrays? 10
- (c) Define a "Strongly connected component" of a digraph. Write an algorithm for finding strongly connected components of a graph. 10
- (d) Sort the following numbers using Quick Sort:  
5, 10, 2, 16, 18, 3, 19, 41, 8  
Clearly write all the steps involved in sorting the numbers. 10
2. (a) Give simplified big-O notation for the following functions: 5
  - (i)  $10n^3 + 6n^2$
  - (ii)  $5n \log n + 30n$
- (b) Write an algorithm for the implementation of a stack using linked list. 15
3. (a) Define a Binary Search Tree. Write the process of insertion of a node into a Binary Search Tree. 15
- (b) What are the properties of a Red-Black Tree? How do AA-trees differ from Red-Black Trees? Give an example each of a Red-Black Tree and an AA-tree. 10
4. (a) Write at least three differences between a circularly linked list and a doubly linked list. Write an algorithm for the creation and insertion operations on a doubly linked list. 10
- (b) Write an algorithm for the implementation of a tree using arrays. 10
5. (a) Explain Sequential File Organisation. 5
- (b) Write an algorithm for the multiplication of two sparse matrices. 15

**MCA (Revised)**  
**Term-End Examination**  
December, 2005

**MCS-022: Operating System Concepts and Networking Management**

Time: 3 hours

Maximum Marks: 100  
(Weightage 75%)

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**Note:** Question no. 1 is **compulsory**. Answer any three from the rest.

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- |    |        |   |    |
|----|--------|---|----|
| 1. | (i)    | Write a shell script (in Linux) to calculate a factorial of any given number.   | 7  |
|    | (ii)   | How is multimedia operating system different from a conventional operating system? Elaborate.   | 5  |
|    | (ii)   | What is the basic philosophy of X-Windows? How is ii different from the rest of GUI?  | 5  |
|    | (iv)   | What are the differences between IP class addresses: A, B, C, D, E?   | 5  |
|    | (v)    | How will you secure a guest account in Windows 2000?  | 4  |
|    | (vi)   | Can more than one person use the same user account on a Linux system? Discuss.  | 4  |
|    | (vii)  | Discuss the various criteria for selecting a UPS for your system.   | 6  |
|    | (viii) | List the four computer system vulnerabilities.  | 4  |
| 2. | (i)    | Explain the working scheme and design principles of DNS through appropriate diagrams.   | 15 |
|    | (ii)   | Discuss file management subsystems of Linux   | 5  |
| 3. | (i)    | What are the goals of computer security? Discuss the main issues in Windows security management   | 15 |
|    | (ii)   | Define the essential difference between the following:  | 5  |
|    | (a)    | Spooling  |    |
|    | (b)    | Buffering   |    |
| 4  | (i)    | Briefly describe all the steps in installing the Linux operating system.  | 15 |
|    | (ii)   | What is the need of a firewall? What are its limitations?   | 5  |
| 5. | (i)    | Answer the following questions with respect to Windows 2000:  |    |
|    | (a)    | What is the purpose of distributed file system? What are its features? How are the two types of distributed files-roots implemented on Windows 2000 Server? | 5  |
|    | (b)    | How does a domain differ from a workgroup?  | 3  |
|    | (c)    | When should security groups be used instead of distribution groups?   | 3  |
|    | (ii)   | Name any five methods of authentication available in Windows operating system and briefly describe.   | 5  |
|    | (iii)  | Discuss the advantages and disadvantages of Bus and Mesh topologies.  | 4  |

**MCA (Revised)**  
**Term-End Examination**  
December, 2005

**MCS-023: Database Management Systems**

Time: 3 hours

Maximum Marks: 100  
(Weightage 75%)

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**Note:** Question no. 1 is **compulsory**. Answer any **three** from the rest.

---

1. (a) Consider the following requirements of a staff management system of an organisation:

8

- The basic information that needs to be stored about the staff includes staff-id, name, address, date of birth, date of employment, post held.
- It keeps dependent information of employees. An employee can have many dependents.
- Pay details of the employees are also kept.
- It also keeps track of the various departments and employees of those departments.

Draw the E-R diagram for the organisation. Make suitable assumptions, if any.

(b) Consider the following relational scheme:

- Student (s\_id, name, phone, Programme
- Subject (subject\_id, subject\_name, taught\_by)
- Marks (s\_id, subject\_id, marks)

Make assumptions, if any.

Formulate SQL queries for the following:

15

- (i) Find the names of students who have passed more than 5 subjects. (For passing a subject, student must get at least 50 marks)
- (ii) Find the Programme of the students who have not passed a single course.
- (iii) Find the subject that has been passed by all the students who have appeared for that subject
- (iv) Find the list of teachers who have taught more courses than what has been taught by teacher 'XYZ'.
- (v) Find the sid of those students who share the same phone numbers. (Assume that a maximum of two students can have the same phone number.)

(c) Assume the following three concurrent transactions:

14

T1: Read A, B and C and writes modified values of B, C and A.

T2: Read A, C and D and writes modified values of A and C.

T3: Reads A, B, C and D only and produces a result E.

Write the pseudo code for the transactions above. Show a non-serialisable schedule for the transactions. Construct a precedence graph for the non-serialisable schedule created by you.

(d) Write at least six advantages of the database approach.

3

2. Consider the following relation:  
 Examination (student\_id, name, subject\_code, paper\_code, maximum\_marks, pass\_fail, examination\_date, exam\_centre\_code, Marks\_obtained\_by\_student)
- 20
- (i) Explain at least three anomalies in the relation above
  - (ii) Identify the functional dependencies in the relation. Identify the primary key of the relation
  - (iii) Normalise the relation to 2NF and 3NF.
  - (iv) Write the SQL commands for creating the tables. Specify the primary key(s) also.
- 3 (a) Explain the sequential file organisation with help of a diagram. Write at least one advantage and one disadvantage of this organisation  
 5
- (b) Explain the following relational algebraic operations with the help of one example each:  
 5
- (i) Set Difference
  - (ii) Division
- (c) What is an authorisation matrix? Where is it used? Explain the use of authorisation matrix with help of an example  
 5
- (d) Explain the two phase locking scheme with the help of an example. Why is strict two phase locking needed?  
 5
4. (a) Which of the two data structures, binary search tree or B tree, would you use for implementing an index in a database system? Justify your answer.  
 4
- (b) Explain the inverted file organisation with the help of an example. How do you search on multiple keys using this organisation? Explain with an example.  
 8
- (c) What are distributed database systems? List four advantages and six disadvantages. Explain fragmentation in a distributed database system, with the help of an example.  
 8
5. Explain the following in the context of database systems, with the help of an example each:
- (i) Data independence
  - (ii) Data dictionary
  - (iii) Issues relating to physical database design
  - (iv) Three-Tier client-server architecture
  - (v) Deadlock
- 20

**MCA (Revised)**  
**Term-End Examination**  
December, 2005

**MCS-024: Object Oriented Technologies and Java Programming**

Time: 3 hours  
Marks: 100

Maximum  
(Weightage

75%)

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**Note:** Question no. 1 is **compulsory**. Answer any **three** from the rest.

---

1. (a) What is a global variable? Explain two major problems that may occur due to global variables.  
5
- (b) What is inheritance? Explain two benefits of inheritance, with an example of each.  
5
- (c) “One object in Java can be assigned as reference to another object of the same type”. To explain this concept write a complete Java program and explain how a reference object works.  
5
- (d) What is a constructor? Write a java program to explain how super class constructors are called in their subclasses.  
5
- (e) What is multithreading? Explain this with an example of how interthread communication takes place in Java.  
5
- (f) Explain how a string class object can be created using an existing ‘String Buffer’ object. Also, explain how can you find the location of the last occurrence of ‘a’ in the string “java Programming”.  
5
- (g) What is a checkbox? How would you put checkboxes on an applet? Explain how checkbox group is created in Java.  
5
- (h) What is a datagram? Explain how objects of the class DatagramPackat can be created.  
5
2. (a) What is an instance variable? Explain how an instance variable of a class can have different value for each object of that class.  
15
- (b) What is encapsulation? Explain how encapsulation provides modularity and information hiding.  
5
- (c) What is a URL connection? Write a Java program to explain the processes of reading from and writing to a URL.  
5
- (d) What is a language paradigm? Explain two basic features of an object oriented paradigm.  
5

3. (a) List four differences between a Java applications program and Java applet program with an example of each type of program.  
8
- (b) Find the errors in the following Java program and correct them  
6
- ```
Public class My_string
{
Public void main(string)
{String string= "Java Programming
```
- (a) Spooling
- (b) Buffering
- 4 (i) Briefly describe all the steps in installing the Linux operating system.  
15
- (ii) What is the need of a firewall? What are their limitations?  
5
5. (i) Answer the following questions with respect to Windows 2000:
- (a) What is the purpose of distributed file system? What are its features? How are the two types of distributed files-roots implemented on Windows 2000 Server ?  
5
- (b) How does a domain differ from a workgroup?  
3
- (c) When should security groups be used instead of distribution groups?  
3
- (ii) Name any five methods of authentication available in Windows operating system and briefly describe.  
5
- (iii) Discuss the advantages and disadvantages of Bus and Mesh topologies.  
4

## 9. FORMS AND ENCLOSURES

*Note: You may use the photocopies of these forms.*

### FORM NO. 1

| <p>Enrol. No. _____<br/>         Programme Title: _____</p> <p>Name : _____</p> <p>Course Code: _____ Medium: _____</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">S.No.</th> <th style="width: 15%;">Assignment No.</th> <th style="width: 70%;"></th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td>For Office Use Only</td> </tr> <tr> <td> </td> <td> </td> <td>S.No. _____</td> </tr> <tr> <td> </td> <td> </td> <td>Date of Receipt: _____</td> </tr> <tr> <td> </td> <td> </td> <td>Name of Evaluator: _____</td> </tr> </tbody> </table> <p>Signature of the Student<br/>         Date : _____</p> <p>Date of despatch to the Evaluator:<br/>         _____</p> <p>Date of receipt from the Evaluator:<br/>         _____</p> | S.No.          | Assignment No.                  |  |  |  | For Office Use Only |  |  | S.No. _____ |  |  | Date of Receipt: _____ |  |  | Name of Evaluator: _____ | <div style="text-align: center;">  <p><b>INDIRA GANDHI NATIONAL OPEN UNIVERSITY</b><br/> <b>ASSIGNMENTS REMITTANCE -CUM-ACKNOWLEDGEMENT CARD</b></p> </div> <p>Enrol. No. _____ Programme Title: _____</p> <p>Name : _____ Medium : _____</p> <p>Course Code: _____</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">S.No.</th> <th style="width: 15%;">Assignment No.</th> <th style="width: 70%;">For Office Use Only</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td>S.No. _____</td> </tr> <tr> <td> </td> <td> </td> <td>Signature of the receiver _____</td> </tr> <tr> <td> </td> <td> </td> <td>Date : _____</td> </tr> </tbody> </table> <p>Signature of the Student _____ Seal</p> <p>Name : _____</p> <p>Address of the Student : _____</p> <p>Date : _____</p> <p>(Please write your complete address and affix adequate postal stamp on reverse)</p> | S.No. | Assignment No. | For Office Use Only |  |  | S.No. _____ |  |  | Signature of the receiver _____ |  |  | Date : _____ |
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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                | Signature of the receiver _____ |  |  |  |                     |  |  |             |  |  |                        |  |  |                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |                |                     |  |  |             |  |  |                                 |  |  |              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                | Date : _____                    |  |  |  |                     |  |  |             |  |  |                        |  |  |                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |                |                     |  |  |             |  |  |                                 |  |  |              |

Affix  
Stamp  
Here

From:

The Coordinator  
 Study Centre concerned

To

(ADDRESS OF THE STUDENT)

.....  
 .....  
 .....



Please read the instructions overleaf before filling up this form:

FORM NO. 2



**Indira Gandhi National Open University  
New Delhi  
REQUISITION FOR FRESH SET OF ASSIGNMENTS**

Programme of Study

Enrolment Number

Study Centre Code

Write in BLOCK CAPITAL LETTERS only.

**Name:** Shri/Smt./Kum

Please indicate course code, assignment code and course title for which you need the assignments in the following columns. The assignments of the course which you have already passed should not be mentioned.

| <i>Sl. No.</i> | <i>Course Code</i> | <i>Assignment Code</i> | <i>Course Title</i> | <i>Medium</i> |
|----------------|--------------------|------------------------|---------------------|---------------|
| 1.             |                    |                        |                     |               |
| 2.             |                    |                        |                     |               |
| 3.             |                    |                        |                     |               |
| 4.             |                    |                        |                     |               |
| 5.             |                    |                        |                     |               |
| 6.             |                    |                        |                     |               |
| 7.             |                    |                        |                     |               |
| 8.             |                    |                        |                     |               |

**REASONS FOR REQUEST FOR FRESH SET OF ASSIGNMENTS: (Tick (√) whichever is applicable)**

1. Assignments not received at all earlier.
2. Assignments were received after the due dates prescribed for their submission.
3. Assignments submitted but could not secure minimum qualifying score.
4. Assignments submitted earlier but misplaced at Study Centre/Post/HQ.
5. Assignments responses submitted after due dates were rejected by the Study Centre.
6. Failed to secure over-all qualifying grade in course(s) mentioned above and wish to improve over-all qualifying grade only by attempting one assignment.

**Complete Address** .....

**Signature** .....

.....

**Date** .....

.....

**Pin. Code :** .....

**For Office Use Only:**

Date of Despatch of Assignments to the student: .....

## INSTRUCTIONS FOR DOING ASSIGNMENTS

1. Read instructions for submission of assignments given in your Programme guide carefully.
2. Assignments should be demanded only, if your registration for that course (Subject) is valid.
3. Please ensure that you have mentioned your correct Enrolment No. (it consists of 9 digits), Name, Course Code/ Title, Name of semester/year, wherever applicable and Study Centre Code on your assignment responses before submitting it to concerned authorities.
4. Submission of assignments within due dates is prerequisite for appearing in the term-end examination. You are, therefore, advised to submit your ASSIGNMENTS at your Study Centre within the prescribed dates. Assignment received after due dates will be summarily rejected.
5. You can appear in term-end examination or submit only minimum required number of assignments if you fail to secure over-all qualifying grade in the course (subject).
6. Assignments should not be demanded to improve your score if you have secured minimum qualifying score in a course (subject).
7. Please do not submit your assignment responses twice either at the same Study Centre or at different Study Centres for evaluation.

**Please mail this form to:**

The Registrar  
MPPD  
Indira Gandhi National Open University  
Maidan Garhi  
NEW DELHI- 110 068

**Form No. 3**



***Please retain a photocopy of any matter that you submit to the University.***

**Indira Gandhi National Open University  
Maidan Garhi, New Delhi-110 068**

**Application Form for obtaining Duplicate Grade Card/Mark-sheet**

Name of the Candidate .....

Enrolment No. 

|  |  |  |  |  |  |  |  |  |  |
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Address .....

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Pin Code : 

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Programme .....

Month and Year of the Exam .....

Centre from where  
appeared at the last  
examination: .....

Bank Draft/IPO No. .... dated ..... for Rs. 100/- in favour of  
IGNOU,  
New Delhi

Date: .....

.....  
Signature

**Note:** Fee for duplicate, grade card is Rs. 100/-. The duplicate grade card/mark list will be sent by Registered Post.

**The filled in form with the requisite fee is to be sent to:**

The Registrar (SED)  
Indira Gandhi National Open University  
Block 12, Maidan Garhi  
New Delhi -110 068.

**(For Change of Address, send it duly filled-in to the concerned Regional Director, who will forward it to the Registrar (SED) and Registrar (SRD), Maidan Garhi, New Delhi after verification)**

**Application for Change of Address**

Date: \_\_\_\_\_

To

The Registrar, SR&ED  
IGNOU  
Maidan Garhi  
New Delhi-110 068.

**THROUGH THE REGIONAL DIRECTOR CONCERNED**

Enrolment No. \_\_\_\_\_

Programme \_\_\_\_\_

Name (in caps) \_\_\_\_\_

**1. DETAILS FOR CHANGE/CORRECTION OF MAILING ADDRESS**

**New Address**

**Old Address**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

City \_\_\_\_\_ Pin \_\_\_\_\_

City \_\_\_\_\_ Pin \_\_\_\_\_

\_\_\_\_\_  
Signature of the Student

*Please retain a photocopy of any matter that you submit to the University.*

(Re-Registration for the next semester for BCA and MCA)





**Form No.6**

**INDIRA GANDHI NATIONAL OPEN UNIVERSITY  
MAIDAN GARHI NEW DELHI – 110 068**

**APPLICATION FORM FOR RE-EVALUATION OF ANSWER SCRIPT**

**Name:** .....

**Programme** .....

|  |  |  |  |  |  |  |  |  |  |
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**Enrolment No.**

**Address:**

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**Pincode**

**Month and Year of the Exam:**.....

**Name of Exam Centre:**.....

**Centre Code:**.....

| <b>Courses, in which<br/>Re-evaluation is sought</b> | <b>COURSE CODE</b> | <b>TITLE OF THE COURSE</b> |
|------------------------------------------------------|--------------------|----------------------------|
|                                                      | .....              | .....                      |
|                                                      | .....              | .....                      |
|                                                      | .....              | .....                      |
|                                                      | .....              | .....                      |

**Total amount paid Rs:**.....  
(Rs.300/- per course/paper)

**Bank Draft No.**.....(Issuing Bank).....

**Date:**.....

**Signature of the student**

**NOTE:**

*The request for re-evaluation by the students must be made before 31<sup>st</sup> March for December TEE and 30<sup>th</sup> September for June TEE or within one month of declaration of results whichever is later. The date of declaration of results will be calculated from the date on which the results are placed on the IGNOU website.*

*After re-evaluation, the better of the two scores of original marks/grade and re-evaluated marks will be considered.*

*The revised marks after the re-evaluation shall be incorporated in the student record and the revised Grade card/Marks sheet shall be sent to the students within one month from the receipt of the application.*

*Re-evaluation is not permissible for the Projects, Practicals, Assignments, Seminar etc.*

**The filled in form with the requisite fee is to be sent to:**

**Dy. Registrar (Exam-III)**

**(S. E. Division)**

**Indira Gandhi National Open University**

**Maidan Garhi, New Delhi – 110 068**

(Re-Admission)

**Form No.8**



# INDIRA GANDHI NATIONAL OPEN UNIVERSITY

## APPLICATION FORM FOR IMPROVEMENT IN DIVISION/CLASS

(Rules & regulations are mentioned on next page of this form. Please go through them carefully before filling up the form).

Prescribed dates for submission of form:-

1<sup>st</sup> to 30<sup>th</sup> April for June Term-end Exam.

1<sup>st</sup> to 31<sup>st</sup> October for December Term-end Exam.

1. Name :.....

2. Programme:

Enrolment No.

|  |  |  |  |  |  |  |  |  |  |
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3. Address:

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..... Pin Code

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4. Term-end examination, in which programme completed June/December .....

Total marks/Overall point grade obtained

Percentage obtained

.....

.....

(Please enclose photocopy of the statement of marks/grades card)

5. Course(s), in which Improvement is sought:

COURSE CODE

COURSE CODE

1. ....

4. ....

2. ....

5. ....

3. ....

6. Fee details:-

(The fee for this purpose is to be paid through demand draft drawn in favour of IGNOU & payable at New Delhi).

No. of Course(s) ..... X Rs. 300/- =Total Amount .....

Demand Draft No. .... Date .....

Issuing Bank .....

7. Term-end examination, in which you wish to appear:- June /December.....

8. Examination centre details, where you wish to appear in term-end examination:-

Exam. Centre Code:..... City/Town: .....

### UNDERTAKING

I hereby undertake that I shall abide by the rules & regulations prescribed by the University for improvement in Division/Class.

Date: .....

Signature: .....

Place: .....

Name: .....

P.T.O.

## RULES & REGULATION FOR IMPROVEMENT IN DIVISION/ CLASS

1. The improvement of marks/grades is applicable only for the Bachelor's/Master's Degree Programmes.
2. The students, who fall short of 2% marks for securing 1<sup>st</sup> Division or 2<sup>nd</sup> Division only, are eligible for applying for improvement.
3. Only one opportunity will be given to improve the marks/grade.
4. The improvement is permissible only in theory papers. No improvement is permissible in Practicals / Lab courses, Projects, Workshops and Assignments etc.
5. Under the Provision of improvement, a maximum of 25% of the maximum credits required for successful completion of a programme shall be permitted.
6. Students wishing to improve the marks will have to apply within six months from the date of issue of final statement of marks/grade card to them, subject to the condition that their registration for the programme/course being applied for improvement, is valid till the next term-end examination in which they wish to appear for improvement.
7. No student will be permitted to improve if maximum duration to complete the programme, including the re-admission period, has expired.
8. After appearing in the examination for improvement, better of the two examinations i.e. marks/grade already awarded and the marks/grade secured in the improvement examination will be considered. In such cases, the improved marks/grade can be incorporated only on surrender of the statement of marks/Grade Card, Provisional Certificate and Degree Certificate already issued to the student.
9. In case of improvement, the month and year of completion of the programme will be changed to the Term-end examination, in which students appeared for improvement.
10. Students will be permitted for improvement of marks/grades provided the examination for the particular course, in which they wish to improve is being conducted by the University at that time.
11. Students wishing to improve their performance should submit the application in the prescribed format alongwith fee @ Rs. 300/- per course by means of Demand Draft drawn in favour of IGNOU payable at New Delhi and send within the prescribed dates to the following address:-  
Registrar,  
Student Evaluation Division,  
Indira Gandhi National Open University,  
Maidan Garhi,  
New Delhi-110068
12. On the top of the envelope containing the prescribed application form, Please mention "APPLICATION FORM FOR IMPROVEMENT IN DIVISION/CLASS"



INDIRA GANDHI NATIONAL OPEN UNIVERSITY  
MAIDAN GARHI, NEW DELHI – 110068.

**APPLICATION FORM FOR OBTAINING PHOTOCOPY OF THE ANSWER SCRIPT**

(Rules & regulations are mentioned on the reverse side of this form. Please go through them carefully before filling up the form).

Prescribed dates for submission of form: -1<sup>st</sup> March to 15<sup>th</sup> April for June Term-end Exam.  
1<sup>st</sup> September to 15<sup>th</sup> October for December Term-end Exam.

1.Name.....

2. Programme:  Enrolment No: 

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3.Address: .....

..... Pin Code 

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4. Details of the course (s), for which photocopy of the answer script (s) is/are required:

(a) Term-end examination: June/ December .....

(b) Exam Centre Code: 

|  |  |  |  |  |
|--|--|--|--|--|
|  |  |  |  |  |
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(c) Exam-Center-Address  
.....  
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.....

(d) Course(s):  
.....

5. Fee details:-

(The fee for this purpose is Rs. 100/- per course, which is to be paid through demand draft drawn in favour of IGNOU and payable at New Delhi)

No. of Course(s): ..... X Rs. 100/- = Total Amount: .....

Demand Draft No.: ..... Date: .....

Issuing Bank: .....

6. Self attested photocopy of the Identity Card : Attached/ Not attached issued by the University

**UNDERTAKING**

I hereby undertake that the answer script(s), for which photocopy (ies), applied for, belongs to me. For this purpose, I am enclosing self attested photocopy of my Identity Card issued by the University. In case, my statement is found false, the University may take action against me as deemed fit.

Date:.....

Signature .....

Place:.....

Name: .....

## **RULES & REGULATIONS FOR OBTAINING PHOTOCOPY OF THE ANSWER SCRIPT**

1. Photocopy(ies) of the answer script(s) shall be provided to the students from December – 2008 term – end examination (TEE), onwards.
2. The fee for photocopy of the answer scripts shall be Rs. 100/- (Rupees One Hundred Only) per course. Fee shall be paid in the form of a Demand Draft drawn in favour of IGNOU and payable at New Delhi.
3. Application form without self attested photocopy of the Identity Card of the student will not be entertained.
4. Student's application form for photocopy(ies) of the answer script(s) shall reach the Concerned Authority (as mentioned below in the last para) alongwith the prescribed fee within 45 days from the date of declaration of results. The date of receipt of application for June term-end examination shall be by 15<sup>th</sup> October and for December term-end examination by 15<sup>th</sup> April or within 45 days from the date of declaration of result on the University's website, whichever is later.
5. The students, who find that any portion of the answer was not evaluated or any totaling error is noticed, may point out the same and submit their representation alongwith a copy of the answer script supplied to them within 15 days. No other query regarding evaluation of answer script shall be entertained.
6. The students, who intend to apply for photocopy(ies) of the answer script(s) may simultaneously apply for re-evaluation, if they so desire. The last date for submission of application for re-evaluation will not be extended to facilitate them to point out discrepancy in the evaluation.
7. The application form duly filled-in may be sent to the following address except CPE & DPE programmes:-

**The Registrar,  
Student Evaluation Division  
Indira Gandhi National Open University,  
Maidan Garhi, New Delhi-110068.**

8. For the photo copy (ies) of the answer script(s) of CPE & DPE programmes, the application form may be sent to the Regional Centre concerned.







## **RULES & REGULATIONS FOR EARLY DECLARATION OF RESULTS**

1. Request for early declaration of results will be entertained for final semester/year or maximum of 4 backlog courses only, subject to the following conditions:-
  - (i) The student has been selected for higher study/employment and statement of marks/grade card is required to be produced to the institute by a particular date, which is before the prescribed dates of declaration of the University's results.
  - (ii) The student has completed all the other prescribed components except the term-end examination of the courses, for which early evaluation has been sought.
2. Application for early declaration, for the reasons such as to apply for recruitment/higher study/post and promotion purpose etc. will not be entertained.
3. Application without enclosing documentary evidence specifying the reason for early declaration will not be entertained.
4. Application form must reach at the following address before the date of the examination for the course (s) for which early evaluation is sought:-

**The Registrar,  
Student Evaluation Division,  
Indira Gandhi National Open University,  
Maidan Garhi,  
New Delhi-110068.**



INDIRA GANDHI NATIONAL OPEN UNIVERSITY  
STUDENT EVALUATION DIVISION

**APPLICATION FORM FOR ISSUE OF OFFICIAL  
TRANSCRIPT**

1. Name : \_\_\_\_\_

2. Programme:  Enrolment No:

3. Address: .....  
.....  
..... Pin

4. Purpose for which: .....  
transcript is required .....

5. Fee detail:-

Fee for the official transcript:-

Rs. 200/- per transcript, if to be sent to the student/institute in India.  
Rs. 400/- per transcript, if required to be sent to the Institute outside India by the University.  
(The requisite fee is required to be paid through demand draft drawn in favour of 'IGNOU' & payable at 'New Delhi')

No. of transcript(s): ..... X Rs. 200/ Rs. 400/- = Total Amount:  
Rs.....  
Required  
Demand Draft No.: ..... Date:  
.....  
Issuing Bank: .....

6. Whether the transcripts to be mailed by the University: Yes/No (please tick)

7. Name & Address of the University/Institute/Employer (In capital letters) to whom transcript is required to be sent (attached a separate list, if required)  
.....  
.....  
.....

Date:..... (Signature of the student)

The filled in form with the requisite fee is to be sent to:-

The Registrar,  
Student Evaluation Division,  
Indira Gandhi National Open University,  
Maidan Garhi,  
New Delhi-110068.

Note:- The students are required to enclose same number of legible photocopies of both sides of the statement of marks/grade card issued to them, as the number of transcripts required.