

**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 or from its Regional Centres spread across the length and breadth of the country.*

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## 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 yourself of 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. You must also submit the assignments of every 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 is 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 those.** 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. You will find answers to many of them 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.

**1.2.1** Minimum and maximum duration for those directly admitted to 2nd year of MCA under Integrated Programme (for BCA students of IGNOU) is 2 years and 4 years respectively. In case a student of Integrated programme is unable to complete all the requirements for the award of degrees of BCA as well as MCA, s/he can get the duration extended by another two years on remitting the **pro-rata fee for all the left-over courses of BCA as well as MCA in lump-sum**. Pro-rata fee of stand alone BCA will not be accepted from the students of Integrated BCA-MCA.

**1.2.2** Re-admission Form and Table of *Pro-rata fee* can be downloaded from the website ([www.ignou.ac.in](http://www.ignou.ac.in) > STUDENTS ZONE > Downloads > Re-admission>).

## 1.3 Medium of Instruction

The medium of instruction is only **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 conducted by the University during the year subject to completing the minimum time framework and 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       | MCS-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 a student 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, and UGC's letter no. UGC/DEB/2013 dated 14.10.2013.

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

Students who took admission into MCA (from July 2013 session onwards), and did not have Mathematics at 10+2 level or at graduate level have to do BCS-012. They are advised to clear it along with the first year of MCA courses. However, all such students have to successfully complete BCS-012 (wherever applicable) before re-registering for MCA 5th 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 programmes, and also undertakes 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 restricted 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, practical sessions, 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 and Distance Learning (ODL) 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 distance mode 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
- ☞ practical
- ☞ Gyan Darshan Channel, including teleconferencing, Eklavya exclusively for Technology based 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 materials and would not be available for 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 CDs can procure them from:

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

The video 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 a counselling session 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 a specific assignment.**
- (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^                                     | MCS-021     | Data and File Structures                            | 4       | 8                                   |  |
|              | MCS-012     | Computer Organization and Assembly Language Programming | 4       | 8                                   | 2^                                     | MCS-022     | Operating System Concepts and Networking Management | 4       | 8                                   | 2^                                     |
|              | MCS-013     | Discrete Mathematics                                    | 2       | 3                                   |  | MCS-023     | Introduction to Database Management Systems         | 3       | 5                                   | 2^                                     |
|              | MCS-014     | Systems Analysis and Design                             | 3       | 5                                   |  | MCS-024     | Object Oriented Technologies and Java Programming   | 3       | 5                                   | 2^                                     |
|              | 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^                                     | MCS-042     | Data Communication and Computer Networks            | 4       | 8                                   | 2^                                     |
|              | MCS-033     | Advanced Discrete Mathematics                           | 2       | 3                                   |  | MCS-043     | Advanced Database Management Systems                | 4       | 8                                   | 2^                                     |
|              | 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> | MCSP-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 a student 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  | Specific Assignment | Theory       | Practical  | Specific Assignment |
| 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 <sup>*</sup>  | -          | -                   | 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 + Specific Assignment related 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 specific assignment.*

### 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<br>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<br>(Units 1, 2 3 & 4) | Problem Solving, Basics of C, Variables and Constants, Expressions and Operators |
|                           | 2              | Block-2<br>(Units 5 & 6)      | Decision and Loop Control Statements in C and Arrays                             |
|                           | 3              | Block-2,<br>(Units 7 & 8)     | Strings and Functions in C   |
|                           | 4              | Block-3,<br>(Units 9 & 10)    | Structures & Unions, Pointers  |
|                           | 5              | Block-3, Unit<br>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.<br>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<br>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<br>Two sessions on Block-2 |

### Session Details

| Sessions                  | Session Number | Block to be Covered      | Topics to be covered  |
|---------------------------|----------------|--------------------------|---|
| <b>Theory Counselling</b> | 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<br>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               | All the problems given in the session - 7 and session - 8 of Section - 4 of the lab manual are to be executed.                 |

|  |    |                                    |  |
|--|----|------------------------------------|--|
|  |    | (Section - 4)                      |  |
|  | 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**

| <b>Sessions</b>    | <b>Number of Sessions</b> | <b>Comments</b>  |
|--------------------|---------------------------|--|
| Practical Sessions | 10                        | Problem Solving and C programming                        |
| Practical Sessions | 10                        | Digital Logic Circuits and Assembly Language Programming |

#### **Session Details**

| <b>Sessions</b>           | <b>Session Number</b> | <b>Block to be Covered</b>          | <b>Topics to be covered</b>   |
|---------------------------|-----------------------|-------------------------------------|---|
| <b>Practical Sessions</b> | 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**

| <b>S. No.</b> | <b>Counselling Sessions</b> | <b>Number of Sessions</b> | <b>Comments</b>            |
|---------------|-----------------------------|---------------------------|----------------------------|
| 1.            | Theory Sessions             | 8                         | Two sessions on each block |

#### **Session Details**

| <b>Sessions</b>           | <b>Session Number</b> | <b>Block to be Covered</b> | <b>Topics to be covered</b>       |
|---------------------------|-----------------------|----------------------------|-----------------------------------|
| <b>Theory Counselling</b> | 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  |
|--------------------|----------------|------------------------------------|---|
| Theory Counselling | 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   |
| Practical Sessions | 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   |
|--------------------|----------------|----------------------------|--|
| Theory Counselling | 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   | Block 2: Unit 1                    | The Structured Query Language: data definition and manipulation commands, views, nested queries, examples   |
|                           | 4   | Block 2: 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   | Block 3 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                            |
|--------------------|--------------------|-------------------------------------|
| Practical Sessions | 10                 | Data and File Structures Lab        |
| Practical Sessions | 10                 | Operating System and Networking Lab |
| Practical Sessions | 10                 | DBMS Lab                            |
| Practical Sessions | 10                 | Java Programming Lab                |

### Session Details

| Sessions           | Session Number | Block to be Covered  | Topics to be covered  |
|--------------------|----------------|--|---|
| Practical Sessions | 1 to 10        | Lab Manual (Section - 1)<br>Data and File Structures<br>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)<br>Operating Systems and<br>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)<br>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)<br>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. | 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            |
|                    | 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. | Counselling 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                          |
|--------------------|----------------|---------------------|---|
| Theory Counselling | 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                     |
| Practical Sessions | 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 and Unit-3 |
|                    | 8              | Block-4             |  |

## 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)<br>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)<br>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)<br>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. | Couselling 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. | Couselling 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   |
|--------------------|----------------|---------------------|--|
| 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 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  |
| Practical Sessions | 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. | Couselling 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  |
|---------------------------|----------------|-------------------------------------|---|
| <b>Practical Sessions</b> | 1 to 10        | Lab Manual (Section -1)<br>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)<br>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 Interned Technologies

#### Counselling Sessions

| S. No. | Couselling 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                    |
|---------------------------|----------------|---------------------|---|
| <b>Theory Counselling</b> | 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. | Couselling 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<br>Upto Line Drawing Algorithms of Unit -2                   |
|                           | 2              | Block-1                | Rest of the topics of Unit –2 are to be covered<br>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<br>Upto Depth Buffer method of Unit - 2                        |
|                           | 6              | Block - 3              | Rest of the topics of Unit 2<br>All the topics upto Shading of Unit 3                   |
|                           | 7              | Block – 3<br>Block - 4 | Rest of the topics of Unit 3<br>All the topics upto Simulating Accelerations of Unit -1 |
|                           | 8              | Block –4               | Rest of the topics of Unit – 1<br>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)<br>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<br>(Section -2)<br>Computer Graphics and<br>Multimedia | All the problems given in the Section – 2<br>(session- wise) of the lab manual are to be<br>executed. |
|--|----------|---|---|

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

#### Counselling Sessions

| S. No. | Couselling 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 2                        |
|                    | 2              | Block - 1<br>Block - 2 | All the topics of Unit – 3<br>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. | Couselling Sessions | Number of Sessions | Comments  |
|--------|---------------------|--------------------|---|
| 1.     | Theory Sessions     | 5                  | One session on Block – 1 and<br>two sessions each on Block – 2 and<br>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<br>Upto Newton's Cotes formulae of Unit-2 |
|                    | 3              | Block-2             | Rest of the topics of Unit – 2<br>All the topics of Unit-3           |
|                    | 4              | Block-3             | All the topics of Unit-1<br>Upto Inversion Method of Unit-2          |
|                    | 5              | Block - 3           | Rest of the topics of Unit-2<br>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<br>Block -3 | All the topics of Unit-3<br>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 is subject to 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.

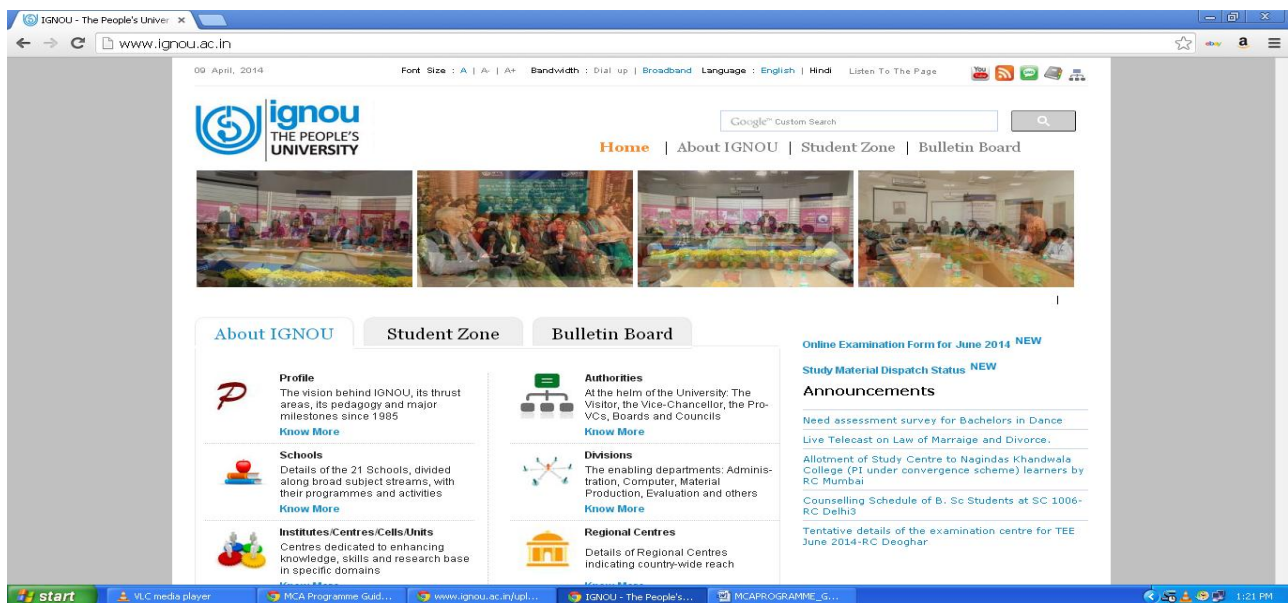


Figure 1

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.

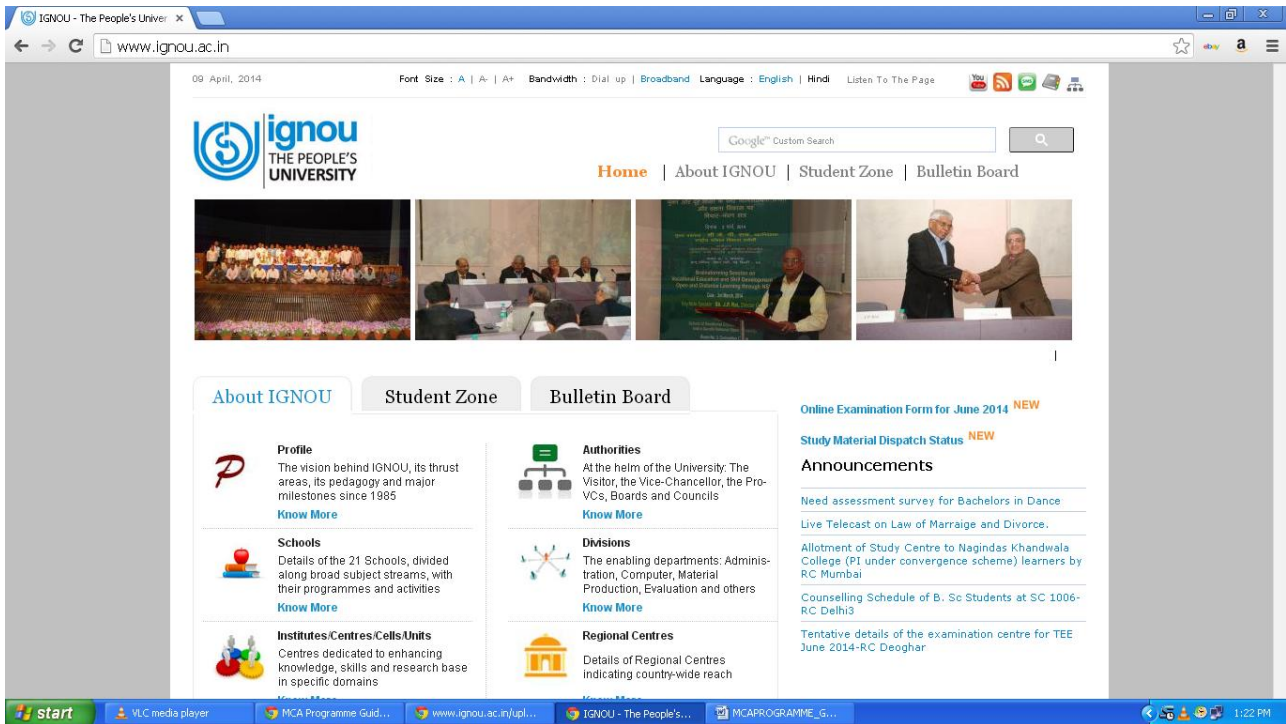


Figure 2

### 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:

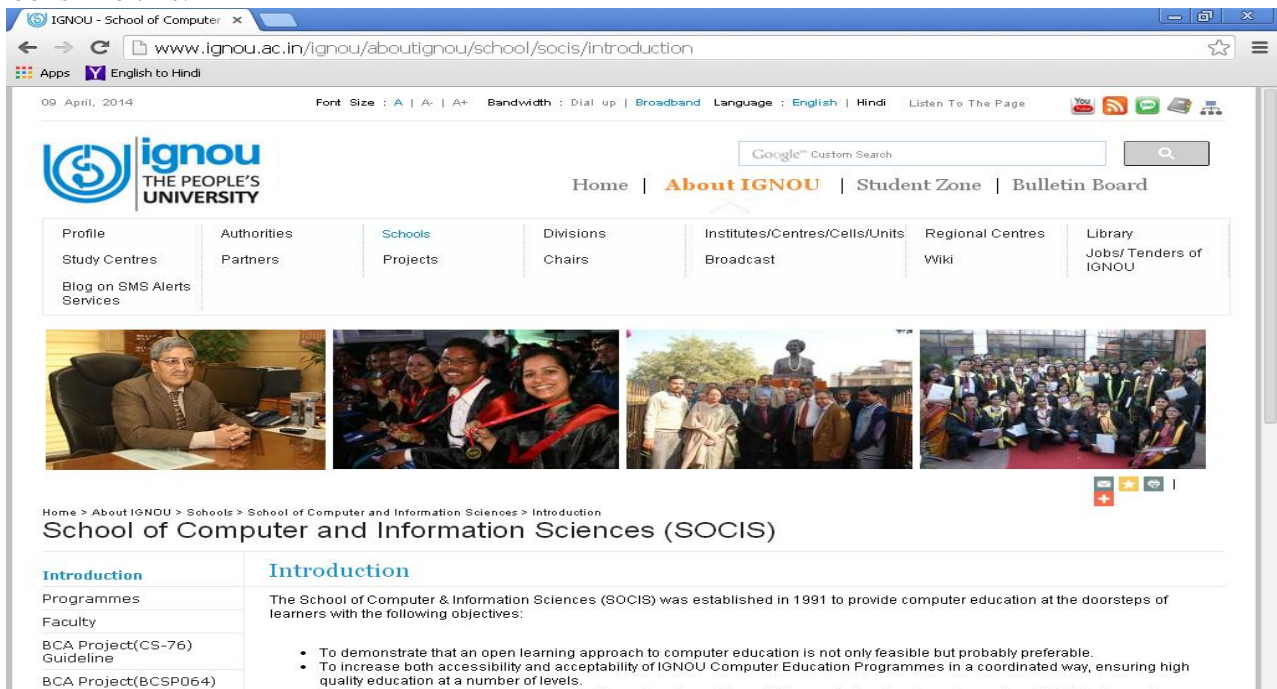


Figure 3

### 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.

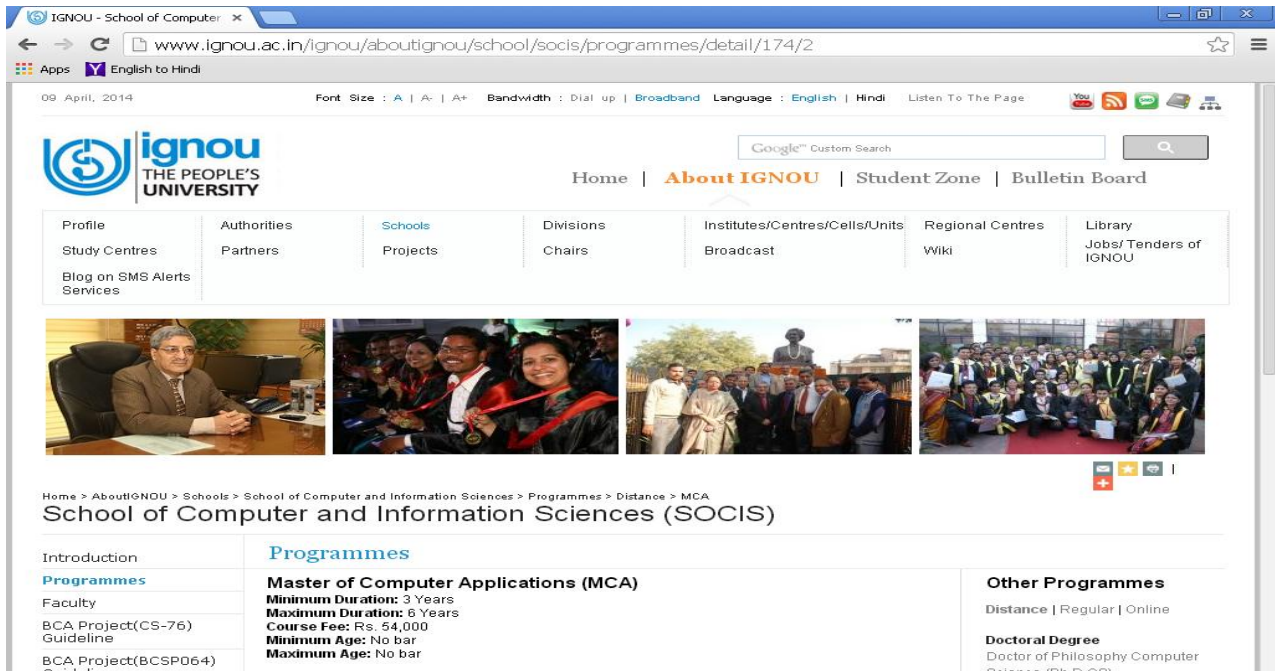


Figure 4

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 the first to fifth semesters of MCA programme. The sixth 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 be used 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. Student will learn various concepts and techniques for problem-solving and will implement those ideas using C programming.

#### 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**

- Error Detection And Correction Codes

**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

**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
  - Programmable Logic Array
  - Read Only Memory ROM

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

- Sequential Circuits: The Definition
- Flip Flops
  - Basic Flip-Flops
  - 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
  - o Resolution
  - o Dynamic Range/Colour Depth
  - o Size and Speed
  - o 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
  - Interrupts
  - DOS Function Calls (Using INT 21H)
- The Types of Assembly Programs
  - 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. In computer science, 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
  - o 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

##### Unit 2: Systems Analyst-A Profession

- 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 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 in 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, 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 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)
  - Transfer 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 hands on experience on C Programming and Assembly Language Programming and improve the practical skill. 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, including the writing of 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

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

### Unit 12: File Structures

## 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
- Accessing Network Resources Using My Network Places
- Mapping a Folder

### **Unit 3: 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



- o Attributes
- o Relationships
- o 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. It 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

- o Character and Boolean Types
- o Declaring and Initialization Variables

- Java Operators

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

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

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

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

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

**Unit 3: Java Language Basics**

- Introduction To Java
  - o Basic Features
  - o Java Virtual Machine Concepts
  - o A Simple Java Program
- Primitive Data Type And Variables
  - o Java Keywords
  - o Integer and Floating Point Data Type

**Unit 1: Class and Objects**

- Class Fundamentals
  - o Creating objects
  - o Assigning object reference variables
- Introducing Methods
  - o Static methods
  - o Constructors
- Overloading constructors
  - o 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

### **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
- 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
- Text Streams
- Stream Tokenizer
- Serialization
- Buffered Stream
- Print Stream
- Random Access File

## **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
  - 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 Course is based on the courses MCS-021, MCS-022, MCS-023 and MCS-024. It 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 objectives 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 objectives of the Course 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

**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
  - Short-term Solvency Ratios

- Activity or Turnover Ratios
- Profitability Ratios
- Market Test 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**

#### **Objectives**

This Course is based on three courses namely MCS-032 (Object Oriented Analysis and Design), MCS-034 (Software Engineering) and MCS-035 (Accountancy and Financial Management). The prime objectives of this Course are (i) To help in learning the use of the computer for object oriented analysis and design concepts, making of UML diagrams with the help of software tools. (ii) to use Software tools for different phases of software development like cycle (iii) to familiarise with the use of software for basic accounting procedures and financial management.

This lab course 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**

**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

**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. Additionally, 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

### **MCS - 044: Mini Project**

**4 Credits**

#### **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 provide 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**

#### **Objectives**

This lab Course is based on MCS-041(Operating Systems) and MCS-043(Advanced Database Management Systems) courses. The basic objective of the Course is to provide the hands on experience to improve the practical skills on UNIX Operating System and Oracle DBMS and also to apply the concepts that been covered in the courses MCS-041 and MCS – 043. This Course is divided into 2 Sections: Section – 1 covers the Unix Lab and Section – 2 covers the DBMS Lab. At the end of each Section, lists of exercises are given for your practice.

### **MCS-051: Advanced Internet Technologies**

**3 Credits**

#### **Objectives**

The Major Objectives of the Course is to introduce concepts, tools/technologies and programming to rapidly develop Internet based distributed, secure, reliable and scalable application. The discussion in the course is centered around Servlet and JSP (Java Server Pages) Programming, JDBC APIs, Server Side component architecture (Enterprise Java Beans), and XML. It also introduces Web Security and its implementation.

#### **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**

### **Objectives**

The Course objective is to provide the use and function of management information systems. It describes and evaluates information systems development processes and techniques.

### **Syllabus**

#### **BLOCK 1: Management Systems**

- Life cycle of organisation
- Vertical and horizontal organisations

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

- Organisation Types
  - Service, Business, Government, Social
  - Industry Types
- Organisational Structure
- Organisational Characteristics
  - Size
  - Location
  - Others
- Organisation functions

#### **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

### Objectives

The Aim & Objective of the Course is to enable the learner's thinking process in the field of Computer Graphics, Animation, Simulation and Multimedia. After going through the Course the learner will be able to understand the abilities required to develop the graphical tools. The understanding of the learned concepts will help the learner in executing the practical component i.e. Lab component of the Computer Graphics

### 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
  - Polygon Surfaces
  - Polygon Tables
  - Plane Equations
  - Polygon Meshes
- Bezier Curves and Surfaces
  - Bezier Curves
  - Properties of Bezier Curves
  - 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
  - Ambient Reflection
  - Diffuse Reflection
  - Specular Reflection
- Shading
  - Gouraud Shading
  - Phong Shading
- Ray Tracing
  - 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

**MCSL-054 Lab (Advanced Internet Technologies and Computer Graphics) 2 Credits**

**MCSE-003 Artificial Intelligence and Knowledge Management 3 Credits**

### Objectives

One of the ways of looking at Artificial Intelligence (AI) is as the study concerned with solving hard and insolvable problems using reasonable amount of time, by exploiting the knowledge of the problem domain. In view of the significance of knowledge in AI, in this course, a number of knowledge representation formalisms are introduced. The formalisms discussed include Propositional Logic, First Order Predicate Logic, Rule-based systems, Semantic Networks and Frames. In order to encode knowledge structures obtained using these formalisms, the syntax of each of the two well-known AI programming languages LISP and PROLOG is discussed along with explanation of how the language can be to encode proposed solutions. Finally, as applications/ products of AI, the topics on Expert Systems and Intelligent Agents are discussed briefly.

MCSE-003 is a 4-credit course and the course material consists of 4 blocks. The pre-requisites for the course include Design and Analysis of Algorithms, Discrete Mathematics and programming and problem solving experience.

### 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

- Dempster-Shafter Theory

### 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

### Unit 2: Fuzzy Logic

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

### BLOCK 3: Handling Uncertainty

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

- Truth Maintenance Systems
- Reasoning Techniques
- Concept of Uncertainty
- Bayes' Theorem
- Certainty Factors and Rule-Based Systems
- Bayesian Networks

### 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

## MCSE-004 Numerical and Statistical Computing

3 Credits

### Objectives

The main objective of this course is to prepare the firm footing of learners in the domain of numerical and statistical computation. Understanding the concepts covered in the course, will make the learner to realize the need of Numerical and statistical components in computer science. Further, the concepts covered in this course will enable the analytical skill of the learner, and s/he may appreciate the need of this course in various domain of computer science viz. Software Reliability, Software Quality Assurance, Software Testing and many more.

### 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

##### 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**

### **MCSE-011 Parallel Computing**

**3 Credits**

### **Objectives**

In view of the limitations of the sequential paradigms in respect of solving difficult problems; over the years, a number of parallel/ concurrent paradigms have emerged that include parallel computer architectures, parallel operating systems, parallel algorithms and parallel programming languages. Based on these paradigms, parallel computer systems have been designed, developed and studied in depth. The purpose of the course is to equip students with skills for solving difficult problems using these paradigms, architectures etc.

MCSE-011 is a 3-credit course and the course material consists of three blocks. The pre-requisites for the course include knowledge of computer architecture, operating system, design and analysis of algorithm and problem solving and programming experience.

### **Syllabus**

#### **BLOCK –I Elements of Parallel Computing and Architecture**

##### **Unit 1 Introduction to Parallel Computing**

- Basic concepts about program/process/ thread concurrent

- Discrete Distribution
- Binomial Distribution
- Poisson Distribution

### **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

- 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

### **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

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

## **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



The objective of the MCA project work is to develop quality software solution by following the software engineering principles and practices. It is only possible when a learner goes about with the task independently. 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**

Students who took admission into MCA (from July 2013 session onwards), and did not have Mathematics at 10+2 level or at graduate level have to do BCS-012. They are advised to clear it along with the first year of MCA courses. However, all such students have to successfully complete BCS-012 (wherever applicable) before re-registering 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 will not 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 successfully completed.** The syllabus is given 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 constrains, 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 course 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 Computer Science is an ever enhancing area, the students should make an attempt and work with extra reading material easily available at the Study Centre / Regional Centre libraries or through websites for working on the assignments. This will enhance his/her learning capabilities. Mostly the assignments are designed in such a way as to help her/him 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.

The table shown below provides the detailed marking scheme for the MCA courses.

| Seme-ster | Course Code | Course Title  | Credits | Continuous Evaluation        |            | Term End Examination   |            |            |
|-----------|-------------|---|---------|------------------------------|------------|--|------------|------------|
|           |             |   |         | Assignment (Weightage – 25%) |            | Theory OR Practicals* ( for Lab courses only)<br>(Weightage – 75%) |            |            |
|           |             |   |         | Max Marks                    | Min. Marks | Duration   | Max. Marks | Min. Marks |
| <b>I</b>  | 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                           | 4       | 100                          | 40         | 3  | 100        | 40         |

|            |                                  |   |        |     |    |   |               |        |
|------------|----------------------------------|---|--------|-----|----|---|---------------|--------|
|            |                                  | Networking Management                             |        |     |    |   |               |        |
|            | 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     |
|            | MCSL-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<br>MCSE-004<br>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 for the non-lab courses. Practical examination will be conducted for 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 in order to get it declared 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 such students will be directed 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** (total 20 marks)

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

| Course code | Continuous assessment of practical sessions lab records (40)         | Assignment problems (40)   | Combined Viva (20) | Total marks (100) |
|-------------|--|--|--------------------|-------------------|
| MCSL-016    | 40   | 40   | 20                 | 100               |
| MCSL-017    | Section –1(20)<br>Section –2(20)                                     | Section –1(20)<br>Section –2(20)                                     | 20                 | 100               |
| MCSL-025    | Section –1(10)<br>Section –2(10)<br>Section –3(10)<br>Section –4(10) | Section –1(10)<br>Section –2(10)<br>Section –3(10)<br>Section –4(10) | 20                 | 100               |
| MCSL-36     | Section –1(13)<br>Section –2(13)<br>Section –3(14)                   | Section –1(13)<br>Section –2(13)<br>Section –3(14)                   | 20                 | 100               |
| MCSL-45     | Section –1(20)<br>Section –2(20)                                     | Section –1(20)<br>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 the 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<br>(2 credits) | 2 hours   | 40(P) + 10 (V)<br>= 50 marks                 | #                          | #                           | #                         |
| MCSL-017<br>(2 credits) | 2 hours   | 20 (P) +5(V)<br>= 25 marks                   | 20(P) + 5(V)<br>= 25 marks | #                           | #                         |
| MCSL-025<br>(4 credits) | 3 hours   | 20(P) + 5(V)<br>= 25 marks                   | 20(P) + 5(V)<br>= 25 marks | 20(P) + 5(V)<br>= 25 marks  | 20(P) + 5(V)<br>=25 marks |
| MCSL-036<br>(3 credits) | 3 hours   | 25 (P) + 5(V)<br>= 30 marks                  | 25(P) + 5(V)<br>= 30 marks | 30(P) + 10(V)<br>= 40 marks | #                         |
| MCSL-045<br>(2 credits) | 2 hours   | 20 (P) + 5(V)<br>= 25 marks                  | 20(P)+ 5(V)<br>= 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 again for that section only.

### 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 Mini Project 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 be carried 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. 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) Re-submission 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, 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.

(iii) **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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- 3. 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.**
- 4. The students should write each assignment separately. All the assignments should not be written in continuity.
- 5. **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.**
- 6. 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.
- 7. **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.**
- 8. **The completed assignment response should be sent to the Coordinator of the Study Centre. Under no circumstances should they be sent to the SED 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.



9. 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. 12**) 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. 1**) 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 SED 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, SED, 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) registration for the courses, in which they wish to appear is valid,
  - (b) they should have opted and pursued the prescribed courses
  - (c) minimum time to pursue these courses is elapsed
  - (d) they have also submitted the required number of assignment(s), if any.
2. The University conducts term-end examination 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 schedule indicating the date and time of examination for each course is sent to all the Regional Centres/ Study Centres in advance. The same is also notified through IGNOU Newsletter from time to time and displays on the website of IGNOU [www.ignou.ac.in](http://www.ignou.ac.in).
4. Examination fee @ Rs. 60/- per course is required to be paid through demand draft in favour of IGNOU and payable at the city of the Regional Centre where submitting the examination form. The examination form can be obtained from the concerned Regional Centre/ Study Centre/ HQ. The student can also submit the on-line examination form. The fee and the guidelines for filling on-line examination form is given below:

#### **Guidelines and instructions for submission of online examination form**

1. Please ensure that you have already submitted the assignments as applicable for the courses you are filling in the Examination Form. Otherwise, Hall Tickets will NOT be issued for the courses for which assignments have not been submitted by you.
2. You are required to pay examination fee @ Rs. 60/- per course for theory as well as practical. Dates for submission of examination forms start from 1st March to 31st March without late fee. Late fee of Rs. 300 /- is from 1st April to 20th April.
3. Mode of payment
  - Credit Card
  - Debit Card of Union Bank of India
4. Students are requested to check the result status before filling examination form.
5. 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.
6. Select courses carefully. Courses for theory as well as practical need to be selected separately from the list appearing on the screen.

7. If student wishes to submit on-line form h/she should keep auto generated control no. for future reference.
8. In case you wish to make payment through credit card please select this option and make the payment. Note that 1.96 % of the amount to be paid will be debited to our Credit Card Account towards transaction charges. Please retain the auto generated control no. for future reference.
9. Student will receive an acknowledgement with control number at the e-mail address given in the application form.
10. Student 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 the particulars of your form are not available, you may submit the form again.
11. 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 Identity Card issued by the University.
12. You will be allowed to appear in Term-end Examination for the courses
  - in which required number of assignment as applicable for the course(s) have been submitted.
  - Registration for the course(s) is valid and not time-barred.

#### 5. Date of Submission of Examination Forms

The dates for submission of Examination forms for June and December Term-end Examinations (TEE) are mentioned hereunder:

| FOR JUNE TEE         | LATE FEE | FOR DECEMBER 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 SED 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/SED at Headquarters indicating their enrolment no., name, address and programme.
9. The students will be entitled to appear for the examination only 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 you can also download it from our website under the “Student Zone” 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. Duplicate Grade Card/marks sheet will be issued on a request from the students in prescribed form (**Form No. 2**) against payment of Rs. 150/- by Demand Draft drawn on IGNOU, New Delhi. The duplicate grade card will be sent by Post to the student.
13. 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.
14. **Early Declaration of Results**

The student can apply for early declaration of Term-end Examination result with a fee of Rs. 700 /- per course. **The application for early declaration of result shall be entertained only if the student has been selected for any post or applied for further studies.** The student must compulsorily submit documentary evidence (proof) in support of the reason for early declaration of result to the concerned Evaluation Centre whose details are available on the University website.

Early Declaration is permissible in Term-end Examination only. This facility is not applicable for Lab/Practical Courses, Project, Assignment, Workshop, seminar, etc., based courses. The Application for Early Declaration of result shall be entertained for final year.

15. **Re-evaluation of Answer-script(s)**

After the declaration of result, if the students are not satisfied with the marks awarded, they can request the University to re-evaluate their Answer Scripts on payment of Rs. 500/- per course. The request for re-evaluation by the student must be made within one month from the date of declaration of result to the concerned Evaluation Centre in the prescribed format along-with the fee of Rs. 500/- per course in the form of Demand Draft in favour of IGNOU payable at the city where submitting the Re-evaluation form. Format attached at the end of the Programme Guide.

16. **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.500/- per course through a Bank Draft drawn in favour of IGNOU payable at Delhi and submit the application and fee to the Registrar, SED, IGNOU, Maidan Garhi, New Delhi.

## 17. Photocopy of the Evaluated Answer Script for the Term End Examination

After the declaration of result, if the students are not satisfied with the marks awarded, they can request the University for obtaining Photocopy of Answer Scripts on payment of Rs. 100/- per course. The request for obtaining Photocopy of Answer Scripts by the student must be made within 45 days from the date of declaration of result to the concerned Evaluation Centre in the prescribed format along-with the fee of Rs. 100/- per course in the form of Demand Draft in favour of IGNOU payable at the city where submitting the Photocopy form. Format attached at the end of the Programme Guide.

## 18. Issue of Transcript

The University provides the facility of official transcripts on request made by the learner on plain paper addressed to the Registrar, Student Evaluation Division (SED), Block-12, IGNOU, Maidan Garhi, New Delhi- 1100068. A fee of Rs. 200/- per transcript payable through DD in favour of IGNOU is charged for this purpose. In case of request for sending transcript outside India, the students are required to pay Rs. 400/-. Format attached at the end of the Programme Guide.

## 19. Duplicate Grade Card

The learner can apply for obtaining duplicate Grade Card in case of lost/misplaced/damaged by paying through DD of Rs. 150/- in favour of IGNOU payable at "New Delhi". Format attached at the end of Programme Guide.

# 6. OTHER USEFUL INFORMATION

## 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. 3**) 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, Student Registration Division (SRD) , 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, SRD and the student. The transfer will be permitted only if seats are available at the new Study Centre.

#### **6.5 Correction/Change of Name/Surname of Learner**

**6.5.1** Spelling mistakes, if any, committed at the time of data entry stage will be rectified at the Regional Center and corrected data transmitted to Student Registration Division for updating in the database. However, Learners are expected to write their correct name (as indicated in the High School Certificate) in the Admission Form. In case any change in the name (other than the one mentioned in his/her High School Certificate), then it is mandatory for the prospective learners to furnish legal evidence of having changed his/her name/ surname while submitting the admission form.

**6.5.2** For Change of Name/Surname, after confirmation of admission, the learners are required to submit the following documents at the Regional Centre, for onward transmission to Registrar, SRD:

- (i) Original copy of Notification in a daily newspaper notifying the change of name;
- (ii) Affidavit, in original, on non-judicial Stamp Paper of the appropriate value sworn in before 1st class Magistrate specifying the change in the name;
- (iii) Marriage Card/ Marriage Certificate in case of women candidates for change in surname;
- (iv) Gazette Notification, in original, reflecting the change of name/ surname;
- (v) Demand Draft of Rs. 400/- drawn in favour of IGNOU payable at New Delhi.

**6.5.3 Request for correction and/ or change of Name/ Surname will be entertained only before completion of the programme.**

#### **6.6 Waiver of IGNOU Programme fee to Inmates Lodged in Prisons**

Inmates lodged in Prisons in the country are exempted from payment of programme fee, including cost of Prospectus. The under-trial/short term prisoners are also eligible for the same benefit of FREESHIP as is extended to other prisoners with the condition that when they go out of jail, they will be treated as normal students and shall pay subsequent fees wherever applicable (Examination fee, re-registration fee, pro-rata fee for Re-admission, registration fee for Convocation, etc.).

#### **6.7 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: srd@ignou.ac.in                               |
| (ii) Exam Centres, Results, Re-checking 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 materials and Assignments, Admission , Fees, Scholarship, Change of Address/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<br>SOCIS, C-Block, New Academic Complex<br>IGNOU, Maidan Garhi, New Delhi - 110 068<br>Phone: 011-29533436 and Fax no.011-29534542, Email:mca@ignou.ac.in |
| (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)<br>Examination -I Phone No.011-29535438<br>Intercom No.2224/2213   |
| (vii) Issue of Provisional Certificates and Grade Cards   | Dy Registrar (Exam-III)<br>Phone No: 011-29536743; Intercom No. 2201  |
| (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)<br>Phone No: 011-29536743 Intercom No. 2202<br>E-mail: seemagoswami@ignou.ac.in  |
| (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)<br>Phone No: 011-29536103/6743<br>Intercom No. 2201/2211<br>E-mail:npsingh@ignou.ac.in   |
| (x) Non incorporation of assignment marks   | Assistant Registrar (Assignment)<br>Phone No: 011-29532294<br>Intercom No. 1312/1319/1325<br>E-mail: assignments@ignou.ac.in  |
| (xi) Online students grievances Cell  | Phone No: 011-29532294 Intercom No. 1313<br>E-mail: sregrievance@ignou.ac.in  |
| (xii) Students' General Enquiries   | Front Office (May I help you), SED/SRD<br>Phone No: 011-29535924-32<br>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)

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## **8. MODEL QUESTION PAPERS**

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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 (Revised)**  
**Term-End Examination**  
**June, 2013**  
**MCS-011 : PROBLEM SOLVING AND**  
**PROGRAMMING**

Time : 3 hours

Maximum Marks : 100  
(Weightage 75%)

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**Note : Question number 1 is compulsory. Attempt any three questions from the rest.**

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1. (a) Explain type cast and size of operator in C language with example. 6
- (b) Write an algorithm to check whether the given number is prime or not. 5
- (c) What is the difference between High level language and low level language?  
Why C is referred as middle level language ? 6
- (d) How many bytes are assigned to store for following : 3
- (i) Double
- (ii) Unsigned char
- (iii) Unsigned integer
- (e) Write a program segment to generate the ' 6 following pattern using "for" and "while loop" 6
- ```
*
* *
* * *
* * * *
```
- (f) Explain the concept of stepwise refinement technique. 4
- (g) Give the C expression for the following algebraic expression : 6
- (i)  $\frac{ab^4c^2 - d}{m - n}$
- (ii)  $ab - [(e + f)^9 / c]$
- (h) What is a logical error ? Give an example of logical error in C. 4
2. (a) What is a structure ? How structures are passed as function arguments ? explain with an example. 10
- (b) What is an array ? How arrays are declared 10 and initialized ? Write a C program to add two matrices of 3 x 3 using arrays. 10

3. (a) Write a program to find out square and cube of given number using macros. 6
- (b) What is # define preprocessor in C. How it is implemented and used in C ? 4
- (c) What is a string ? Write a function in C to convert lower case letters to upper case letters in a given string without using strupp ? 10
4. (a) What are address and indirection operators in C ? How strings are Declared through pointers? Write a program that test a string for a palindrome using pointer notation. 10
- (b) Give the types of file supported in C. Explain formulated Input/Output functions as well as string Input/Output functions. 10
5. (a) Explain the use of following functions in C: 10
- (i) Calloc function
- (ii) realloc function
- (iii) fseek ( )
- (iv) ftell ( )
- (v) strcpy ( )
- (b) Differentiate Sequential and Random Access files. 4
- (c) Explain briefly null pointer assignment. Write a program in C to illustrate this concept. 6

**MCA (Revised)**  
**Term-End Examination**  
**June, 2013**

**MCS-012 : COMPUTER ORGANISATION &  
ASSEMBLY LANGUAGE PROGRAMMING**

Time : 3 Hours

Maximum Marks : 100  
(Weightage : 75%)

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**Note : Question no. 1 is compulsory and carries 40 marks. Attempt any three questions from the rest.**

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1. (a) Add +45 and —10 in binary using 8 bit registers, in 4
- (i) Signed 1's complement  
(ii) Signed 2's complement
- (b) Simplify the following function using Karnaugh map and draw the circuit using AND, OR and NOT gates. 6
- $F(A, B, C) = \Sigma (1, 3, 4, 5, 6, 7)$
- (c) Differentiate between 4
- (i) ROM and Flash Memory  
ii) CDROM and CDRW
- (d) How many RAM chips of size 512K x 1 bit are required to build 1MByte of memory. Show the address distribution for the scheme. 5
- (e) Explain the associative Mapping scheme for Cache Memory. 4
- (f) Explain the features of RAID level 1 and RAID level 5. 5
- (g) Explain various types of instructions used in a typical computer system. 4
- (h) Write a program using 8086 assembly language for multiplication of two 8 bit numbers. Also display the result. 4
- (i) Explain the following 8086 microprocessor with the help of an example. 4
- (i) DAA  
(ii) TEST
2. (a) What are logic Micro operations ? Explain with the help of Examples. 6
- (b) Write a program using 8086 assembly language to linear search an 8 bit value in consecutive byte memory locations. 7

- (c) What is the role of control unit in a computer ? Explain Wilke's control unit using a diagram. 7
3. (a) Explain the memory interleaving with the help of a diagram. 4
- (b) Draw and explain a 4 - bit Adder Subtractor circuit. 6
- (c) Design and explain an instruction pipeline using an illustration. What are various problems faced by an instruction pipeline ? 10
4. (a) Explain with the help of an example/ diagram if needed 8
- (i) Isolated I/O
- (ii) Memory Mapped I/O
- (b) Explain the following techniques for monitors 8
- (i) Shadow Mask
- (ii) Cathode Ray tubes
- (iii) Dot Pitch
- (iii) DPI
- (c) Explain the concept of Virtual Memory in the context of memory management. 4
5. (a) Represent a binary number 1001011 in IEEE 754 floating point representation using 32 bit word length (24 bit mantissa and 8 bit biased exponent). 6

**MCA(Revised)**  
**Term-End Examination**  
**June, 2013**

**MCS-013 : DISCRETE MATHEMATICS**

Time : 2 hours

Maximum Marks : 50

**Note : Question number 1 is compulsory. Attempt any three question from the rest.**

1. (a) A carpenter has twelve patterns of chairs 3 and five patterns of tables. In how many ways can he make a pair of chair and table ? 3
- (b) If 30 books in a school contain a total of 361,327 pages, then show that one of the books must have at least 2045 pages. 3
- (c) Prove that  $A - B = A \Rightarrow A \cap B = \emptyset$  3
- (d) Find the domain for which the functions  $f(x) = 2x^2 - 1$  and  $g(x) = 1 - 3x$  are equal. Also find a domain for which the functions are not equal.
- (e) Construct the truth table of  $(p \vee q) \wedge (\neg p \vee \neg q)$ . 4
- (f) Show that  $a \cdot b + a' \cdot b' = (a' + b) \cdot (a + b')$  3
2. (a) Use mathematical induction method to prove that  $1+3+5+\dots+(2n-1) = n^2$ . 4
- (b) Prove that  $n! + (n+2) = (n+1)!$  3
- (c) Consider the set of ordered pair of natural numbers  $N \times N$  defined by : 3  
 $(a, b) R (c, d) \iff a + d = b + c$ . Prove that is an equivalence relation.
3. (a) Show that  $(p \wedge q) \vee (\neg p \wedge \neg q)$  is a tautology. 3
- (b) Prove that the inverse of one-one onto mapping is unique. 4
- (c) How many solutions does the equation  $x_1 + x_2 + x_3 = 11$  have, where  $x_1, x_2$  and  $x_3$  are non negative integers ? 3
4. (a) Express the Boolean expression  $4xyz' + y'z + xz'$  in a sum of product form. 4
- (b) Find the output of the given circuit. 3
5. (a) In how many ways a person can invite eight of his friends to a party by inviting at least one of them be a female. Considering that the person is having 15 male and 8 female friends. 4
- (b) Let A be the set  $\{ 1, 2, 3, 4 \}$ . Which ordered pairs are in the relation  $R = \{(a, b) \mid a \text{ divides } b\}$  ? 3
- (c) Explain duality principle with the help of example. 3

**MCA(Revised)**  
**Term-End Examination**  
**June, 2013**

**MCS-014 : SYSTEM ANALYSIS AND DESIGN**

Time : 3 hours

Maximum Marks : 100

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**Note : Question number 1 is compulsory. Attempt any three question from the rest.**

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1. (a) Draw a Data Flow Diagram (DFD) till second level depicting various processes, data flow and data repositories for a "Library Management System". Follow the conventions. **10**
- (b) Define a Structure Chart. Draw a Structure Chart for a Payroll Processing System. Also, explain the symbols used in the chart. **10**
- (c) Define modularity. Describe the ways and means to achieve modularity. Explain with the help of an example. **10**
- (d) Write the importance of quality in software development. List specifications of various quality factors. **10**
2. (a) Explain Real Time Systems and Distributed Systems. **10**
- (b) Explain Structured Analysis and Structured Design. What are its goals ? **10**
3. (a) What are the various activities involved in the feasibility study ? Discuss *any three* feasibilities need to be studied during feasibility analysis. **10**
- (b) What are top-down design and bottom-up approaches ? Design top-down approach for any system of your choice. **10**
4. (a) Describe all the steps involved in database design for the system discussed in 1 (a) question. **10**
- (b) Define CASE tools. Explain their role. **5**
- (c) With the help of an example, explain a sequence diagram. **5**
5. Write short notes on the following : **4x5=20**
  - (a) Participatory Design
  - (b) Test Design Document
  - (c) Coupling
  - (d) Decision Tables

**MCS-015**  
**MCA (Revised)**  
**Term-End Examination**  
**June, 2013**

**MCS-015 : COMMUNICATION SKILLS**

Time : 2 hours

Maximum Marks : 50

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**Note : Attempt all questions.**

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**1. Read the following passage and answer the questions given below it.**

Koduvally village near Kozhikode in north Kerala has nearly forgotten its tradition of pottery-making. Today, it is known as the state's "goldvillage", boasting more than 100 jewellery shops. Their clientele : hundreds of families who have relatives working in the Gulf.

In spite of sky-rocketing prices of the yellow metal - from Rs 4,395 per 10 gram in 2000 to more than Rs 20,000 in 2011 - its demand has not been seriously affected in Kerala. The south Indian states alone account for 60 percent of gold sales in India, the world's biggest gold consumer. According to industry sources, Kerala tops the country in gold consumption, with the largest number of retailers - more than 5,000 compared to 1,000 a decade ago. The state consumes about 75 tonnes - valued at about Rs 20,000 crore – of the 650 tonnes of gold sold in India every year and is home to some of Asia's largest gold showrooms. And it's not just the urban parts of the state where swanky, mammoth showrooms are coming up every day; even the villages are witnessing the gold rush with showrooms covering up to 35,000 sq ft.

This huge demand is attributed to the growing remittances - Rs 40,000 crore annually - by its 20 lakh - strong non-residents based in the Gulf and the US. Another reason is the steep increase in prices of rubber in the last 10 years, from Rs 25 per kg to Rs 225 per kg, which is bringing a windfall to Kerala farmers who produce 92 percent of India's natural rubber.

- (a) Say whether the following statements are *True (T)* or *False (F)*. 4
- (i) Once upon a time pottery making was the main occupation of the people of Koduvally.
  - (ii) The people of Koduvally buy gold mainly from Gulf countries.
  - (iii) Kerala is the biggest consumer of gold in the world.
  - (iv) The number of retail gold sellers has gone up from 1000 to 5000 in 10 years.
- (b) Answer the following questions : 2
- (i) Mention the two biggest sources of money in Kerala which enables them to buy gold.
  - (ii) Which part of India is the biggest consumer of gold ?

- (c) Find words from the passage which are close in meaning to the following words/phrases. flashy, very large, money sent to someone at a distance, an unexpected piece of good fortune. 2
- (d) Find words from the passage which are opposite in meaning to the following words : rural, gentle 2
2. Do as directed : 5
- (a) The missing file (was, had been) found in the drawer. (choose the correct word /phrase)
- (b) The stationery available in the local market is the . (use the correct form of *cheap*)
- (c) Form a question to which the following may be the answer.  
The Chief Minister was interviewed by Barkha Dutt.
- (d) Mr. Khanna was asked to explain why he was late. (rewrite in the active voice)
- (e) Dogs are faithful animals \_\_\_\_ (supply a question tag)
3. As purchase manager of a garment factory, you purchased 1000 balls of silk material from Tushar Silk Mills Surat. On delivery it was found that at least 30% of the material had weaving or printing defects. Write a letter to the supplier stating the details of defects and asking them to give a replacement and also give compensation for the inconvenience and loss of time. 10
4. You are an M.Com and MBA from Nagpur University. 10+5  
Apply to HDFC bank for the post of an Assistant Manager. Mention a few other qualities of yours that would be helpful for this job. Enclose a C.V along with the application.
5. You are a Receptionist in Hotel Rain Tree in Chennai. Construct a telephonic conversation with a client who wants to seek information regarding the kind of accommodation available, the tariff, corporate discount, pick up facilities etc. You must write 10 turns of the conversation. 10



**MASTER IN COMPUTER APPLICATIONS**  
**(Revised)**  
**Term-End Practical Examination**  
**June, 2013**

**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.**

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1. Design a log-in page of your company having field for name and password After clicking a log-in button, it should open a new page giving details of the company profile. 20
  
2. Write a program using VB script to do the followings : 20
  - (a) Check the empty text box.
  
  - (b) Generate a random number between 1 to 10.

**MCA (Revised)**  
**Term-End Practical Examination**  
**June, 2013**

**MCSL - 017: C AND ASSEMBLY LANGUAGE PROGRAMMING**

Time allowed : 2 hours

Maximum Marks : 50

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**Note : There are two sections in this paper. Each section is of 1 hour duration. Each section has one compulsory question of 20 marks. Each section has 5 marks for viva-voce separately.**

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**SECTION - A**

**C Programming**

1. Write a C program which read the content of a\_file named MyRecords .txt and display it on console/monitor. 20

**SECTION – B**

**Assembly Language Programming**

1. Write a 8086 assembly language program that take three decimal number as input and find the largest among them. 20

## MCA SECOND SEMESTER MODEL QUESTION PAPERS

**MASTER IN COMPUTER APPLICATIONS  
(Revised)  
Term-End Practical Examination  
June, 2013**

**MCS-021 : DATA AND FILE STRUCTURES**

Time allowed : 3 hours

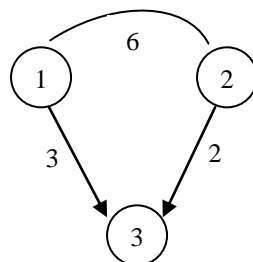
Maximum Marks : 100

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**Note : Question number 1 is Compulsory. Attempt any three questions from the rest. All algorithms should be written nearer to 'C' language.**

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1. (a) Design algorithms for various operations performed on circularly linked list. **10**
- (b) What are the advantages of using lists than arrays while implementing a stack? Explain. **10**
- (c) Write a procedure to find minimum cost spanning tree for a graph using Prim's algorithm. **10**
- (d) Explain the process of creating a Splay Tree using an example. **10**
2. (a) Write a procedure to create, insert and display the content of a singly linked list. **10**
- (b) Propose any two representations for Sparse Matrices and compare them. **10**
3. (a) Write a procedure to create, insert and delete an element in queue. **10**
- (b) Explain the all-pairs shortest path problems with algorithm and trace the algorithm for the following digraph : **10**



- 4.** (a) Write a procedure to sort the following sequence : **10**  
25 57 48 37 12 92 86 33. Use Heap Sort.
- (b) Write the algorithms for each of the following for binary trees :  
(i) Inorder traversal  
(ii) Preorder traversal  
(iii) Postorder traversal
- 5.** (a) Enumerate different file organizations. Explain any two file organizations with examples. **10**
- (b) Discuss any two applications of red-black trees in detail. **10**

**MCA (Revised)**  
**Term-End Examination**  
**June, 2013**

**MCS-022 : OPERATING SYSTEM CONCEPTS  
AND NETWORKING MANAGEMENT**

Time : 3 hours

Maximum Marks : 100

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**Note : Question No. 1 is compulsory. Answer any three questions from the rest.**

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- |    |     |                                                                                             |    |
|----|-----|---------------------------------------------------------------------------------------------|----|
| 1. | (a) | What is an operating system ? Explain the component of computer system with a neat diagram. | 6  |
|    | (b) | Describe the evolution of operating system.                                                 | 6  |
|    | (c) | What are the characteristics of modern operating system ?                                   | 6  |
|    | (d) | Explain the various topologies for a networking system.                                     | 6  |
|    | (e) | Explain the detail about the OSI layers.                                                    | 7  |
|    | (f) | Give the differences between LAN and WAN.                                                   | 6  |
|    | (g) | Write down the purpose of the repeater.                                                     | 3  |
| 2. | (a) | List down the application layer protocols. Explain each one of them in detail.              | 10 |
|    | (b) | Explain the Architecture of Simple Network Management protocol (SNMP)with a neat diagram.   | 10 |
| 3. | (a) | Discuss about the various component of Linux Operating System.                              | 10 |
|    | (b) | What are the file manipulation commands. Briefly explain them with the Syntax.              | 8  |
|    | (c) | What are called filters ?                                                                   | 2  |
| 4. | (a) | Explain about windows 2000 domains, workgroups and trusted relationships.                   | 7  |
|    | (b) | Discuss in detail about user account administration.                                        | 6  |
|    | (c) | How do you configure TCP/IP protocol setting for windows XP ?                               | 7  |
| 5. |     | Give a brief note on the following :                                                        | 20 |
|    | (a) | System Access Control                                                                       |    |
|    | (b) | Password Management                                                                         |    |
|    | (c) | Intrusion Detection                                                                         |    |
|    | (d) | Firewall                                                                                    |    |
|    | (e) | Windows NT Domain Management                                                                |    |

**MCA (Revised)**  
**Term-End Examination**  
**June, 2013**

**MCS-023 : DATABASE MANAGEMENT SYSTEMS**

Time : 3 hours

Maximum Marks : 100  
*(Weightage 75%)*

**Note : Question No. 1 is compulsory. Attempt any three questions from the rest.**

1. (a) Discuss the difference between database systems and file Based systems. 5
- (b) Explain the GROUPBY clause. What is the difference between the WHERE and HAVING clause in SQL ? 6
- (c) Define foreign key. Explain its significance. 4
- (d) Is BCNF stronger than SNF ? Justify your answer with the help of an example. 5
- (e) Discuss the different process of authorisation permitted on database items with the help of examples ? 6
- (f) Define Data Independence ? Explain the difference between physical and logical data independence. 5
- (g) List all the functional dependencies that holds true for the following relation. 4

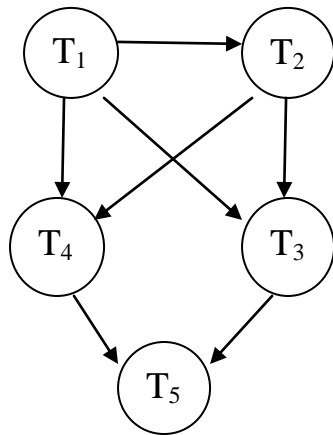
| A              | B              | C              |
|----------------|----------------|----------------|
| a <sub>1</sub> | b <sub>1</sub> | C <sub>1</sub> |
| a <sub>1</sub> | b <sub>1</sub> | C <sub>1</sub> |
| a <sub>1</sub> | b <sub>1</sub> | C <sub>1</sub> |
| a <sub>1</sub> | b <sub>1</sub> | C <sub>1</sub> |

- (h) Discuss the two-phase locking protocol in concurrency control ? 5
2. (a) Construct an E-R diagram for the following problem definition: 8  
 Each company operates four departments, and each department belongs to one company. Each department employs one or more employees, and each employee works for one department. Each of the employees may or may not have one or more dependents, and each dependent belongs to one employee.

- (b) Explain Generalisation/Specialisation in an E-R diagram with the help of an example ? 6
- (c) How would you map the following ER constructs into relations ? Give suitable example. 6
- (i) Weak Entity  
(ii) Generalization  
(iii) Ternary Relationship.
3. (a) What is an outer join ? Discuss the different types of outer joins with the help of example. 5
- (b) Consider the following relations for a database that keeps track of business trips of salespersons in a sales office: 9
- SALES PERSON (SSN, Name, Start-Year, Dept-No)
- TRIP(SSN, From-City, To-City, Departure-Date, Return-Date, Trip-ID)
- EXPENSE(Trip-ID, Account #, Amount)
- Specify the following queries in SQL?
- (i) Find the details (all attributes of TRIP relation) for trips whose expenses exceeds \$2000.
- (ii) Find the SSN of salesman who took trips to 'Honolulu'.
- (iii) Find the total trip expenses incurred by the salesman with SSN = '234 — 56 —7890'.
- (iv) Write the DDL expressions for the above relations:
- (c) Define a view ? How is it different from a table ? Write the SQL Syntax for creating a view. 6
- (b) What are the differences between BST-Tree and B tree Indexes ? 4
- (c) Compare sequential file organisation with Heap files organisation. Discuss the advantages and disadvantages of sequential file organisation. 5
- (d) Explain the following terms : 6
- (i) Equi Join  
(ii) Data Replication  
(iii) Entity Integrity Constraints.
4. (a) Consider the following relation for published books : 10
- Book (Book title, Author name, Book-type, list price, Author-affil, Publisher)  
(Author-affil refers to the affiliation of the author.) Suppose the following dependencies exist :

Book-title → Publisher, Book-type  
 Book-type y → list price  
 Author-name → Author-affil

- (i) What normal form is the above relation in ? Justify.
  - (ii) Normalize the above relation to its highest Normal form.
- (b) Discuss the different types of fragmentation in distributed databases with the help of an example. 5
- (c) Explain the ACID properties of transactions in Database system. 5
5. (a) Consider the precedence graph of a schedule given below. Is the schedule serializable ? Justify. 5





**MCA (Revised)**  
**Term-End Examination**  
**June, 2013**

**MCS-024 : OBJECT ORIENTED TECHNOLOGIES AND JAVA  
PROGRAMMING**

Time : 3 hours

Maximum Marks : 100

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**Note : Question No. 1 is compulsory. Attempt any three questions from the rest.  
Attempt all parts of questions together.**

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1. (a) Bring out the difference between the string and stringbuffer classes in Java. 5
- (b) Explain the concept of inheritance. Give a suitable example by declaring a class and showing two levels of inherited classes with the methods of each. 7
- (c) There are some classes that reside in a public package called my Package. Give three ways in which these can be accessed in the default unnamed package. If one of the classes in my Package has the same name as a class in the default package, how can it be referred to in the default package ? 4
- (d) What are the steps involved in creating a distributed application using Remote Method Invocation ? 6
- (e) (i) How would you transfer control from the innermost loop of a thrice nested loop to the next statement outside the loops ? 1
- (ii) What are the conditions necessary for a class to be serializable ? 1
- (iii) Why is it not necessary to handle Runtime Exception ? 2
- (f) When is the "this" keyword used and why ? Write a program fragment to illustrate. 4
- (g) Write a Java program to read a text file and output the number of case insensitive occurrences of the sequence of letters "the" in it. 10
2. (a) What are Java controls and containers ? Write an applet that displays three labels and four non-exclusive checkboxes on the screen. 8
- (b) Construct a programming problem where the switch statement cannot be used for taking decisions. Now write a Java program to solve the problem. 6
- (c) Write a program to track sessions through hidden form fields. What is the disadvantage of this approach ? 6
3. (a) What is polymorphism ? Write a program to illustrate late binding in Java. 10

- (b) "Experiment 1" is a text file. Write a Java program to read "Experiment 1" and copy the contents of "Experiment 1" to a new file "Experiment 2". Also count the number of words and lines copied. 10
4. (a) There is a database with a table emp\_t that has employee\_id, name, old\_basic\_salary and new\_basic. Write a Java program to find all employees whose old basic salary is less than 20,000 and give them a 10% raise, while all others get a 6% raise. Update emp\_t with the new basic salary of each employee. 12
- (b) Suppose x in octal notation is  $(567)_8$  and similarly  $y = (— 325)_8$ . Write down the values of :
- (i)  $x \ll y$  (ii)  $x / y$
- (iii)  $x \& y$  (iv)  $x \gg 3$
- (v)  $x \gg \gg 3$  (vi)  $x \wedge y$
- (vii)  $\sim x$  (viii)  $\sim y$
5. (a) What is meant by thread priority ? Write a Java program that creates two threads-one with minimum and the other with maximum priority. The first prints the letters A to Z while the second prints the numbers 1 to 26. Which thread would you expect to finish first and why ? 8
- (b) Write a Java program that finds : 8
- (i) the area of a circle with that radius if 1 parameter is passed to it.
- (ii) the area of a rectangle with those sides if 2 parameters are passed to it.
- (iii) the surface area of a box if 3 parameters are passed to it.
- (c) Explain how to compile and run a Java Servlet. 4

**MCA (REVISED)**  
**Term-End Practical Examination**  
**June, 2013**

**MCSL-025 : LABORATORY COURSE (FOR DATA AND FILE  
STRUCTURES, NETWORKING, DBMS LAB AND JAVA  
PROGRAMMING)**

Time allowed : 3 hours

Maximum Marks : 100

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**Note : There are four sections in this paper. Each section is of 45 minutes duration. Attempt only those sections in which you are not yet successful. Answer all the questions in each section. Each section carries 20 marks and the viva-voce for each section is of 5 marks separately.**

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**SECTION-A**  
**Data and File Structures**

1. Write a C program to implement Binary Search Algorithm. Using this program search 9 from the following list : 20
- 1, 3, 6, 9, 12, 15, 18, 21, 24.

**SECTION-B**  
**Networking**

**Perform the practical on LINUX/UNIX/Windows 2000. In case you do not have sufficient rights to perform a task, then write all the steps to perform that task.**

1. Run the following commands and write the uses of each command. 4
- (a) sfc (b) hostname (c) rcp (d) diskperf
2. Perform the following tasks : 9
- (a) Create a file named My.TXT and copy it to another drive/ directory.
- (b) Create a user group with two users and set their password.
- (c) Show TCP/IP setting of your PC.
3. Install and configure a network printer. 7

**SECTION-C**  
**DBMS LAB**

1. (a) Create the following table with proper data types for all the fields. 8  
The key field is underlined. Insert 10 meaningful records in the table.
- STUDENT (Roll\_No, Name, Program, Date\_of\_Birth, Semester,  
year\_of\_ Admission)
- (b) Answer the following queries using SQL on the above table : 12
- (i) List name and Roll number of all the MCA program students.
  - (ii) List name and program of study of all the students whose date of birth is 01/09/1994 or after that.
  - (iii) List name and Roll number of all the MCA program Third Semester students.

**SECTION-D**  
**Java Programming**

1. Write a Java program which create a class named Account and derive Saving – Account and Fixed - Account classes from it. Define appropriate constructors and methods to access account detail.

## 9. FORMS AND ENCLOSURES

Please read the instructions overleaf before filling up this form:



**Indira Gandhi National Open University  
New Delhi**

**Form No.1**

### REQUISITION FOR FRESH SET OF ASSIGNMENTS

Programme of Study

Enrolment Number 

|  |  |  |  |  |  |  |  |  |
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 Study Centre Code 

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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.

| Sl. No. | Course Code | Assignment Code | Course Title | Medium |
|---------|-------------|-----------------|--------------|--------|
| 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 :** .....

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**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

***Please retain a photocopy of any matter that you submit to the University.***

**Application Form for obtaining Duplicate Grade Card/Mark-sheet**

Name of the Candidate .....

Enrolment No.

|  |  |  |  |  |  |  |  |  |  |
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Address .....

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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. 150/- in favour of  
IGNOU,  
New Delhi

Date: .....

.....  
Signature**Note:** Fee for duplicate, grade card is Rs. 150/-. 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 Regional Director  
IGNOU Regional Centre \_\_\_\_\_

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.*





**Indira Gandhi National Open University**  
**RE-REGISTRATION/COURSE OPTION FORM**  
**For BCA/MCA/MP– Session**  
**and**  
**RE-ADMISSION FORM FOR MP**

**Form No.4**

Send this filled-in form  
 along with fee to:  
**The Regional Director**  
 of your Regional Centre  
 \* As per schedule

I opt for the following courses and enclose a Demand Draft towards the course fee as per details given below:  
 (For details of courses on offer, please see overleaf).

1. Name of Student : \_\_\_\_\_  
 in block letters
2. Enrolment Number : 

|  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|
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3. Region Code : 

|  |  |
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4. Programme Code : 

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5. Specialisation : \_\_\_\_\_  
 Diploma Code for  
 MBA degree

|                         |
|-------------------------|
| Draft No. : _____       |
| Issuing Bank and Branch |
| Payable at : _____      |
| Date : _____            |
| Amount Rs. : _____      |

6. Semester for which re-regn. is sought (Please √):

| <b>MCA (for revised syllabus only)</b> |     |    |   |    |
|----------------------------------------|-----|----|---|----|
| II                                     | III | IV | V | VI |
|                                        |     |    |   |    |

| <b>BCA (for pre-revised sylb. only)</b> |     |    |   |    |
|-----------------------------------------|-----|----|---|----|
| II                                      | III | IV | V | VI |
|                                         |     |    |   |    |

7. Details of course(s) opted (for MP students only)

| S.No.                   | Course Title | Course Code | Course Fee |
|-------------------------|--------------|-------------|------------|
| 1.                      |              |             | Rs.        |
| 2.                      |              |             | Rs.        |
| 3.                      |              |             | Rs.        |
| 4.                      |              |             | Rs.        |
| Late fee, if applicable |              |             | Rs.        |
| Total fee               |              |             | Rs.        |

Note: 1. A student can remit the fee pertaining to one semester only at a time. Only one RR Form will be accepted for a given semester.

- For MP students only:**
2. A student should opt for and indicate the **Specialisation Diploma** of his/her choice, if not already done, as soon as he/she registers for the first course of specialisation stream and should indicate the **Specialisation Diploma code in item No. 5** above. **The option once exercised shall be final.** If no specialisation is indicated in item 5 above, University shall register you for specialisation area on the basis of first course opted from specialisation stream. **No change would be permissible at subsequent stage.**
  3. A student can opt up to **four courses** in a given session. Courses already opted need not be repeated unless the validity of registration of such a course has already expired. Further, **a student can submit only one RR Form for a given session. For registration purposes, MS-100 is treated as one course. The fee for MS-100 is Rs.3000/-.**
  4. A course once selected for study **must be successfully completed within 4 semesters.** In case of failure to do so, the student will be required to seek **RE-ADMISSION** by paying a fee of **Rs.1500/- per course**, as per schedule given below.
  5. Request for **change of course** should be submitted to the RC, as per schedule (fee @**Rs.1500/- per course**).
  6. MBA old students initially registered up to **JULY 2006 cycle of admission** are **not eligible for Re-registration in JULY 2014 session.**

7. The **validity** of registration of the courses being done in **JULY 2014 session** by the old students of **Jan.2007, July 2007 & Jan.2008 batches** will be reduced to **ONE, TWO & THREE semesters** respectively, as against the normal four semesters due to **fixing of Maximum duration of 8 (eight) years** in Management Programmes.

**Signature of the Student with date**

\_\_\_\_\_

**Address:**

\_\_\_\_\_

Mobile No

\_\_\_\_\_

Phone No & E-mail Id:

**\* Schedule for submission of Re-registration form at the Regional Centre only:**

|    | <b>For July Session</b>                            | <b>For January Session</b>                            | <b>Late Fee</b> |
|----|----------------------------------------------------|-------------------------------------------------------|-----------------|
| 1. | 1 <sup>st</sup> February to 31 <sup>st</sup> March | 1 <sup>st</sup> August to 1 <sup>st</sup> October     | Nil             |
| 2. | 1 <sup>st</sup> April to 30 <sup>th</sup> April    | 3 <sup>rd</sup> October to 31 <sup>st</sup> October   | 200.00          |
| 3. | 1 <sup>st</sup> May to 31 <sup>st</sup> May        | 1 <sup>st</sup> November to 30 <sup>th</sup> November | 500.00          |
| 4. | 1 <sup>st</sup> June to 20 <sup>th</sup> June      | 1 <sup>st</sup> December to 20 <sup>th</sup> December | 1000.00         |



**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:.....

| Courses, in which<br>Re-evaluation is sought | COURSE CODE | TITLE OF THE COURSE |
|----------------------------------------------|-------------|---------------------|
| .....                                        | .....       | .....               |
| .....                                        | .....       | .....               |
| .....                                        | .....       | .....               |
| .....                                        | .....       | .....               |

Total amount paid Rs:.....  
 (Rs.500/- per course/paper)

Bank Draft No.....(Issuing Bank).....

Date:.....

Signature of the student

## **RULES & REGULATION FOR RE-EVALUATION OF ANSWER SCRIPTS**

- 1) The request for re-evaluation by the student must be made before 31st March for December TEE and 30th September for June TEE or within one month of declaration of results, whichever is later.
- 2) The date of declaration of result will be calculated from the date on which the result are placed on the IGNOU website.
- 3) After re-evaluation, the better of the two scores of original marks/grade and marks/grade after reevaluation will be considered.
- 4) The revised marks/grade after re-evaluation shall be communicated to the student on receipt of reevaluation result and result of re-evaluation will also made available on the IGNOU website at [www.ignou.ac.in](http://www.ignou.ac.in). The minimum time required for re-evaluation shall be 30 days from the date of receipt of application.
- 5) Re-evaluation is permissible in TEE only and not in the Project/Dissertation Practicals/Lab courses, Workshops, Assignments & Seminar etc.
- 6) On the top of the envelope containing the prescribed application form, Please mention '**APPLICATION FORM FOR RE-EVALUATION OF ANSWER SCRIPTS**'.
- 7) Application form must reach within the prescribed dates at the following address:-

| Sl.No. | Address of Evaluation Centre                                                                                                                                 | Jurisdiction of Evaluation Centre                                                                                                                  |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.     | Dy. Registrar<br>Evaluation Centre<br>Block-5, IGNOU, Maidan Garhi<br>New Delhi-110068                                                                       | All Examination Centres within Delhi-1, Delhi- 2, Delhi-3, All Schools and Divisions at Hqs.                                                       |
| 2.     | Dy. Registrar<br>Evaluation Centre, Periyar Thidal<br>No.50, EVK Sampath Road<br>Vepery Chennai – 600 007                                                    | All Examination Centres in Chennai, Hyderabad, Port Blair, Vijayawada, Trivandrum, Cochin, Bangalore, Madurai, Panaji, Nagpur and Sub-RC Vatakara. |
| 3.     | Dy. Registrar<br>Evaluation Centre<br>IGNOU Regional Centre<br>2nd Floor, Biscomaun Tower<br>W. Gandhi Maidan, Patna -800 001                                | All Examination Centres in Patna, Raipur, Bhuvneshwar, Koraput, Siliguri and Raghunathganj.                                                        |
| 4.     | Dy. Registrar<br>Evaluation Centre, IGNOU Regional<br>Centre, B-1/33, Sector-H, Aliganj<br>Lucknow – 226 024                                                 | All Examination Centres in Lucknow, Varanasi, Aligarh, Dehradun, Noida, Karnal, Chandigarh, Khanna, Shimla, Jammu and Srinagar,                    |
| 5.     | Dy. Registrar<br>Evaluation Centre, IGNOU Regional<br>Centre, 1st Floor, MSFC Building<br>270, Senapati Bapat Road, Pune-<br>411016                          | All Examination Centres in Pune, Ahmedabad, Bhopal, Jabalpur, Jaipur, Rajkot and Mumbai.                                                           |
| 6.     | Dy. Registrar<br>Evaluation Centre, IGNOU Regional<br>Centre, H/No.71, GMC Road<br>Christian Basti, Guwahati – 781 005                                       | All Examination Centres in Guwahati, Itanagar, Imphal, Shilong, Agartala, Gangtok, Kohima and Aizwal.                                              |
| 7.     | Dy. Registrar<br>Evaluation Centre<br>IGNOU Regional Centre<br>Bikash Bhavan, 4th Floor, North<br>Block,<br>Bidhan Nagar (Salt Lake City)<br>Kolkata-700091. | All Examination Centres in Kolkata, Darbhanga and Ranchi.                                                                                          |



**Indira Gandhi National Open University**  
**Student Registration Division**  
**Maidan Garhi, New Delhi – 110 068**

**Form No.6**

Dates for submission :  
**1<sup>st</sup> Aug. to 31<sup>st</sup> Oct.**  
 or  
**1<sup>st</sup> Feb. to 30<sup>th</sup> April**

**RE-ADMISSION FORM FOR ALL PROGRAMMES**  
 (other than MP & MPB - Details as shown in Table-A)

1. Name & Address of the student \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

2. Programme Code :

3. Enrol.No.

4. Regional Centre Code :

5. Study Centre Code :

6. Details of course(s) not completed for which re-admission is sought (please enclosed a separate Annexure, if the table below is found insufficient).

| S.No.     | Course Code | Title of the Course | Credits | Course Fee (Rs.) |
|-----------|-------------|---------------------|---------|------------------|
|           |             |                     |         |                  |
|           |             |                     |         |                  |
|           |             |                     |         |                  |
|           |             |                     |         |                  |
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|           |             |                     |         |                  |
|           |             |                     |         |                  |
|           |             |                     |         |                  |
| Total Rs. |             |                     |         |                  |

7. Details of re-registration for the missed year(s)/semester(s), if any:

| Year(s)/ semester(s) | Course Code(s) of the missed year(s)/semester(s) | Re-registration fee as per current rate (Rs.) |
|----------------------|--------------------------------------------------|-----------------------------------------------|
|                      |                                                  |                                               |

8. Total Fee (col.no.6+7) Rs. \_\_\_\_\_ enclosed vide Demand Draft No. \_\_\_\_\_  
 Date \_\_\_\_\_ of \_\_\_\_\_ (Name of Bank)  
 (DD should be drawn in favour of "IGNOU" payable at New Delhi)

Dated : \_\_\_\_\_

Signature of the student

Mail this **Re-admission Form** along with DD to Registrar,  
 Student Registration Division, IGNOU, Maidan Garhi, New  
 Delhi-110 068 on or before the last date mentioned above.

Note: **Please retain a copy of this form for any future reference.**

## **RULES & GUIDELINES FOR RE-ADMISSION**

1. Re-admission is permissible in the following cases :
  - (a) Students who failed to complete the requirements in full or in part within the maximum span period prescribed.
  - (b) Students who failed to complete the requirement of attendance in practicals as prescribed in Programme curriculum within the maximum span period prescribed.
2. **Students who do not register for all years/semesters of a Programme and fail to pay the prescribed full Programme fee during the maximum duration of the Programme are also eligible for Re-admission, provided they pay full fee for the missed year(s)/ semester(s) as per rate applicable for the session for which they seek re-admission, in addition to the *pro-rata course fee for re-admission* as per rate given in Table-A for each of the course(s) they failed to successfully complete within the maximum period prescribed.**
3. Course fee paid for re-admission would be valid for a period of **six months/one year/two consecutive academic years or four consecutive semesters** only, as given below:
  - a) **Six months** - **for all Certificate Programmes of six months duration**
  - b) **One year** - **for all Diploma/PG Dip. Programmes of one year duration (including BLIS, MLIS, MADE etc.)**
  - c) **Two years** - **for all undergraduate and post-graduate programmes whose minimum duration is of 2 years and above.**
4. **The additional period indicated at point no.3 above will commence from the date of completion of the maximum duration of the Programme for which the registration was done initially.**
5. Students shall not be on rolls of the university beyond the additional period indicated at point no.3 above.
6. The credit earned by the student towards his/her courses and assignments successfully completed shall be retained for the revalidated period, provided the syllabus and methodology now in vogue are similar to the course(s) successfully completed earlier.
7. No study material will be supplied on re-admission. If the earlier study material is replaced, the student will be required to buy changed course material.
8. The students will be allowed to take re-admission in the old course(s) as long as the examination in the old course(s) is conducted by the University.
9. For the Programmes containing practical component, the norms of fee payable will be as decided by the respective Schools.
10. Students are required to pay the *pro-rata Re-admission fee* as per details given in Table-A, in lump sum, for all the courses they failed to successfully complete earlier. **Fee once paid will not be refunded under any circumstances.** Students of **BCA-MCA Integrated Programme** should pay the *pro-rata re-admission fee*, in lump sum, for all those courses of BCA as well as MCA that have not been successfully completed during the maximum duration of 8 years.
11. *Pro-rata fee* for Re-admission would be changed as and when the University revises the Programme fee for various Programmes.
12. Other conditions as prescribed by the University relating to the admission and re-admission shall remain the same.
13. The Demand Draft for Re-admission fee together with the re-registration fee of the missed year(s)/semester(s), if any, should be drawn in favour of IGNOU payable at New Delhi. Please write your Enrol. No., Name and Programme code and also the words '**Re-admission**' on the reverse of the DD.

### **P.S.**

1. **Students can check their Re-admission status from the website ([www.ignou.ac.in](http://www.ignou.ac.in)> STUDENTS ZONE> Admission> Registration Status> CHECK READMISSION Status >).**
2. **The following programmes have been wound-up and term-end examination will no longer be conducted in the old syllabus courses, hence re-admission not allowed:**
  - (i) **BCA(old sylb) [Jan.1996, Jan.1997 & Jan.1998 batches]**
  - (ii) **MCA(old syllabus) [pre-Jan. 2005 batches]**
  - (iii) **CIC (However Re-admss will be applicable for CIC-2 & CIC-5 for B.Com & CBS students)**
  - (iv) **BIT,** (v) **ADIT,** (vi) **MLIS (old sylb.),** (vii) **BLIS (old sylb.)** & (viii) **B.Sc(N) (old sylb.)**

**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:

|         | <u>COURSE CODE</u> | <u>COURSE CODE</u> |
|---------|--------------------|--------------------|
| 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. 500/- =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: .....

Place: .....

Signature: .....

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. 500/- 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"



**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  
.....  
.....  
.....

(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.



**INDIRA GANDHI NATIONAL OPEN UNIVERSITY**  
 STUDENT EVALUATION DIVISION  
 MAIDAN GARHI, NEW DELHI-110 068  
 TERM-END EXAM – JUNE / DECEMBER, 201 \_\_\_\_

**EXAM FORM**

|            |  |
|------------|--|
| Serial No. |  |
|------------|--|

Control No.

**INSTRUCTIONS**  
 1. Please submit your exam form at the concerned Regional Centre under which your examination centre falls.  
 2. Write in CAPITAL LETTERS only within the box without touching the lines as shown in the sample below.

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
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|----------------|--|----------------------|--|-------------------|--|
| Programme Code |  | Regional Centre Code |  | Study Centre Code |  |
|----------------|--|----------------------|--|-------------------|--|

|               |                                                                       |
|---------------|-----------------------------------------------------------------------|
| Enrolment No. | Exam Centre Code<br><small>(Where you wish to appear in Exam)</small> |
|---------------|-----------------------------------------------------------------------|

**Name of the Candidate:** (Leave one box empty between First Name, Middle Name and Surname)

|  |
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|  |
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**Address for Correspondence** (Do not give Post Box No. Address. Leave a blank box between each unit of address like House No., Street Name, PO, etc.)

|                                                                       |          |    |                                                                                           |     |    |
|-----------------------------------------------------------------------|----------|----|-------------------------------------------------------------------------------------------|-----|----|
|                                                                       |          |    |                                                                                           |     |    |
|                                                                       |          |    |                                                                                           |     |    |
| City                                                                  | District |    |                                                                                           |     |    |
|                                                                       |          |    |                                                                                           |     |    |
| State                                                                 | Pin Code |    |                                                                                           |     |    |
|                                                                       |          |    |                                                                                           |     |    |
| MOBILE NO.                                                            | E-MAIL   |    |                                                                                           |     |    |
|                                                                       |          |    |                                                                                           |     |    |
| Physical handicapped<br><small>(Please tick the relevant box)</small> | YES      | NO | Scribe/Amnuensis required by the student<br><small>(Please tick the relevant box)</small> | YES | NO |

**FOR SCRIBE/AMNUENSIS, THE STUDENT MAY APPROACH THE CONCERNED REGIONAL CENTRE (UNDER WHOM THE EXAMINATION CENTRE FALLS) ALONG WITH DISABILITY CERTIFICATE**

**COURSE OPTION:**

Course codes for which appearing for the first time OR failed in the earlier TEEs including Practical Courses for BCA, MCA/ PGDLAN/ BLIS Programmes. **FEE ₹60/- PER COURSE** (Demand draft in favour of IGNOU and payable at City of Regional Centre under which your exam centre falls.)

| S.No. | Course Code | S.No. | Course Code |
|-------|-------------|-------|-------------|
| 1.    |             | 9.    |             |
| 2.    |             | 10.   |             |
| 3.    |             | 11.   |             |
| 4.    |             | 12.   |             |
| 5.    |             | 13.   |             |
| 6.    |             | 14.   |             |
| 7.    |             | 15.   |             |
| 8.    |             | 16.   |             |

**FEE DETAILS** (Please write your Name & Enrolment No. at the back of the Draft)

| Total No. of Course |        | Total Amount |  |
|---------------------|--------|--------------|--|
| Theory Courses      | ₹ × 60 |              |  |
| Practical Courses   | ₹ × 60 |              |  |
| Late Fee            |        |              |  |
| <b>TOTAL</b>        |        |              |  |

|                                                                 |     |
|-----------------------------------------------------------------|-----|
| 1. Draft No.                                                    |     |
| Amount                                                          |     |
| 2. Draft No.                                                    |     |
| Amount                                                          |     |
| Date                                                            | / / |
| Issuing Branch _____                                            |     |
| Payable at (Regional Centre under which your exam centre falls) |     |

|              |  |
|--------------|--|
| ISSUING BANK |  |
|--------------|--|

| Dates for Submission of Exam Forms |           |                     |           |                                                                                 |
|------------------------------------|-----------|---------------------|-----------|---------------------------------------------------------------------------------|
| FOR JUNE TEE                       | LATE FEE  | FOR DECEMBER TEE    | LATE FEE  | SUBMISSION OF EXAM FORM                                                         |
| 1 March to 31 March                | NIL       | 1 Sept. to 30 Sept. | NIL       | ONLY AT THE CONCERNED REGIONAL CENTRE UNDER WHICH YOUR EXAMINATION CENTRE FALLS |
| 1 April to 20 April                | ₹ 300/-   | 1 Oct. to 20 Oct.   | ₹ 300/-   |                                                                                 |
| 21 April to 30 April               | ₹ 500/-   | 21 Oct. to 31 Oct.  | ₹ 500/-   |                                                                                 |
| 1 May to 15 May                    | ₹ 1000/-* | 1 Nov. to 15 Nov.   | ₹ 1000/-* |                                                                                 |

\*Exam for these students will be conducted at Regional Centre city only.

**Before submitting the examination form please ensure that:**

- The required number of assignments as applicable for the course(s) filled in the examination form have been submitted.
- The authentication certificate is duly signed by the Coordinator/Incharge of your Study Centre/PSC/PI...etc.
- Registration for the course(s) is valid and not time-barred.
- **Examination fee ₹ 60/- per course has been remitted and the relevant proof enclosed.**
- In case examination fee is submitted through demand draft please ensure that the **demand draft is made in favour of IGNOU and payable at the city of the Regional Centre where you are submitting your examination form.**
- The enrolment number, programme code, course code are correctly filled in the examination form.

**In case of non-compliance of any of the above conditions candidature for appearing in the Term-end Examination will not be considered and no Hall Ticket will be issued.**

**PLEASE NOTE :**

- |                                      |                                                                               |
|--------------------------------------|-------------------------------------------------------------------------------|
| Examination fee per course is        | - ₹60/- (Examination fee once paid will not be refunded/adjusted in any case) |
| Examination form to be submitted at  | - Regional Centre under which your examination centre falls                   |
| Demand draft to be made in favour of | - IGNOU and payable at the city where submitting the exam form                |

**INSTRUCTIONS FOR FILLING UP THE EXAMINATION FORM**

1. Please fill in the course(s) only for which the assignments have been submitted by you within the scheduled time. No Hall Ticket will be issued in case the assignments for the course(s) have not been submitted.
2. Please write correct course code(s) as indicated in your Programme Guide, failing which the course(s) will not be included in Hall Ticket for taking examination (For example ECO-01/MS-02).
3. In case wrong/invalid course code is mentioned in examination form, the course will not be included in the Hall Ticket and the examination fee paid will not be refunded.
4. Examination form should be submitted only once for each Term-end Examination. In case two exam forms are submitted the candidature will be cancelled.
5. Please send the examination form by Registered/Speed Post and retain the proof of its mailing till you receive the Hall Ticket.
6. Term-end Examination result is also available on the University website ([www.ignou.ac.in](http://www.ignou.ac.in)). Please see the result status before filling examination form.
7. It is advised to enclose/forward only the Examination Fee along with this form. Any other fee (registration/re-registration) forwarded with this form will result in rejection of the examination form.
8. Examination form received without examination fee or late fee (if applicable) will similarly be rejected.
9. Students of BA/B.Com/BCA/BTS Programme can take examination for courses up to 48 credits and those of Management Programme can take examination for a maximum of 8 courses at a time.
10. Normally the Study Centre is the Examination Centre. In case you wish to take examination at a particular centre the code of your chosen centre be filled up as Examination Centre Code. However, if Examination Centre chosen by you is not activated you will be allotted another Examination Centre under the same Region.
11. **In case you fail to receive Examination Intimation Slip/Hall Ticket one week before the commencement of examination you may visit our website ([www.ignou.ac.in](http://www.ignou.ac.in)) and download the Hall Ticket and report at the Examination Centre with your Identity Card.**
12. Change of Examination Centre, once allotted, is not permissible under any circumstances.
13. No student will be allowed two exam centres for a TEE.

**DECLARATION**

I hereby declare that I have read and understood the instructions given above. I also affirm that I have submitted all the required number of assignments as applicable for the course(s) filled in the examination form and my registration for the course(s) is valid and not time barred. If any of my statements is found to be untrue, I will have no claim for taking examination. I undertake that I shall abide by the rules and regulations of the University.

Date \_\_\_\_\_

(Signature of the student)

Phone No. (R) \_\_\_\_\_ Mobile No. \_\_\_\_\_ Email Id \_\_\_\_\_

Phone No. (O) (with STD code) \_\_\_\_\_

**AUTHENTICATION BY CO-ORDINATOR/INCHARGE OF  
STUDY CENTRE/PROGRAMME STUDY CENTRE/PARTNER INSTITUTION/  
COMMUNITY COLLEGE**

It is to certify that the student has submitted all the assignment(s) for the course(s) filled in the examination form.

Centre Code \_\_\_\_\_

Date \_\_\_\_\_

(Signature & Stamp of Co-ordinator/Incharge)  
Study Centre/PSC/PI/Community College



## **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.**

**APPLICATION FORM FOR ISSUE OF OFFICIAL TRANSCRIPT**

1. Name : \_\_\_\_\_

2. Programme:  Enrolment 

|  |  |  |  |  |  |  |  |  |  |
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No:

3. Address: .....

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..... Pin 

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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.**

**ASSIGNMENTS REMITTANCE -CUM-ACKNOWLEDGEMENT CARD**

| Enrol. No. _____<br>Programme Title: _____<br><br>Name : _____<br><br>Course Code: _____ Medium: _____<br>_____                                                                                                                                                                                                                                                                                                                               | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2" style="text-align: center;"> <b>INDIRA GANDHI NATIONAL OPEN UNIVERSITY</b></td> </tr> <tr> <td colspan="2" style="text-align: center;"><b>ASSIGNMENTS REMITTANCE -CUM-ACKNOWLEDGEMENT CARD</b></td> </tr> <tr> <td style="width: 50%; padding: 5px;">                             Enrol. No. _____<br/>                             Name : _____<br/>                             Course Code: _____                         </td> <td style="width: 50%; padding: 5px;">                             Programme Title: _____<br/>                             Medium : _____                         </td> </tr> <tr> <td style="width: 50%; padding: 5px;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">S.No.</th> <th style="width: 35%;">Assignment No.</th> <th style="width: 50%;">For Office Use Only</th> </tr> </thead> <tbody> <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> </td> <td style="width: 50%; padding: 5px;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">S.No.</th> <th style="width: 35%;">Assignment No.</th> <th style="width: 50%;">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> </td> </tr> <tr> <td style="width: 30%; padding: 5px;">                 Signature of the Student<br/>                 Date : _____             </td> <td style="width: 70%; padding: 5px;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">                             Date of despatch to the Evaluator:<br/>                             _____<br/><br/>                             Date of receipt from the Evaluator:<br/>                             _____                         </td> <td style="width: 50%; padding: 5px; text-align: right;">                             Seal                         </td> </tr> </table> </td> </tr> <tr> <td colspan="2" style="padding: 5px;">                 Signature of the Student<br/>                 Name : _____<br/>                 Address of the Student : _____<br/>                 Date : _____<br/>                 (Please write your complete address and affix adequate postal stamp on reverse)             </td> </tr> </table> | <b>INDIRA GANDHI NATIONAL OPEN UNIVERSITY</b>                                                   |                     | <b>ASSIGNMENTS REMITTANCE -CUM-ACKNOWLEDGEMENT CARD</b> |  | Enrol. No. _____<br>Name : _____<br>Course Code: _____ | Programme Title: _____<br>Medium : _____ | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">S.No.</th> <th style="width: 35%;">Assignment No.</th> <th style="width: 50%;">For Office Use Only</th> </tr> </thead> <tbody> <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> | S.No.                 | Assignment No. | For Office Use Only |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                 | S.No. _____ |                |                     | Date of Receipt: ____ |  |             | Name of Evaluator: _ | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">S.No.</th> <th style="width: 35%;">Assignment No.</th> <th style="width: 50%;">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> | S.No.                           | Assignment No. | For Office Use Only |              |  | S.No. _____ |  |  | Signature of the receiver _____ |  |  | Date : _____ | Signature of the Student<br>Date : _____ | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">                             Date of despatch to the Evaluator:<br/>                             _____<br/><br/>                             Date of receipt from the Evaluator:<br/>                             _____                         </td> <td style="width: 50%; padding: 5px; text-align: right;">                             Seal                         </td> </tr> </table> | Date of despatch to the Evaluator:<br>_____<br><br>Date of receipt from the Evaluator:<br>_____ | Seal | Signature of the Student<br>Name : _____<br>Address of the Student : _____<br>Date : _____<br>(Please write your complete address and affix adequate postal stamp on reverse) |  |
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| <b>ASSIGNMENTS REMITTANCE -CUM-ACKNOWLEDGEMENT CARD</b>                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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No. _____<br>Name : _____<br>Course Code: _____                                                                                                                                                                                                                                                                                                                                                                                        | Programme Title: _____<br>Medium : _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">S.No.</th> <th style="width: 35%;">Assignment No.</th> <th style="width: 50%;">For Office Use Only</th> </tr> </thead> <tbody> <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> | S.No.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Assignment No.                                                                                  | For Office Use Only |                                                         |  | S.No. _____                                            |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                               | Date of Receipt: ____ |                |                     | Name of Evaluator: _ | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">S.No.</th> <th style="width: 35%;">Assignment No.</th> <th style="width: 50%;">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> | S.No.       | Assignment No. | For Office Use Only |                       |  | S.No. _____ |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Signature of the receiver _____ |                |                     | Date : _____ |  |             |  |  |                                 |  |  |              |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                 |      |                                                                                                                                                                               |  |
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| Signature of the Student<br>Date : _____                                                                                                                                                                                                                                                                                                                                                                                                      | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">                             Date of despatch to the Evaluator:<br/>                             _____<br/><br/>                             Date of receipt from the Evaluator:<br/>                             _____                         </td> <td style="width: 50%; padding: 5px; text-align: right;">                             Seal                         </td> </tr> </table>                                                                            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| Signature of the Student<br>Name : _____<br>Address of the Student : _____<br>Date : _____<br>(Please write your complete address and affix adequate postal stamp on reverse)                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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From:

The Coordinator  
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(ADDRESS OF THE STUDENT)

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