PROGRAMME GUIDE
FOR
BACHELOR OF COMPUTER APPLICATIONS

(BCA_NEW)

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

http://www.ignou.ac.in

Programme Guide:

July, 2024. This is the Programme Guide for BCA_NEW Programme offered by IGNOU from July, 2024 admission cycle.

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MESSAGE FROM PROGRAMME COORDINATOR

Dear Student,

I welcome you to the Bachelor of Computer Applications (BCA_NEW) Programme. IGNOU's BCA_NEW Programme is structured as per latest developments in the field of Computer Science Applications and also keeping in view the need and requirements of the Information Technology Industry. BCA_NEW programme from July, 2024 session carries 120 credits. During your study, you will receive support from IGNOU through the network of our Regional / Student Support Centres(LSCs) and web. You will be attached to a Student Support Centre where most of the academic activities including academic and practical counseling will take place. Attend counseling sessions at your Student Support Centre regularly as per schedules. Attending the counseling sessions with preparation will provide you an opportunity to clear your doubts in the respective course. You will receive printed course material in accordance with IGNOU's dispatch schedules. There may be delays in your receipt of printed course material due to various reasons. It may be noted that the course material is available at http://www.egyankosh.ac.in and the same may be downloaded for carrying your studies without interruption until you receive the printed course material. You need to have a **minimum of 70% attendance** for practical counseling sessions, to be eligible to appear for Term End Practical Examinations. In case you fall short of minimum attendance for practical counseling sessions, then, you may need to pay the prescribed fee to attend the practical counseling sessions again and appear for the term end practical examinations in future.You need to submit requisite assignments before the due dates to become eligible to appear for Term End Theory and Practical Examinations.

Please note that BCA_NEW programme guide and assignments are not sent in printed form. They will be available only on IGNOU Website and can downloaded. Normally,you need to submit your assignments at the respective LSC. There is need for you to be in constant touch with IGNOU Website as well as regularly check your email for communications from the Regional Center / LSC and other departments of IGNOU so that you can follow them. Its essential to re-register for each semester from second semester onwards after you get admission to the first semester. **Also, try your best to solve the previous exams question papers of the concerned courses during the semester. It will enable you understand the concepts in depth thus increasing the probability of your success.** Self Learning is the key for success. The counseling sessions are different from lectures. You are suggested to prepare in advance and get your doubts clarified by the concerned Academic Counselor at the LSC.

It is to be noted that the payments that are mentioned in various proformas/formats/forms are as on date and is **subject to revision from time to time**. You are advised to check these proformas/formats/forms from IGNOU website/LSC/RC for any revision/ modification. Some useful forms and formats (or the link to useful forms and formats) are also given at the end of this booklet. The Programme Guide, forms and formats are also available on the IGNOU website. Please confirm the fees with the RC / LSC / website before you pay. Programme Guide is a very important document for you, as a distance student you may have several queries, many of them would be answered by this booklet. Preserve this booklet until you successfully complete the BCA_NEW Programme. Don't forget to re-register for the semesters as per schedule as you may not be able to pursue your studies without payment of the fee before due dates. Some useful addresses are given in this Programme Guide. In case of any difficulty, communicate to the concerned, on the listed address for fast action. Please note that the information given in Programme Guide may vary from time to time. Hence, please ascertain from IGNOU website or concerned departments by email before following.

IGNOU reserves the right to change any rule or regulation pertaining to BCA_NEW Programme that are specified or not specified in the Programme Guide, at any time. You are advised to visit **IGNOU website-http://www.ignou.ac.in, and your Regional Center Website for latest information and circulars, if any. Also contact/visit your Student Support Center regularly for latest information, if any.** I wish you success in pursuing BCA_NEW Programme. The fee mentioned in the Programme Guide may change. **Hence, before payment, please find the correct fee from the concerned department or IGNOU website.**

Wishing you all the best,

BCA_NEW Programme Coordinator Email ID :
bca@ignou.ac.in

1. BASIC INFORMATION

1.1 BCA_NEW Programme Objectives

The basic objective of the programme is to open a channel of admission for computing courses for students, who have done the 10+2 and are interested in taking computing/IT as a career. After acquiring the Bachelor's Degree (BCA_NEW) at IGNOU, there is a further educational opportunity to go for an MCA at IGNOU or Master's Programme at any other University/Institute based on the eligibility conditions prevailing at the time of admission. Also after completing BCA_NEW Programme, a student should be able to get a entry-level jobs in the field of Information Technology or ITES.

1.2 Duration of the Programme

Minimum: 3 Years

Maximum: 6 Years

1.3 Programme Fee

₹ 8000/- per semester and ₹ 48000/- for full programme. The fees may change as and when University decides. The student may get latest update on the fees from the concerned IGNOU Regional Centre or from the Student Registration Division (SRD) or from Student Service Centre (SSC).

1.4 Medium of Instruction

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

1.5 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 three-credit course involves 90 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.**

1.6 BCA_NEW Programme Structure

The programme has been divided into two semesters per year (January to June and July to December). Consequently, there will be two examinations every year - one in the month of June for the January to June semester courses and the other in December for the July to December semester courses. The students are at liberty to appear for any of the examinations schedule conducted by the University during the year subject to completing the minimum duration and other formalities prescribed for the programme. Student may ensure that s/he paid the requisite fee as well as fulfils other requirements such as prescribed minimum attendance etc. before appearing in the term end examinations. The result may be withheld or may be cancelled in case it is found that the student's registration to the course is invalid or did not register. The following is the **BCA_NEW Programme Structure:**

Course Code	Course Title	Credits	School
SEMESTER-I			
BEVAE-181	Environmental Studies	4	SOS
BEGLA-136	English at Work Place	6	SOH
BCS-111	Computer Basics and PC Software	4	SOCIS
BCSL-013	Computer Basics and PC Software Lab	2	SOCIS
BCS-012	Basic Mathematics	4	SOCIS
	Total Credits:	**20**	
SEMESTER-II			
FEG-02	Foundation Course in English-2	4	SOH
MCS-202	Computer Organisation	4	SOCIS
MCS-203	Operating Systems	4	SOCIS
MCSL -204	WINDOWS and LINUX Lab	2	SOCIS
MCS-201	Programming in C and Python	4	SOCIS
MCSL– 205	C and Python Lab	2	SOCIS
	Total Credits:	**20**	
SEMESTER-III			
MCS-208	Data Structures and Algorithms	4	SOCIS
MCSL -209	Data Structures and Algorithms Lab	2	SOCIS
MCS-207	Database Management Systems	4	SOCIS
BCS- 131	Programming in C++	4	SOCIS
BCSL-135	DBMS and C++ Lab	2	SOCIS
BCS -040	Statistical Techniques	4	SOCIS
	Total Credits:	**20**	
SEMESTER-IV			
MCS-206	Object Oriented Programming using Java	4	SOCIS
BCSL-146	Object Oriented Programming using Java Lab	2	SOCIS
BCS -053	Web Programming	2	SOCIS
BCSL-147	Web Programming Lab	2	SOCIS
BCS -041	Fundamentals of Computer Networks	4	SOCIS
BCOC-131	Financial Accounting	6	SOMS
	Total Credits:	**20**	
SEMESTER-V			
BCS- 151	Introduction to Software Engineering	4	SOCIS
BCS – 042	Introduction to Algorithm Design	2	SOCIS
BCSL-159	Introduction to Algorithm Design Lab	2	SOCIS
BCOS - 184	E-Commerce	4	SOMS
MSEI-023	Cyber Security	4	SOVET
BECS-184	Data Analysis	4	SOSS
	Total Credits:	**20**	
SEMESTER--VI			
BCOS -185	Entrepreneurship	4	SOMS
MSEI-027	Digital Forensics	4	SOVET

BCSP-165	Project		12	SOCIS
	Total Credits:		**20**	

No. of Theory Courses: 23; No. of Practical Courses: 08; Project: 01; Total Credits: 120

1.7 Recognition

IGNOU is a Central University established by an Act of Indian 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 Circulars F-1/8/92(CPP) dated Feb.1992 and F1-52/ 2000 (CPP-II) dated 5 May, 2004 & AIU Circular No. EV/B (449)/94/177115 dated January 14, 1994.

In recognition of the pre-eminence of IGNOU and its quality of education and degrees offered, IGNOU has been exempted from seeking approval from UGC for offering programmes in ODL and Online MODE (as per UGC notification F.No.1-19/2020(DEB-I) dated March 25, 2021.

You may download all the recognition related information from the following web links.

http://www.ignou.ac.in/ignou/aboutignou/division/srd/new
http://ignou.ac.in/ignou/aboutignou/division/srd/Recognition

1.8 Student Support Services

In order to provide individualized support to its students, the University has created a number of LSCs throughout the country for this Programme. These are administratively coordinated by the Regional Centres. The LSCs are the contact points for the students on all major aspects of the Programme. These include counselling sessions for theory, practical, etc.

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 LSC 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 LSC 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.* You are also advised to be in touch with IGNOU website so that you are updated to the latest developments in BCA_NEW. Please ensure that you don't follow any oral advice without authenticating from IGNOU Website or IGNOU email IDs.

1.9 iGRAM

With the objective of putting in place a system for quick resolution of students problems IGNOU has developed iGRAM. **For quick response and redressal you may send your query/grievance on iGRAM at http://igram.ignou.ac.in/.**

1.10 Contact information of BCA_NEW Programme Coordinator

Students may contact the BCA_NEW Programme Coordinator by sending a communication through post to The BCA_NEW Programme Coordinator, SOCIS, Vishveswaraiah Bhavan, C-Block, IGNOU Academic Complex, IGNOU, Maidan Garhi, New Delhi – 110068, or can send an   Email   to   *bca@ignou.ac.in*

2. INSTRUCTIONAL SYSTEM

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

☞ self-instructional material
☞ face-to-face counselling at LSCs by academic counsellors
☞ web based academic support: e-content available on e-Gyankosh portal
☞ assignments
☞ practicals
☞ Gyan Vani
☞ Gyan Darshan
☞ SWAYAM Prabha

2.1   Self Learning Materials (SLMs)

SLMs are the primary form of instructional materials. 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 SLMs alone may not be sufficient to write assignments and prepare for the term-end Examinations. Some reference books are available at your LSC. There may be delays in the receipt of printed study materials by the students owing to different reasons. However, students are advised to download the course material that is available on IGNOU website and start studying. They are also advised that they attend to the video lectures uploaded to http://www.youtube./com/ignou.

2.2 eGyankosh

You may download softcopy of your study material of BCA_NEW from eGyankosh (http://www.egyankosh.ac.in)

2.3   IGNOU eContent App

IGNOU eContent App for Android can be downloaded and installed from https://play.google.com/store/apps/details?id=ac.in.ignou.Viewer

2.4   Lectures on Gyan Darshan and Interactive Radio Counselling

The live lectures based on BCA_NEW courses of SOCIS are telecasted on GD (Gyan Darshan) channel. The live telecast can be seen on http://www.ignouonline.ac.in/ .You can listen radio counseling programs on http://www.ignouonline.ac.in/. Also schedule of GD (Gyan Darshan) lectures and Interactive Radio Counselling Program (IRC) can be seen on http://www.ignouonline.ac.in/

Figure: IGNOUOnline Portal Web Page

Details of Availability on various platforms of Gyan Darshan Channel and Gyan Vani

Gyan Darshan Channel

Sl.No.	DTH Platform	TV Channel No.
1.	Airtel	442
2.	TATA Sky	755
3.	Sun Direct	596
4.	Den	526
5.	In Digital	464 (Delhi)
6.	Hathway	473
7.	Dish TV	991
8.	TACTV	576 & 577

Gyan Darshan Web Link: http://gd.ignouonline.ac.in/gyandarshan/

Gyandarshan TV Channel available on C-band

Telephone number of EMPC Video Studio-2 for interaction; during live session: 011-29532844, 011-29532845, Toll Free: 1800112346, Fax: 011-29536134. Please check the latest Channel Numbers , Telephone Numbers , Toll Free Numbers, Fax etc.

Gyan Vani Channel

Sl.No.	DTH Platform	TV Channel No.
1.	DD Free Dish	44

The **SWAYAM PRABHA-DTH**:

This channel is funded by MoE, Govt of India and Coordinated by IGNOU, New Delhi. Channel-13 of Swayamprabha includes lectures related to programmes offered by SOCIS. The channel can be accessed at https://swayamprabha.gov.in/program/current_he/13

2.5 Counseling Sessions

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

2.5.1 Theory Sessions

In Open and Distance Learning (ODL) system, face-to-face contact between the students 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 Student Support Centres to provide Counseling and guidance to you in the courses that you have chosen for study. Normally, these sessions will be held at the LSCs.

You should note that the Counseling 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 BCA_NEW programme. In these sessions, you must try to resolve your subject-based difficulties and any other related issues.

> **Before attending the Counseling 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.**

2.5.2 Practical Sessions and Compulsory Attendance

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

i) **70% attendance** is compulsory for each lab course. **However, this condition is not applicable for the computer time given for assignment implementation.**

ii) This is a pre-requisite for taking the term-end practical examination in the respective lab courses.

iii) A student who fails to **fulfill the 70% attendance requirements** are **required to re-appear in the practical classes in the next session in the next session by remitting 50% of the pro-rate fee.** For fee details and the application form, please contact your Regional Centre. In case, the student appears for the term end practical examination in a course without fulfilling the minimum attendance requirements, then the result shall be withheld and University reserves the right to cancel the result.

iv) Student attendance will be recorded course-wise at the LSC.

v) Strictly follow the guidelines given in the Lab manuals for the respective lab courses.

vi) **Computer to Student ratio will be 1:2.**

2.5.3 Number of Counseling sessions

Course Code	Course Title	Credits	School	No. of Counselling Sessions
SEMESTER I				
BEVAE-181	Environmental Studies	4	SOS	05
BEGLA-136	English at Work Place	6	SOH	09
BCS-111	Computer Basics and PC Software	4	SOCIS	09
BCSL-013	Computer Basics and PC Software Lab	2	SOCIS	20
BCS-012	Basic Mathematics	4	SOCIS	12
	Total Credits:	**20**		
SEMESTER II				
FEG-02	Foundation Course in English-2	4	SOH	05
MCS-202	Computer Organisation	4	SOCIS	06
MCS-203	Operating Systems	4	SOCIS	06
MCSL -204	WINDOWS and LINUX Lab	2	SOCIS	20
MCS-201	Programming in C and Python	4	SOCIS	06
MCSL– 205	C and Python Lab	2	SOCIS	20
	Total Credits:	**20**		
SEMESTER III				
MCS-208	Data Structures and Algorithms	4	SOCIS	06
MCSL -209	Data Structures and Algorithms Lab	2	SOCIS	20
MCS-207	Database Management Systems	4	SOCIS	06
BCS- 131	Programming in C++	4	SOCIS	09
BCSL-135	DBMS and C++ Lab	2	SOCIS	20
BCS -040	Statistical Techniques	4	SOCIS	05
	Total Credits:	**20**		
SEMESTER IV				
MCS-206	Object Oriented Programming using Java	4	SOCIS	06
BCSL-146	Object Oriented Programming using Java Lab	2	SOCIS	20
BCS -053	Web Programming	2	SOCIS	10
BCSL-147	Web Programming Lab	2	SOCIS	20
BCS -041	Fundamentals of Computer Networks	4	SOCIS	12
BCOC-131	Financial Accounting	6	SOMS	10
	Total Credits:	**20**		
SEMESTER V				
BCS- 151	Introduction to Software Engineering	4	SOCIS	09
BCS – 042	Introduction to Algorithm Design	2	SOCIS	06
BCSL-159	Introduction to Algorithm Design Lab	2	SOCIS	20
BCOS - 184	E-Commerce	4	SOMS	06
MSEI-023	Cyber Security	4*	SOVET	5 Theory + 10 Practical
BECS-184	Data Analysis	4	SOSS	12

		Total Credits:	20		
	SEMESTER VI				
BCOS -185	Entrepreneurship	4	SOMS	06	
MSEI-027	Digital Forensics	4*	SOVET	5 Theory + 10 Practical	
BCSP-165	Project	12	SOCIS	12	
		Total Credits:	20		

Note: **(1) Duration of each theory academic counselling session: 2 hours**
(2) Duration of each practical academic counselling session: 3 hours;
 *: There are both theory and practical components in MSEI-023 and MSEI-027

2.5.4 Semester wise Counseling Sessions:

Semester	No. of Sessions	
	Theory	**Practical**
I	35	20
II	23	24
III	26	40
IV	38	40
V	38	30
VI	11	22
TOTAL	**171**	**176**

Note: For BEVAE-181, BEGLA-136, FEG-02, BCOC-13, BCOS-184, MSEI-023, BECS-184, BCOS-185 AND MSEI-027 courses, number of counseling sessions will be as per existing decisions / rules of the respective schools.

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

4. BCA_NEW PROGRAMME SYLLABUS

The following is the syllabus of all the six semesters of BCA_NEW programme.

4.1   Detailed Syllabus of BCA_NEW First Semester

1. BEVAE - 181 Environment Studies   **4 Credits**

   Block 1: An Introduction to Environment and Environmental Issues

   Unit 1: Our Environment
   Unit 2: Ecosystems
   Unit 3: Major Ecosystems

   Block 2: Natural Resources

   Unit 4: Land and Water
   Unit 5: Forest Resources
   Unit 6: Biodiversity: Value and Services
   Unit 7: Energy Resources

   Block 3: Environmental Issues and Concerns

   Unit 8: Biodiversity: Threats and Conservation
   Unit 9: Environmental Pollution and Hazard
   Unit 10: Waste Management
   Unit 11: Global Environmental Issues

   Block 4: Protecting our Environment: Policies and Practices

   Unit 12: Environmental Legislation
   Unit 13: Human Communities and Environment
   Unit 14: Environmental Ethics

2. BEGLA-136 English at the Workplace   **6 Credits**

   Block-1 Exploring the Job Market

   Unit-1 Profiling Oneself for the Job
   Unit-2 Searching for a Job
   Unit-3 Responding to Job Advertisements
   Unit-4 Preparing for the Job

   Block-2 Preparing for Job Interviews

   Unit-5 Using Body Language Effectively
   Unit-6 Portfolio Making
   Unit-7 Writing Your Curriculum Vitae (CV)
   Unit-8 Preparing to Face an Interview

Block-3 Skills for the Workplace-I

Unit-9 Etiquette, Cultural Awareness and Gender Perceptions
Unit-10 Understanding Customers
Unit-11 Essentials of Customer Service
Unit-12 Work Ethics

Block-4 Skills for the Workplace-II

Unit-13 Participating in Discussions
Unit-14 Marking Presentations
Unit-15 Writing Business Letters
Unit-16 Writing Business Emails

3. **BCS-111: Computer Basics and PC Software** 　　　　　　**3 Credits**

Objectives:

This is the first course in Computer Science for the BCAOL students; therefore, it deals with the basic concepts of computers. It discusses about the computer hardware, its components and basic computer architecture. The course also deals with the basic computer software including the operating system and its concepts. This course also highlights some of the open source software technologies. Finally, the course highlights the applications of computers that include web applications, social networking and wiki.

BLOCK 1: Basics of Computer Hardware

Unit 1: Computer their Origin and Applications

A bit of history highlighting the concepts, Abacas, Difference Engine, Electro-magnetic Computers, Discrete components, IC circuits, Current hardware Platforms, Description of current applications of computer highlighting role of computers, Limitations of Computers.

Unit 2: Functioning of a Computer

Components of a computer and their role, Number system, Codes ASCII Unicode.
Concept of Instruction – a simple example, Role of ALU and CU with the help of an example.

Unit 3: Memory System

Type of memories and their characteristics, What is the need of memory hierarchy?
Memory Hierarchy with examples of each level, Current trends in memory.

Unit 4: I/O Devices and their Functions

I/O devices, Current trends in I/O

Unit 5: My Personal Computer

Explain the configuration of PC and its components in respect of identification of various components so that a student can relate all the terms discussed in Unit 1 to 4 to this configuration.

BLOCK 2: Basics of Computer Software

Unit 1: Software Evolution

Different type of software and its evolution, System and application software, Utility software, Perverse software, Open Source software.

Unit 2: Operating System Concepts

Need and Functions, Type of OS starting from Batch, Multi-programming and real time Network and distributed OS, Web OS, Examples of OS and their features.

Unit 3: Concept of Programming Languages

Some basic constructs, Editors, Compilers and interpreters, Assemblers.

Unit 4: Computer Applications

Concepts of Open Source Software, Philosophy – licensing, copyright. Project Management Software, Timesheet system, Office Applications, Word Processing – Creating a Memo for a number of people, Spreadsheet – Creating a sheet of Income
& deduction and calculation of IT Database – a small application with data records, a form, a query and a report. Email – Sending mail to a number of people in a group.

BLOCK 3: Internet Technologies

Unit 1: Networking and Internet

Basic of Networking Concepts, Advantages of Networking, Basic model of Networks, Network Devices, TCP/IP, Web addresses, DNS, IP addresses.

Unit 2: Web Applications I

Browsing, E-mail, Messenger/Chat

Unit 3: Web Applications II

Blogging, E-Learning and wiki, Collaboration, Social Networking.

4. BCSL-013: Computer Basics and PC Software Lab   2 Credits

Objectives:

The main objectives of PC Software Lab course are to familiarize with basic operations of:

i) Operating systems such as Windows and Linux.
ii) Word Processor such as Open Office and MSWord.
iii) Workbook, worksheet, graphics and Spreadsheets.
iv) PowerPoint including animation and sounds.
v) Address book, Spam and Filtering in E-mail.
vi) Browsing, Search, Discussion forum and Wiki's.

Section 1 :   **Operating System**

Session 1 :   Familiarization (Keyboard, Memory, I/O Port),

Session 2:   Windows (2 Session)

Session 4 :   Linux (2 Session)

Section 2 :   Word Processor (Open Office and MS Word)

Session 1:   Basic Operations (Font selection, Justification, Spell check, Table, Indentation).

Session 2   :   Table of Contents, Track Changes and Commenting,

Session 3   :   Mail Merge, Printing, Practice session.

Section 3   :   Spread Sheet (Concept of Worksheet, Workbook and Cell)

Session 1   :   Data   entry, Data   editing and Formula,

Session 2   :   Functioning,

Session.3   :   Graphics and Practice session.

Section 4   :   PowerPoint

Session 1   :   Basics operation,

Session 2   :   Animation and Sounds.

Section 5   :   E-mail

Session 1   :   Basic Operation, Session 2: Address Book, Spam and Filtering.

Section 6   :   Browsing and Discussion Forum

Session1   :   Browsing and Search (2 Sessions),

Session 3   :   Discussion Forum, Wiki and GoogleDoc (3 Sessions).

4.2   Detailed Syllabus of BCA_NEW Second Semester

1.   FEG-02 : Foundation Course in English -2   **4 Credits**

Block 1

Unit 1   : Writing paragraph-1,

Unit 2   : Writing paragraph-2, the development of a paragraph

Unit 3   : Writing a composition

Unit 4   : Expository composition

Unit 5   : Note-taking 1

Unit 6   : Writing reports-I, reporting events

Block 2

Unit 7   : Argumentative composition-1, techniques of argument

Unit 8   : Argumentative composition-1, logical presentation

Unit 9   : Note taking-2, use of tables and diagrams

Unit 10   : Writing reports-2, reporting meetings and speeches

Unit 11: Writing summaries-1

Unit 12: Writing summaries-2

Block 3

Unit 13: Writing paragraphs-2

Unit 14: Narrative composition-1
Unit 15: Narrative composition-2

Unit 16: Writing reports-3, reporting interviews

Unit 17: Writing reports-4, reporting surveys

Unit 18: Writing summaries-3

Block 4
Unit 19: Descriptive composition-1, describing persons
Unit 20: Descriptive composition-2, describing places and objects

Unit 21: Descriptive composition-3, describing conditions and processes

Unit 22: Note-taking-3,

Unit 23: Writing reports-5, reporting experiments

Unit 24: Summing up

2.   **MCS-202 Computer Organisation**   **4 Credits**

Objective

This course explains the basic component of computer systems. This course includes details on data representation, interconnection structures, memory system, input-output system, and the Central Processing Unit. It also provides a detailed view of digital logic circuits, microprocessors and assembly language Programming and some of the important peripheral devices. Some of the advanced computer organizations are also part of this course. The first block of the course explains Data Representation, Instruction Execution, Interrupts, Buses, Boolean algebra, Design of Logic Circuits, etc. The second block deals with the Memory System, The Memory Hierarchy, Secondary Storage technologies, the concepts of high speed memory, Cache Organisation , Input Output interfaces, Input Output techniques, DMA, Input Output processors, External Communication Interfaces, Interrupt Processing, BUS arbitration, etc. The third block deals with the Central Processing Unit. It includes the Instruction Set, the Instruction format, the Instruction Set Architecture, Micro-Operations, the organization of Arithmetic logic unit, Design of simple units of ALU, the Control Unit, The hardwired control, Wilkes control, the Micro-programmed control etc. The fourth block deals with the Assembly Language Programming, Microprocessor, RISC, and various types of multiprocessor technologies. Block and Unit Structure

Block 1: Data Representation and Logic Circuits

Unit 1: A Computer System

Different Architectures of Computer Systems Von Neumann Architecture Instruction Set Architecture CISC and RISC Mobile Architecture Multi-processor Architectures Instruction and its Execution using Simple Register Set

Unit 2: Data Representation

Number System Conversions of various types of Numbers Character Representation – ASCII, UNICODE (UTF 8 and UTF 16) Negative Number Representation using Complements Fixed Point Representation Floating Point Representation Normalized Mantissa, biased Exponent, precision IEEE Format for single and double precision numbers with examples Error Detection Codes Parity Bit Single Error Correcting Code Computer Arithmetic Addition and Subtraction Multiplication and Division

Unit 3: Logic Circuits - Introduction

Digital Logic Boolean algebra Logic Gates Combinational Circuits Canonical forms, Minterm, Maxterm Combinational Circuits simplification using Boolean Algebra and K-map Design of circuits using NAND, NOR, AND, OR, NOT gates Examples of Combinational Circuits Adders, Decoders, Multiplexer, Encoder, Programmable Logic Array, Read Only Memory ROM, Adder-Subtractor

Unit 4: Logic Circuits – Sequential Circuits

Flip Flops - Basic latch and its working Clocked flip flops (S-R, D, J-K, T with Logic diagram, characteristics table and Excitation Tables) Master Slave Flip Flops and Edge Triggered Flip-flops Examples of Sequential Circuits (Registers, Counters – Asynchronous Counters, Synchronous Counters, RAM) 20 Sequential Circuit Design Example using 2 bit counter

Block 2: Memory and Input/Output Organisation

Unit 5: The Memory System

The Memory Hierarchy SRAM, ROM, DRAM, Flash Memory, Secondary Memory, Auxiliary Memory Hard Disk Drives, Optical Memories, SSD, CCDs, Bubble Memories (Characteristics: Drive Speed, Access Time, Rotation Speed, Partitioning & Formatting, Hard Drive Interface, Removable Drives (CD-ROM & DVD-ROM), Removable Storage Options, Blue Ray discs. RAID and its Levels

Unit 6: Advance Memory Organisations

Locality of Reference -Spatial, temporal, sequential Cache Memory, Cache Organisation Associative Memory Interleaved Memory Virtual Memory

Unit 7: Input/Output Organisation

Input / Output Devices or External or Peripheral Device, I/O Interface/ External Communication Interfaces Memory Mapped I/O and Isolated I/O Input Output Interface, Interrupts Modes of Transfer, Priority Interrupt, DMA, Serial Communication. The Device Controllers and its Structure, Device Drivers, Plug and Play Input Output Techniques (Programmed Input /Output, Handshaking, InterruptDriven Input /Output, InterruptProcessing DMA (Direct Memory Access), Input Output Processors

Unit 8: Device Technology

Keyboard, Mouse, Video Cards, Monitors, Liquid Crystal Displays (LCD), LEDs, Digital Camera, Sound Cards, Printers, Modems, Scanners

Block 3: The Processing Unit

Unit 9: Instruction Set Architecture

Instruction Set Characteristicsand Design Considerations Operand Data Types, Types of Instructions, Stored Program Organization, Number of Addresses and Instruction size Instruction Set and Format Design Issues (Instruction Length, Allocation of Bits among Opcode and Operand, Variable Length of Instructions, Example of Instruction Format. Addressing Schemes Immediate Addressing, Direct Addressing, Indirect Addressing, Register Addressing, Register Indirect Addressing, Indexed Addressing Scheme, Base Register Addressing, Relative Addressing Scheme, Stack Addressing

Unit 10: Registers, Micro-Operations and Instruction Execution

Register Organization (Programmer Visible Registers, Status and Control Registers), Register Transfer Language, Bus and Memory Transfers Arithmetic, Logic and Shift Microoperations, Instruction Execution and Microoperations, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output, Interrupt, Instruction Pipelining, ALU Organisation

Unit 11: The Control Unit

Hardwired Control, Wilkes Control Micro-Programmed Control The Micro-Instructions (Types of Micro-Instructions, Control Memory, Micro-Instruction Formats), The Execution of Micro- 21 Program, Address Sequencing, Design issues of Control Unit.

Unit 12: 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: Microprocessor and Advanced Architectures

Unit 13: Microprocessor Architecture

Structure of 8086 CPU (The Bus Interface Unit, Execution Unit (EU)) Register Set of 8086, Instruction Set of 8086 (only limited number of instructions to be explained -Data Transfer Instruction, 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 14: Assembly Language Programming

Use of Assembly Language programming, Machine Language, Assembly Language, Assembler, InputOutput Programming. 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, EXE Programs), How to Write Good Assembly Programs

Unit 15: Assembly Language Programming

Simple Assembly Programs (Data Transfer, Simple Arithmetic Application, Application Using Shift

Operations, Larger of the Two Numbers), Programming With Loops and Comparisons (Simple Program Loops, Find the Largest and the Smallest Array Values, Character Coded Data, Code Conversion), Programming for Arithmetic and String Operations (String Processing, Some More Arithmetic Problems), Modular Programming (The stack, FAR and NEAR Procedures, Parameter Passing in Procedures, External Procedures)

Unit 16: Advanced Architectures

Parallel Processing Pipelining Arithmetic Pipeline Instruction Pipeline Vector Processing Array Processors Multiprocessors Characteristics of Multiprocessors Interconnection Structures Interprocessor Arbitration Interprocessor Communication and Synchronization Cache Coherence Multicore Processors.

3. **MCS-203 OPERATING SYSTEMS**   **4 Credits**

Objectives
This is the core course on Operating Systems (OS). The main objectives of this course are:

To understand the OS role in the overall computer system
- To study the operations performed by OS as a resource manager
- To understand process concept, process concurrency, synchronization and Deadlocks
- To design and solve synchronization problems
- To understand the scheduling policies of OS
- To understand the different memory management techniques
- To understand the concepts of input/output, storage and file management
- To understand the goals and principles of protection
- To understand the advanced topics such as Multiprocessor Systems, Distributed OS and Mobile OS
- To study and compare different OS(Windows, Linux, Android and Ios) and compare their features.

Block and Unit Structure

BLOCK 1: Introduction to Operating Systems and 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

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
  - Havender's Algorithm
  - Deadlock Prevention
- 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
  o Directories
  o Disk Space Management
  o Disk address translation
  o File related system services
  o Asynchronous Input / Output

Unit 4: Security and Protection
- Security Threats
- Security Policies and Mechanisms
- Authentication
  o Passwords
  o Alternative Forms of Authentication
- Protection in Computer Systems
- Security Models
  o Access-Control Matrix
  o Mandatory Access Control
  o Discretionary Access Control
  o Rule-Based Access Control
  o Role-Based Access Control
  o The Take-grant Model
  o Multilevel Models

BLOCK 3: Advanced Topics in Operating Systems

Unit 1: Multiprocessor Systems
- Multiprocessor and Processor Coupling
- Types of Multiprocessor Operating System
  o Separate Supervisors
  o Master/Slave
  o Symmetric
- Multiprocessor OS Functions and Requirements

Unit 2: Distributed Operating Systems

- Characteristics of Distributed Systems
- Design Issues Involved in Distributed
- Systems Communication in Distributed Systems
- Clock Synchronization in Distributed
- Systems Mutual Exclusion
- Distributed File Systems
- Distributed Shared Memory

- Remote Procedure Calls
- Other Middleware Technologies

UNIT 3: Mobile Operating Systems
- Introduction
- Objectives
- Mobile Devices – An Introduction
- Mobile Operating System
- Evolution of Mobile OS
- Need for the Mobile OS
- Characteristics of Smartphone OS
- Design Issues in Mobile OS
- Popular Mobile OS

Block – 4 Case Studies (Windows, Linux, Android & IoS)

Unit 1: Case Study 1 – Windows 10
Unit 2: Case Study 2 - LINUX
Unit 3: Case Study 3 – ANDROID
Unit 4: Case Study 4 – IoS

4. MCSL-204 WINDOWS and LINUX Lab   2 Credits

Objectives:
Main objective of this laboratory course is to provide hands on exercises to the students based on Operating Systems Course.

Lab Sessions:

- There will be 20 practicalsessions (3 hours each) of which 10 sessions will be on Windows Operating System and 10 sessions will be on LINUX.

- The practice problems for all 20 sessions will be listed session-wise in the lab manual.

Block 1: WINDOWS and LINUX Lab
Section 1: WINDOWS 10
Section 2: LINUX

5. MCS-201   Programming in C and Python   4 Credits

Objective

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

Block and Unit Structure

C PROGRAMMING (BLOCK - 1 & 2)

BLOCK 1: An Introduction to C

Unit 1: Programming Fundamentals

- Problem - Solving Techniques
- Steps for Problem - Solving
- Using Computer as a Problem-Solving Tool
- Baics of Algorithms
- Definition
- Features of Algorithm
- Flowcharts
- Basic Symbols used in Flowchart Design
- Structured Programming concepts
- C Language and its features
- Structure of a 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

Unit 2: Data Types Operators and Expressions
- 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
- Preprocessor directives
- Assignment Statements
- Arithmetic Operators
- Relational Operators
- Logical Operators

- Comma and Conditional Operators
- Type Cast Operator
- Size of Operator
- C Shorthand
- Priority of Operators

Unit 3: 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 4: Arrays& Strings
- 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
- Declaration and Initialization of Strings
- Display of Strings Using Different Formatting Techniques
- Array of Strings
- String Functions and Applications

BLOCK 2: Functions, Structures, Pointers and File Handling in C
Unit 5: 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

Unit 6: 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
- Bit fields

Unit 7: Pointers

- Pointers and their Characteristics
- Address and Indirection Operators
- Pointer Type Declaration and Assignment
o Pointer to a Pointer
o Null Pointer Assignment
- Pointer Arithmetic
- Passing Pointers to Functions
o A Function Returning More than One Value
o Function Returning a Pointer
- Arrays and Pointers
- Array of Pointers
- Pointers and Strings

Unit 8: File Handling

- File Handling in C Using File Pointers
o Open a file using the function f open $(\ )$
o Close a file using the function $f$close$(\ )$
- Input and Output using file pointers
o Character Input and Output in Files
o String Input / Output Functions
o Formatted Input / Output Functions
o Block Input / Output Functions
- Sequential Vs Random Access Files
- Positioning the File Pointer
- The Unbufferred I/O - The UNIX like File Routines

PYTHON PROGRAMMING (BLOCK-3&4)
Block-3 Introduction to Python Programming
Unit-9 Introduction to Python

- History of Python
- Need of Python
- Packages for Cross platform application of Python
- Getting started with Python
- Program structure in python
- Running the First program

Unit-10 Data Structures and control statements in Python
- ●Data Types
- ●Data Structures
- ○Arrays
- ○Linked Lists
- ○Stacks
- ○Queues
- ●Sequence, Selection and Iteration constructs
- ●Recursion

Unit-11 Functions and File Handling in Python
- ●Function definition and call
- ●Function Scope
- ●Arguments
- ●Function Objects
- ●Lambda Functions
- ●Anonymous Functions
- ●File Operations
- ●Creating. Opening and using files

Unit-12 Modules and Packages
- ●Module Creations and Usage
- ●Module Search Path
- ●Module Vs. Script
- ●Package Creation and Importing
- ●Standard Library Modules

Block-4 Advanced Features in Python
Unit-13 Classes in Python
- ●Introduction to Object Oriented Paradigms
- ●Classes and instances
- ●Classes method calls
- ●Inheritance and Compositions
- ●Static and Class Methods
- ●Operator Overloading
- ●Polymorphism

Unit-14 Exception Handling in Python Programming
- ●Default Exception Handler
- ●Catching Exceptions
- ●Raise an exception
- ●User defined exception

Unit-15 Advanced Concepts
- ●Decorators
- ●Generators
- ●Iterators

- Co-routines

Unit-16 Data Access using Python
- Database concepts
- Creating database
- Querying Database
- Using SQL to get more out of database

6. **MCSL-205   C and Python Lab**   **2Credits**

Objectives:

Main objective of this laboratory course is to provide hands on exercises to the students based on Programming in C and Python course.

Lab Sessions:

- There will be 20 practicalsessions (3 hours each) of which 10 sessions will be on C Programming and 10 sessions will be on Python.

- The practice problems for all 20 sessions will be listed session-wise in the lab manual.

Block 1 : C and Python Lab
Section 1: C Programming
Section 2: Python Programming

4.3   Detailed Syllabus of BCA_NEW Third Semester

1. **MCS-208   Data Structures and Algorithms**   **4 Credits**

Objectives
The student should become well versed with Algorithms and various data structures. S/he should be able to use them appropriately as per need during development of programs. Also, the student 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 course also includes Advanced Data Structures which will enable student to apply them in solving complex problems.

Block and Unit Structure
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, Pointers and Structures
- Arrays and Pointers
- Sparse Matrices
- Structures
- Polynomials
- Representation of Arrays

o Row Major Representation
  o 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
  ● Skiplists
  ● Applications

BLOCK 2: Stacks, Queues and Trees
Unit 4: Stacks
  ● Abstract Data Type-Stack
  ● Implementation of Stack
  o Implementation of Stack using Arrays
  o Implementation of Stack using Linked Lists
  ● Algorithmic Implementation of Multiple Stacks
  ● Applications

Unit 5: Queues
  ● Abstract Data Type-Queue
  ● Implementation of Queue
  o Array Implementation
  o Linked List Implementation
  ● Implementation of Multiple Queues
  ● Implementation of Circular Queues
  o Array Implementation
  o Linked List Implementation of a circular queue
    Priority Queues
  ● Implementation of DEQUEUE
  o Array Implementation of a dequeue
  o 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
  o Recursive Implementation of Binary Tree Traversals
  o Non Recursive Implementations of Binary Tree Traversals
  ● Applications

BLOCK 3: Graph Algorithms and Searching Techniques
Unit 7: Advanced Trees

- Binary Search Trees
- o Traversing a Binary Search Trees
- o Insertion of a node into a Binary Search Tree
- o Deletion of a node from a Binary Search Tree
- AVL Trees
- o Insertion of a node into an AVL Tree
- o Deletion of a node from and AVL Tree
- o AVL tree rotations
- o Applications of AVL Trees
- B-Trees
- o Operations on B-Trees
- o Applications of B-Trees
- Splay Trees
- o Splaying steps
- o Splaying Algorithm
- Red-Black trees
- o Properties of a Red-Black tree
- AA-Trees

Unit 8: Graphs
- Definitions
- Shortest Path Algorithms
- o Dijkstra's Algorithm
- o Graphs with Negative Edge costs
- o Acyclic Graphs
- o All Pairs Shortest Paths Algorithm
- Minimum cost Spanning Trees
- o Kruskal's Algorithm
- o Prims's Algorithm
- o Applications
- Breadth First Search
- Depth First Search
- Finding Strongly Connected Components

Unit 9: Searching and Sorting Techniques

- Linear Search
- Binary Search
- Applications
- Internal Sorting
- o Insertion Sort
- o Bubble Sort
- o Quick Sort
- o 2-way Merge Sot

- o Heap Sort
- Sorting on Several Keys
- External Sorting Algorithms

BLOCK 4: File Structures and Advanced Data Structures
Unit 10: Hashing
- Introduction
- Index Mapping
- Collision Handling
- Double Hashing
- Load Factor and Rehashing

Unit 11: Advanced Data Structures
- Scapegoat Trees
- Tries
- Binary Tries
- X-Fast Tries
- Y-Fast Tries

Unit 12: File Structures
- Terminology
- File Organisation
- Sequential Files
- o Structure
- o Operations
- o Disadvantages
- o Areas of use
- Direct File Organisation
- Indexed Sequential File Organisation

2.   **MCSL-209**   **Data Structures and Algorithms Lab**   **2 Credits**

Objectives:

Main objective of this laboratory course is to provide hands on exercises to the students based data Structures and Algorithms course.

Lab Sessions:

- There will be 20 practicalsessions (3 hours each) of which 10 sessions will be on Data Structures Programming and 10 sessions will be on Algorithms

- The practice problems for all 20 sessions will be listed session-wise in the lab manual.

Block 1: Data Structures and Algorithms Lab
Section 1: Data Structures Lab
Section 2 : Algorithms Lab

3. MCS-207   Database Management Systems   4 Credits

Objective

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, e-commerce website and other activity that required permanence of data storage. Database management systems manage data more efficiently and effectively. This course provides the basic conceptual background necessary to design and develop simple database system. This course also provides you information about various types of database management system. After going through this course, a student will be able to:

- explain features of a DBMS and various database models
- create conceptual database model like E-R models and create a relational database design
- write relational algebraic and SQL queries including static and dynamic SQL queries
- normalize a database design
- explain the features of transactions, Recovery, Concurrency and Security in DBMS.

Block and Unit Structure
Block 1: Introduction to DBMS
Unit 1: Database Management System – An Introduction

Need for a Database Management System
Logical DBMS Architecture - Three level architecture of DBMS
Mappings between levels and data independence
Physical DBMS Structure - DML Precompiler**,** DDL Compiler**,** File Manager**,** Database Manager **,** Query Processor**,** Database Administrator**,** Data files indices and Data Dictionary
   Introduction to Different Data
   Models and Current Trends

Unit 2: Relational Database
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)
Example of queries using relational algebra

Unit 3: ER Model
Entity Relationship (ER) Model
 (Entities, Attributes, Relationships)
E-R Diagram
Enhanced ER tools
 (Subclasses, Super class, and Inheritance, Specialization and Generalization, Constraints and Characteristics of Specialization and Generalization)
Converting ER and EER diagram to tables

Unit 4: File Organisation in DBMS
Physical Database

Storage of Database on Hard Disks
File Organisation and Its Types
  Sequential File Organisation, Indexed File Organisation, Hashed File Organisation
  Types of Indexes, Index and Tree Structure, Multi-key File Importance of File Organisation in Databases

Block 2: Normalisation and Database Queries
Unit 5: Integrity, Functional Dependence and Normalization
Relational Database Integrity (The Keys, Referential Integrity, Entity Integrity)
Redundancy and Associated Problems
Functional Dependencies
Normalization (The First Normal Form, The Second Normal Form, The Third Normal Form, Boyce Codd Normal Form
Desirable Properties of Decomposition with examples

Unit 6: Higher Normal Forms
Multi value dependency
4NF
Join Dependency
5NF
Introduction to other normal form

Unit 7: Structured Query language
Data Definition Language
Data Manipulation Language
Data Control Language
SQL Introduction
Aggregate functions, Group by and having clause

Unit 8: Complex Queries
Joins
Equi join, self join, outer joins etc.
Sub-queries and correlated sub-queries
Views, Sequences, Indexes, Synonyms
Nested Queries

Unit 9: Advanced SQL
Assertion and views
Cursors, triggers and stored procedures
Embedded SQL
Dynamic SQL
Advanced Features of SQL

Block 3: Database Transactions, Recovery and Security
Unit 10: Transaction Management
The Transactions and its Properties
The Concurrent Transactions and associated problems
The Locking Protocol (Serialisable Schedules, Locks, Two Phase Locking (2PL) Deadlock and its Prevention
Deadlock Handling,
Optimistic Concurrency Control
Timestamp based Protocol
Multi-version Schemes
Weak Levels of Consistency
SQL commands for Transactions

Unit 11: Database Recovery and Security
Recovery and Atomicity
Recovery with Concurrent Transaction
Checkpointing
Buffer Management
Levels of database security
Access control
Audit trails in the databases
Relationship between Security and Integrity
SQL support for recovery and security

Unit 12: Query Evaluation
Measures of Query Cost (Selection Operation,, Sorting, Join Operation, other Operations)
Evaluation of Expression
Transformation of Relational Expressions
Role of Relational Algebra in query optimization
Estimating Statistics of Expression
Choice of Evaluation Plans
Views and query processing
Storage and query optimization.

Block 4: Introduction to Advanced Database Models
Unit 13: Object Oriented Database
Unit 14: Data Mining and Data Warehousing
Unit 15: NOSQL databases
Unit 16: Emerging Database Models

4. BCS-131   Programming in C++   4 Credits

Objectives:

The object oriented programming paradigm is one of the popular programming paradigms of today. Due to its characteristics object orientation has added new dimensions in the software development process. In this course concept of Object Oriented Programming (OOP) is introduced and for this purpose C++ programming language is being used. C++ a very powerful general purpose programming language, which supports object oriented programming paradigm. This course covers basics of C++ programming language which includes data types, variables, operators, and array and pointers. Also object oriented features such as class and objects, inheritance, polymorphism are covered in this course. Finally exceptions handling, I/O operations and STL are explained.

BLOCK 1: Basics of Object Oriented Programming & C++

Unit 1: Object Oriented Programming

Structured vs. Object Oriented Programming, Object Oriented Programming Concepts, Benefits of Object oriented programming, Object Oriented Languages.

Unit 2: Introduction to C++

Genesis of C++, Structure of a C++ program, Data Types, Operators and Control Structures.

Unit 3: Objects and Classes

Classification, Defining Classes, Encapsulation, Instantiating Objects, Member Functions, Accessibility labels, Static Members.

Unit 4: Constructors and Destructors

Purpose of Constructors, Default Constructor, Parameterized Constructors, Copy Constructor, Destructor, Memory Management.

BLOCK 2: Inheritance and Polymorphism in C++

Unit 1: Inheritance

Concept of Reusability, Types of Inheritance, Single and Multiple Inheritance, Multilevel Inheritance.

Unit 2: Operator Overloading

Function and Operator Overloading, Overloading Unary and Binary Operators.

Unit 3: Polymorphism and Virtual Function

Abstract Class, Function Overriding, Dynamic Binding, Pure Virtual Functions.

BLOCK 3: Advanced Features of C++

Unit 1: Streams and Files

Stream Classes, Types of I/O, Formatting Outputs, File Pointers, Buffer.

Unit 2: Templates and STL

Function and Class Templates, Use of Templates, Standard Template Library.

Unit 3: Exception Handling

Exceptions in C++ Programs, Try and Catch Expressions, Exceptions with arguments.

Unit 4: Case Study

A Case Study to implement a real world problem.

5.   BCSL-135 DBMS and C++ Lab   2 Credits

Objective:
This laboratory course is based Database Management Systems. Main objective of this laboratory course is to provide hands on exercises to the students based on Database Management Systems.

Lab Sessions: There will be 20 practical sessions (3 hours each) of which 10 sessions will be on DBMS and 10 sessions will be on C++ Lab. The practice problems for all 20 sessions will be listed session-wise in the lab manual.

Objectives:

Objective of this course is to provide hands on experience to the students in C++ programming. Students will write program in C++ based on concepts learned in C++ programming course. In this course programming to be done for implementation of OO features such as class, objects, inheritance, polymorphism.

Syllabus and Sessions Allocation:

Session1: Basics of C++, data type, I/O, Control Structures etc., Session 2: Class and Objects, function calling, Session 3: Constructor and Destructor, Session 4: Inheritance, Session 5: Operator Overloading, Session 6: Polymorphism, Session 7: Template class and function, Session 8: I/O and streaming,Session9: Exception Handling, Session10: STL.

Block 1: DBMS Lab and C++ Lab

Section 1: Database Management Systems
Section 2: C++ Lab

6. BCS-040   Statistical Techniques   4 Credits

BLOCK 1: Statistics and Probability

Unit1:DescriptiveStatistics

Collecting Data, Kinds of Data, Frequency Distribution of a Variable, Graphical Representation of Frequency Distribution, Summarisation of Data, Measures of Central Tendency, Measures of Dispersion or Variability.

Unit 2:ProbabilityConcepts

Preliminaries, Trials, Sample Space, Events, Algebra of Events, Probability Concepts, Probability of an Event, Probability of Compound Events, Conditional Probability and Independent Events.

Unit 3:ProbabilityDistributions

Random Variable, Discrete Random Variable, Continuous Random Variable, Binomial Distribution, Poisson Distribution, Uniform Distribution, Normal Distribution.

BLOCK 2: Statistical Inference

Unit4:Sampling Distributions

Population and Samples, What is a Sampling Distribution, t-distribution, Chi-Square distribution F-distribution.

Unit5:Estimation

Point Estimation, Criteria For a Good Estimator, Interval Estimation, Confidence Interval for Mean with Known Variance, Confidence Interval for Mean with Known Variance, Confidence Interval for Proportion.

Unit6:TestsofSignificance

Some Basic Concepts, Tests About the Mean, Difference in the Means of Two Populations Test About the Variance.

Unit7:Applications of Chi-Square in Problems with Categorical Data

Goodness-of-fit, Test of Independence.

BLOCK3: Applies Statistical Methods

Unit8: Analysis of Variance: One-Way Classification

Analysis of Variance: Basic Concepts, Source of Variance, One-Way Classification Model for One-Way Classification, Test Procedure, Sums of Squares, Preparation of ANOVA Table, Pair wise Comparisons, Unbalanced Data, Random Effects Model.

Unit 9:Regression Analysis

Simple Linear Regression, Measures of Goodness of Fit, Multiple Linear Regression, Preliminaries, Regression with Two Independent Variables.

Unit10:ForecastingandTimeSeriesAnalysis

Forecasting, Time Series and Their Components, Long-term Trend, Seasonal Variations, Cyclic Variations, Random Variations/Irregular Fluctuations, Forecasting Models, the Additive Model, the Multiplicative Model, Forecasting Long-term Trends, The Methods of Least Squares, the Methods of Moving Averages, Exponential Smoothing.

Unit11:StatisticalQualityControl

Concept of Quality, Nature of Quality Control, Statistical Process Control, Concepts of Variation, Control Charts, Control Charts For Variables, Process Capability Analysis, Control Charts For Attributes, Acceptance Sampling, Sampling Plan Concepts, Single Sampling Plans.

BLOCK4:Sampling

Unit12:SimpleRandomSamplingandSystematicSampling

Sampling- What and Why? Preliminaries, Simple Random Sampling, Estimation of Population Parameters Systematic Sampling, Linear Systematic Sampling, Circular Systematic Sampling, Advantages and, Limitations of Systematic Sampling.

Unit13:Stratified Sampling

StratifiedSampling,Preliminaries,Advantages,Estimationofpopulationparameters, Allocation of sample size, Construction of strata, Post-Stratification.

Unit14:ClusterSamplingandMultistageSampling

Cluster Sampling, Preliminaries, Estimation of population mean, Efficiency of cluster sampling Multistage sampling, Preliminaries, Estimation of mean in two stage sampling.

Note: There may be some minorchangesinthesyllabusofBCS-040.

4.4   Detailed Syllabus of BCAOL Fourth Semester

1.   MCS-206   Object Oriented Programming using Java   4Credits

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. Java is one of the prominent programming language for Object Oriented Programming. This Course is designed to give you exposure to the

concepts of object-oriented programming using java. It will help in learning to write programs in java using object-oriented concepts and features of java including exceptions handling and multithreading. Also this course will teach students to use java API, Stream classes, GUI in java, and use of JDBC in applications development.

Block and Unit Structure

Block 1: Java Fundamentals

Unit1: Introduction to Java
- Introduction to Object Oriented
- Programming Features of Java(OOP, robustness,
- multithreading, networking, Interpreted and High Performance, Distributed, dynamic etc)) JDK, JRE, JIT, JVM
- Environment setup for java☐ development(First java program)

Unit 2: Basics of Java
- Data Type
- Unicode
- Variables
- Operators
- Statements/expression
- Example Program with use of Scanner
- Class

Unit3: Decisions and Loops
- Array
- Decision Constructs
- Loop Constructs

Unit4: Class and Objects
- Class Fundamentals
- Declaring Objects
- Object Lifecycle (creation, "dereference by reassignment" and garbage collection) Methods(Getter and Setter)
- Encapsulation
- Access Modifier/Specifier
- Constructors in Java
- Garbage Collection
- The Finalize ( ) Method

Block 2: Inheritance, Polymorphism and Packages

Unit 1: Inheritance

- Basics of Inheritance
- Advantages of Inheritance
- Member Access and Inheritance
- Types of Inheritance
- Use of Super Keyword
- Creating Multilevel Class Hierarchy
- Demonstrating Order of Constructors
- Execution Use of Final Keyword

Unit 2: Polymorphism

- Introduction to Polymorphism
- Advantages of Polymorphism
- Types of Polymorphism
- Method Overloading
- Method Overriding
- Abstract Class
- Application of Abstract Class

Unit 3: Assertions and Exception Handling

- Assertion and its use
- Fundamentals of Exception Handling
- Features of Exception
- Types of Exception
- Exceptions Handling in Java
- Multiple Catch Clauses
- Throw
- Throws
- Finally
- Java Built-in Exceptions
- Creating Own Exception Subclasses

Unit 4: Packages and Interfaces

- Package
- Access Rules in Packages
- Finding Packages and CLASSPATH
- Creating Own Packages
- Importing Packages
- Basics of Interface in Java
- Defining , Implementing and Applying
- Interface Default Interface Methods
- Issues of Multiple Interfaces
- Use of static Methods in an Interface

Block 3: Multithreading and I/O

Unit: 1 Multithreading

- Multithreading
- Java thread Model
- Creating Threads in Java
- Implanting Runnable Interface
- Extending Thread Class
- Thread Life Cycle
- Creating Multiple Threads
- Using isAlive( ) and join( )
- Thread Priority
- Synchronization
- Interthread Communication
- Suspending , Resuming, and Stopping
- Threads Obtaining a Thread State
- Using Multitheading

Unit 2: Number and Strings (String, StringBuilder, string buffer)
- Number Class and its Methods
- String Class and its Methods
- StringBuilder Class and its Methos
- StringBuffer Class and its Methods

Unit 3: I/O Streams
- Introduction to I/O Class and Interfaces
- File Class and its Methods
- The AutoClonable, Clonable and
- Flushable Interfaces I/O Exceptions
- Introduction to the Stream Classes
- Byte Stream Classes
- Character Stream Classes
- The Clonable Class
- Serialization

Unit 4: Java API
- Date and Time
- Set
- Map
- HashMap
- Stack
- Vector
- List

Block 4: Graphical User Interface and Java Database Connectivity

Unit1: Introduction to GUI in Java
- Introduction to AWT / Swing/ JavaFX
- Features of JavaFX
- User Interface Components of JavaFX
- Work with Layouts
- Add Text
- Add HTML Content

Unit2: Working with UI Controls
- Skin Applications with CSS
- Build UI with FXML
- Event Handling in JavaFX
- Effects, Animation, and Media

Unit3: JDBC Part-1
- JDBC Introduction
- JDBC Driver
- JDBC Database Connection Steps
- JDBC Driver Manager Class
- JDBC Statement Interface
- Prepared Statement
- Callble Statement

Unit:4 JDBC Part 2
- JDBC ResultSet Interface
- JDBC Transactions
- JDBC Batch Processing
- JDBC RowSet Interface
- Introduction to Java Data Object (JDO)

2. BCSL-146 Object Oriented Programming using Java Lab   2 Credits

Objective: This laboratory course is based on Object Oriented Programming using Java. Main objective of this laboratory course is to provide hands on exercises to the students based on Object Oriented Programming using Java.

Lab Sessions:

There will be 10 practical sessions (3 hours each) of which 10 sessions will be on Java Programming.

Section 1: Java Programming

3.   BCS-053 Web Programming   2 Credits

Objectives:

Aftergoingthroughthiscourseastudentshouldbeableto:

- UseXHTMLtagstocreatesimplestaticwebpages;

- formatasimpleWebpageusingCascadingStylesheets;

- statetheconceptsapplicabletowebprogramming;

- createaninteractiveanddynamicWebsiteusing JavaScript;

- representdataovertheWeb using XML;

- appreciatetheuseofAjaxandRichInternetApplications,and

- performserver sidescriptingusingJavaServer Pages(JSP).

BLOCK 1:ClientSide

Unit1:Web 2.0 andXHTML

What Is Web 2.0? Introduction to Web 2.0 terms: Search, Content Networks, Blogging, SocialNetworking, SocialMedia, RichInternet Applications(RIAs), Web Services, Mashups, Widgets and Gadgets, Introduction to XHTML and WML, Syntactic Differences between HTML and XHTML, Standard XHTML Document Structure, An example ofXHTML covering Basic Syntax, Images, Hypertext Links, ListsandTables, CreationofanXHTMLForm, InternalLinkingandMetaElements.

Unit2:UsingStyleSheets

CSS: Inline Styles, Embedded Style Sheets, Linking External Style Sheets, Style Specification Formats Selector Forms, Colour, Property Value Forms, Font Properties, ListProperties, Alignment of Text, The Box Model, Background Image
,The<span>and<div>Tags.

Unit3:Introduction toXML

XML Basics, XML Document Structure, XML Namespaces, Document Type Definitions, XML Schemas, Displaying XML Documents.

Unit4:Programming with Java Script–DOMand Events

The Document Object Model, Element Access in JavaScript, Traversing and Modifying a DOM Tree, DOM Collections and Styles, Events, Examples of Event Handling from Body, Button, Text Box and Password Elements, Dynamic Documents using JavaScript – element moving, visibility, positioning etc., Example program (s),Introduction and example of AJAX.

Unit5:IntroductiontoWAPandWML

WAPand WMLBasics,WMLformattingand links,WMLinput,WMLtasks, WML timer, WML variables, Example.

BLOCK 2: Server Side

Unit1: The Server Side Scripting

Server side scripting and its need ,Two-Tier, Three-Tier, N-Tier and Enterprise Architecture, Various Languages/ Technologies for server scripting ,HTTP Methods (such as GET, POST, HEAD, and so on) , Purpose ,Technical characteristics,Method selection, Use of request and response primitives, Web container – Tomcat.

Unit2: JSP –Basic

Basic JSP Lifecycle, JSP Directives and Elements, Scriptlets, Expressions, Action Elements, Standard Actions, Comments and Template Data, JSP variables, The out Object, Request, response, sessions and application objects.

Unit3: JSP –Applications

Exceptions and exception handling using JSP, Cookies and sessions, Managing Email using JSP.

Unit4: JSP Application Development

Example applications using JSP, What is JDBC? Need for JDBC, Database Drivers, Connection using JDBC API, Application development and deployment.

4.   *BCSL-147:Web Programming Lab*   *2 Credits*

This lab course is **of 1 Credit**, based on course Web programming.

Session wise coverage:

Session1   : Using Web2.0andcreatingpagesusingXHTML.

Session2   : Creating Style Sheets for the web pages created in session.

Session3   : Creating sample XML document and displaying it.

Session4   : WML.

Session5 and 6 :   Using and writing Java Script in web pages, including event sand Ajax.

Session7,8   : Using JSP.

Session9,10   :Writing simple applications using JSP and JDB and deploying it.

5.   BCS-041: Fundamental of Computer Networks   4 Credits

Objectives:

This course introduces the basics of data communication and networking. Students will develop an understanding of the general principles of data communication and networking as used in networks. It also includes an activity of setting up a small local area network. The goal of this course is that the student will develop an understanding of the structure of network, its elements and how these elements operate and communicate with each other.

BLOCK 1:Concepts of Communication and Networking

Unit 1: Basics of Data Communication

Concept of communication system, Analog and Digital Communication, Data communication modes, Synchronous and asynchronous transmission, Simplex, half-duplex, full duplex communication, Networking Protocols and Standards, Layering, OSI reference model, encapsulation, End-to-end argument. Protocol design issues, Applications.

Unit 2: Modulation and Encoding

Analog Modulation (AM, FM, PM), AM Demodulation (one technique only), Advantages and Disadvantages of each., Analog to Digital (Digitization), Sampling, Quantization, Digital to Analog, Digital Modulation (ASK, FSK, PSK, QPSK).

Unit 3: Multiplexing and Switching

Concept, FDM, TDM, SDM, Multiplexing Applications, Circuit and Packet Switching.

Unit 4: Communication Mediums

Digital data transmission, Serial and Parallel Transmission, Guided and Unguided mediums, Wireless Communication, Coaxial Cables, Twisted Pair Cables, Fiber Optic Cables, Connectors.

BLOCK 2: Networks and Devices

Unit 1: Network Classifications and Topologies

Network Concept, LAN overview, LAN Topologies, LAN access methods, Network Types based on size like PAN, LAN, MAN, WAN, Functional Classification of Networks, Peer to Peer, Client Server. Wide Area Network, WAN Topologies, WAN Access Methods.

Unit 2: OSI and TCP/IP Models

Introduction of OSI Model, Need of such Models, Basic functions of each OSI layer, Introduction to TCP/IP, Comparisons with TCP/IP layers. (At the beginner's level).

Unit 3: Physical and Data link Layer

Error detection and correction, CRC, Framing, Retransmission strategies, Multi-access communication, CSMA/CD, Ethernet, Addressing, ARP and RARP.

Unit 4: Internetworking Devices

Network Interface Cards, Modems, Repeaters, Hubs, Bridges, Switch (L2 and L3 differences) and gateways.

BLOCK 3: Network, Transport and Application Layer

Unit 1: Network layer

Circuit and packet switching, Routing, Congestion control, Routing protocols: distance vector vs link-state routing, DV problems, Network Addressing, Forwarding, Fragmentation, Error Messaging Services.

Unit 2: Transport layer

Addressing and multiplexing, Flow control, congestion control, data transport, Port numbers, service models, Intro to reliability, QoS.

Unit 3: Application Layer

DNS, Remote Logging, File transfer, Network Management, client-server applications, WWW, E-mail, MIME.

Unit 4: Network Applications

Internet Applications like emails, chatting, social networking, Rail Reservations, Information Sharing, e-governance, Online Processing and Collaborations, etc., Mobile Applications.

BLOCK 4: Network Design and Security

Unit 1: Building a Simple Network

Examples of designing the developing small networks, Structure Cabling, Integrating home computers and devices, creating a small Networking.

Unit 2: Introduction to Network Architectures

X.25, Frame relay, Telephone network, ATM network, ISP, IPv4 and IPv6 overview

Unit 3: Introduction to Wireless and Mobile Networks

Introduction to wireless communication systems, modern wireless communication systems and generations, Introduction to cellular mobile systems, CDMA, cellular system design fundamentals.

Unit 4: Network Security

Introduction to computer security, Security services, Authentication and Privacy, Block and Stream Ciphers, Public and Private key Cryptography, Introduction to RSA, MD5 and DES at the beginner's level.

6.   BCOC-131:   FINANCIAL ACCOUNTING   6 Credit

BLOCK 1 THEORETICAL FRAMEWORK

Unit 1 Nature and Scope of Accounting

Unit 2 Accounting Process and Rules
Unit 3 Accounting Principles
Unit 4 Accounting Standards

BLOCK 2 ACCOUNTING PROCESS
Unit 5 Journal and Ledger
Unit 6 Subsidiary Books
Unit7 Trial Balance and Rectification of Errors

BLOCK 3 FINAL ACCOUNTS
Unit 8 Depreciation
Unit 9 Final Accounts-I
Unit 10 Final Accounts-II

BLOCK 4 HIRE PURCHASE AND INLAND BRANCHES
Unit 11 Hire Purchase-I
Unit 12 Hire Purchase-II
Unit 13 Branch Accounts-I
Unit 14 Branch Accounts-II

BLOCK 5 CONSIGNMENTS AND JOINT VENTURES
Unit 15 Consignments-I
Unit 16 Consignments-II
Unit 17 Joint Venture

BLOCK 6 COMPUTERISED ACCOUNTING
Unit 18 Introduction to computer Accounting and Creation of Company
Unit 19 Creating Masters
Unit 20 Voucher Entries and Invoicing
Unit 21 Preparation of Reports

4.5 Detailed Syllabus of BCA_NEW Fifth Semester

1. **BCS-151: Introduction to Software Engineering**   **3 Credits**

Objectives:
After studying the course, the student should:
   a) Be able to develop SRS as per any of the existing standards;
   b) Know various Function and Object oriented modeling & design techniques;
   c) Know various testing techniques;
   d) Know different Software Development Life Cycle models; and
   e) Know the concepts of Software Project Management.

BLOCK 1 : Development of SRS

Unit 1: Characteristics of SRS
Completeness, Unambiguity, Inconsistency, IEEE SRS.

Unit 2: Function oriented Modeling
DFD, ERD, Structure Chart, SRS, Data Dictionaries.

Unit 3: Object Oriented Modeling

UML Introduction, Use Case Diagrams, Class Diagrams.

BLOCK 2 : Design and Testing

Unit 1: Function Oriented Design
Constructing solution to problem, Identifying components and their interaction, Visualizing the solution, Characteristics of a good function oriented design (Coupling, Cohesion etc.).

Unit 2: Object Oriented Design
Identification & Specification problem domain static objects, Working out the application logic objects, Identification of necessary utility objects, Methodology of identification of objects, Case Study.

Unit 3: Testing Techniques
Different testing techniques with examples.

Unit 4: Development and Execution of test cases
Debugging, Testing tools & Environments, Types of test cases and test plans

BLOCK 3 : Software Engineering Concepts

Unit 1: Software Development Models
Program vs Software, Definition of Software Engineering, SDLC models.

Unit 2: Software Project Management Concepts
Planning, Execution, Monitoring, Control of Software Projects, Software Metrics, Application of PERT and GANTT charts.

Unit 3: Software Engineering Fundamentals
Software Configuration Management, Software Maintenance, Software Quality Assurance.

2. BCS-042: Introduction to Algorithms Design   2 Credits

Objectives:

To learn about properties of algorithm and how to design an algorithm, discuss asymptotic notations, Design and measure time complexity analysis of searching, sorting and Graph traversal algorithms. Make comparison of different type of algorithm likes Linear, Quadratic, Polynomial and Exponential, Describe how greedy approach facilitate solving the problem. Discuss Divide and Conquer approach for solving the problem.

BLOCK 1:Introduction to Algorithm

Unit 1: Basics of an Algorithm

Definition and Example of an algorithm, Characteristics of an algorithm, Steps in Designing of Algorithms, Growth of function, Recurrence, Problem Formulation (Tower of Hanoi), Substitution Method, Iteration Method, Master Method.

Unit 2: Asymptotic Bounds

Asymptotic Notations, Concept of efficiency of analysis of an algorithm Comparative efficiencies of algorithms: Linear, Quadratic, Polynomial and Exponential.

Unit 3: Analysis of simple Algorithms

Euclid's algorithm for GCD, Horner's Rule for polynomial evaluation, Simple Matrix (n x n) Multiplication, Exponent evaluation e.g. a^n, Searching, Linear Search, Sorting, Bubble sort, Insertion Sort, Selection sort.

BLOCK 2: Design Techniques

Unit 1: Greedy Technique

Elements of Greedy strategy, Activity Selection Problem, Continuous Knapsack Problem, Coin changing Problem, More Examples.

Unit 2: Divide and Conquer Approach

General Issues in Divide and Conquer, Binary Search, Merge Sort, Quick Sort, Integer Multiplication, More Examples.

Unit 3: Graph Algorithm

Representation of Graphs, Adjacency Matrix, Adjacency List, Depth First Search and Examples, Breadth First Search and Examples.

3. BCSL-159 Introduction to Algorithm Design Lab   2 Credit

This course will cover practical implementations of several algorithms covered in BCS-042 course.

4. BCOS-184: E-COMMERCE   4 Credit

E-Commerce will facilitate using computer software, manage data to make data-driven decisions, and prepare statistical reports, spreadsheets, presentations, publications, and web pages. In this course there are four blocks and in each block there are five units.

BLOCK 1 BASICS OF E-COMMERCE

Unit 1 Introduction to E-Commerce
Unit 2 E-Commerce: Business Models
Unit 3 Technology used in E-Commerce
Unit 4 Electronic Governance

BLOCK 2 E-PAYMENT SYSTEM

Unit 5 Electronic Payment
Unit 6 E-Banking

BLOCK 3 WEBSITE DEVELOPMENT AND HOSTING

Unit 7 Website Development
Unit 8 Electronic Commerce Software
Unit 9 Web Server Hardware and Software

BLOCK 4 CYBER SECURITY & INFORMATION ACT

Unit 10 Cyber Security

Unit 11 Cyber Security Measures

Unit 12 IT Act 2000

BLOCK 5 ONLINE PORTAL AND APP: BUSINESS, SHOPPING & SERVICES

Unit 13 Online Shopping / E-Tailing

Unit 14 Online Services

Unit 15 App Based Commerce

5.   MSEI-023   Cyber Security   4 Credits

Block-1 Information Gathering

Unit 1 Social Engineering

Unit 2 E-Mail Crime & Investigation

Unit 3 Reverse Engineering

Unit 4 Cracking methodology

Block-2 Database Security

Unit 1 Introduction to Database Concepts

Unit 2 Hands-on Database Usage and Hacking Attempt

Unit 3 Database Security – I

Unit 4 Database Security –II

Block-3 Web Technology

Unit 1 Introduction to Web Architecture

Unit 2 Client Side Scripts

Unit 3 Server Side Scripts

Unit 4 Attacks on Web Application

Block-4 Internet Technology

Unit 1 Internet Architecture

Unit 2 Social Networking Sites

Unit 3 Advanced Searching Techniques

Unit 4 Latest Trend in Internet Securities

6.   BECS 184   Data Analysis   4 credits

Block 1 Review of Mathematical and Statistical Concepts

Unit 1 Mathematical Concepts

Unit 2 Statistical Concepts

Unit 3 Introduction to Statistical Software

Block 2 Data Collection and Presentation of Data

Unit 4 Data Collection: Methods and Sources

Unit 5 Tools of Data Collection

Unit 6 Data Presentation

Block 3 Analysis of Quantitative Data

Unit 7 Univariate Data Analysis

Unit 8 Bivariate Data Analysis

Unit 9 Multivariate Data Analysis

Block 4 Composite Index Numbers and Qualitative Data
Unit 10 Composite Index Numbers
Unit 11 Analysis of Qualitative Data

4.6 Detailed Syllabus of BCA_NEW Sixth Semester

1. BCOS-185   ENTREPRENEURSHIP   4 Credits

BLOCK 1 ENTREPRENEURSHIP: A PERSPECTIVE
Unit 1 An Introduction to Entrepreneurship
Unit 2 Entrepreneurial Eco-system
Unit 3 Dimensions of Entrepreneurship
Unit 4 Entrepreneurs Competencies

BLOCK 2 BUSINESS IDEA SELECTION AND FEASIBILITY
Unit 5 Business Opportunity Identification and Selection
Unit 6 Market survey
Unit 7 Business Plan preparation-I
Unit 8 Business Plan Feasibility : I
Unit 9 Business Plan : Implementation

BLOCK 3 MOBILISING RESOURCES AND START-UP
Unit 10 Start-up initiatives
Unit 11 Mobilising Financial Resources
Unit 12 Mobilising Non-financial Resources

BLOCK 4 ENTREPRENEURSHIP AND MICRO, SMALL AND MEDIUM ENTERPRISES (MSMES)
Unit 13 Entrepreneurship Development and MSMEs
Unit 14 Family Businesses in India
Unit 15 Success Stories

2. MSEI-027   Digital Forensics   4 Credits

[Block-1 Cyber Crime and Cyber Forensics](#)

Unit 1 Various Types of Cyber Crimes
Unit 2 Banking and Financial Crimes
Unit 3 Identify Thefts and Data thefts/Source Code Thefts
Unit 4 Spam and Botnets

[Block-2 Digital Forensics : Tools and Techniques](#)

Unit 1 Digital Investigation
Unit 2 Data Acquisition and Information Gathering
Unit 3 Forensic Examination of Systems
Unit 4 Forensic Examination of Network Devices

[Block-3 Mobile Forensics](#)

Unit 1 Introduction to Mobile Forensics and Technologies
Unit 2 Analysis of CDR's

Unit 3 Application of SIM Card Reader's
Unit 4 Forensic Examination of Mobile Devices

Block-4 Security Issues in Wireless Technologies

Unit 1 Introduction to Wireless technologies
Unit 2 Wireless Devices
Unit 3 Securing Wireless Network
Unit 4 Ethical Hacking-Wireless Security

3.   BCSP-165:   Project   12 Credits

The objective of the BCA_NEW project work is to develop a quality software solution by following the software engineering principles and practices. During the development of the project the students should involve in all the stages of the software development life cycle (SDLC). The main objective of this project course is to provide students a platform to demonstrate their practical and theoretical skills gained during five semesters of study in BCA_NEW Programme. During project development students are expected to define a project problem, do requirements analysis, systems design, software development, apply testing strategies and do documentation with an overall emphasis on the development of a robust, efficient and reliable software systems. The project development process has to be consistent and should follow standard.. For example database tables designed in the system should mach with the E-R Diagram. SRS documents to be created as per IEEE standards. Students are encouraged to spend maximum time of the sixth semester 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 BCA_NEW final semester project. The courses studied by the students during the BCA_NEW Programme provide them the comprehensive background knowledge on diverse subject areas in computer science such as computer programming, data structure, DBMS, Computer Organization, SAD, Software Engineering, Computer Networks etc., which will be helping students in doing project work. Student will receive Project Guidelines along with their 5th semester course material. Students may also download Project Guidelines from IGNOU Website. Students should strictly follow and adhere to the BCSP-064 project guidelines.

5. EVALUATION SCHEME

5.1 Evaluation and Marking Scheme of BCA_NEW

Completion of the programme requires successful completion of both assignment component and the Term-end Examination component for each of the courses in the programme. The total numbers of courses in BCA_NEW are 32 (including a Project Course) and the total number of credits are 120.

Course Code	Course Title	Credits	School	No. of Counselling Sessions
SEMESTER I				
BEVAE-181	Environmental Studies	4	SOS	05
BEGLA-136	English at Work Place	6	SOH	09
BCS-111	Computer Basics and PC Software	4	SOCIS	09
BCSL-013	Computer Basics and PC Software Lab	2	SOCIS	20
BCS-012	Basic Mathematics	4	SOCIS	12
	Total Credits:	**20**		
SEMESTER II				
FEG-02	Foundation Course in English-2	4	SOH	05
MCS-202	Computer Organisation	4	SOCIS	06
MCS-203	Operating Systems	4	SOCIS	06
MCSL -204	WINDOWS and LINUX Lab	2	SOCIS	20
MCS-201	Programming in C and Python	4	SOCIS	06
MCSL– 205	C and Python Lab	2	SOCIS	20
	Total Credits:	**20**		
SEMESTER III				
MCS-208	Data Structures and Algorithms	4	SOCIS	06
MCSL -209	Data Structures and Algorithms Lab	2	SOCIS	20
MCS-207	Database Management Systems	4	SOCIS	06
BCS- 131	Programming in C++	4	SOCIS	09
BCSL-135	DBMS and C++ Lab	2	SOCIS	20
BCS -040	Statistical Techniques	4	SOCIS	05
	Total Credits:	**20**		
SEMESTER IV				
MCS-206	Object Oriented Programming using Java	4	SOCIS	06
BCSL-146	Object Oriented Programming using Java Lab	2	SOCIS	20
BCS -053	Web Programming	2	SOCIS	10
BCSL-147	Web Programming Lab	2	SOCIS	20
BCS -041	Fundamentals of Computer Networks	4	SOCIS	12
BCOC-131	Financial Accounting	6	SOMS	10
	Total Credits:	**20**		
SEMESTER V				

BCS- 151	Introduction to Software Engineering	4	SOCIS	09
BCS – 042	Introduction to Algorithm Design	2	SOCIS	06
BCSL-159	Introduction to Algorithm Design Lab	2	SOCIS	20
BCOS - 184	E-Commerce	4	SOMS	06
MSEI-023	Cyber Security	4*	SOVET	5 Theory + 10 Practical
BECS-184	Data Analysis	4	SOSS	12
	Total Credits:	**20**		
	SEMESTER VI			
BCOS -185	Entrepreneurship	4	SOMS	06
MSEI-027	Digital Forensics	4*	SOVET	5 Theory + 10 Practical
BCSP-165	Project	12	SOCIS	12
	Total Credits:	**20**		

Note:

i) 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 part in the practical course of Term-End Practical Examination is compulsory in order to get it declared successful in the respective course. The practical examination includes Viva Voce only.

(i) ** 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 Project Evaluation and (ii)Viva-voce.

Courses	Evaluation Methodology
BCS-111, BCS-012, BCS-131, BCS-151, BCS-041	(a) **Continuous Evaluation:** Max. Marks:100, Min.Marks:40, Weightage:25% (b) **Term End Examination:** Max. Marks: 100, Min. Marks 40, Weightage: 75% Duration of TEE: 3 hours
BCSL-146, BCSL-147, BCSL-159, BCSL-135, BCSL-159	a) **ContinuousEvaluation:**Max.Marks:50,Min.Marks:20,Weightage:25% b) **Term End Practical Examination:** Max. Marks: 50, Min. Marks 20, Weightage: 75%, Duration of TEPE: 1 hour
BCSL-013	(a) **Continuous Evaluation:** Max. Marks:100,Min.Marks:40,Weightage:25% **TermEndPracticalExamination:**Max.Marks:50,Min.Marks20,Weightage:75% Duration of TEPE: 2 hour
BCS-040	(a) **Continuous Evaluation:** Max. Marks:100, Min.Marks:35Weightage:25% (b) **Term End Examination:** Max. Marks: 50, Min. Marks 17.5, Weightage: 75% Duration of TEE: 2 hours
BCS-042 , BCS-053	(a) **Continuous Evaluation:** Max. Marks:100, Min.Marks:40Weightage:25% (b) **Term End Examination:** Max. Marks: 50, Min. Marks 20, Weightage: 75% Duration of TEE: 2 hours

FEG-02	a) **Continuous Evaluation:** Max.Marks100,Min. Marks:35,Weightage: 30% b) **Term End Examination:** Max.Marks:50,Min.Marks:17.5,Weightage:70%, Duration of TEE: 2 hours
BCSP-165	(a) **Project Report Evaluation:** Max.Marks:150, Min.Marks:60,Weightage:75% (b) **Project Viva:** Max.Marks:50, Min.Marks:20,Weightage:25% The minimum passing marks in each of the project report evaluation and viva-voce are 40%
BECS-184	**Continuous Assessment (CA)** 30% **Term End Examination (TEE)** 70%
MCS-201 **MCS-202** **MCS-203** **MCSL-204** **MCSL-205** **MCS-206** **MCS-207** **MCS-208** **MCSL-209**	**Continuous Assessment (CA) 30%** **Term End Examination (TEE) 70%**
BEVAE-181 **BEGLA- 136** **BCOC-131** **BCOS-184** **BCOS-185**	**Continuous Assessment (CA)** 30% **Term End Examination (TEE)** 70%
MSEI-023 **MSEI-027**	**Continuous Assessment (CA)** 30% **Term End Examination (TEE)** 70% A student needs to secure at least 50% marks in continuous assessment and term end examination (Theory and Practical) Separately in a course to be declared successful in that particular course. This requirement in applicable for all the courses of MSCIS.

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-204	Section–1(20) Section–2(20)	Section–1(20) Section–2(20)	20	100
MCSL-205	Section–1(20) Section–2(20)	Section–1(20) Section–2(20)	20	100
MCSL-209	Section–1(20) Section–2(20)	Section–1(20) Section–2(20)	20	100
MCSL-210	Section–1(20) Section–2(20)	Section–1(20) Section–2(20)	20	100

Course Code	Course Title	Credits	Continuous Evaluation Assignment (Weightage – 25%)		Term End Examination Theory OR Practicals*(for Lab courses only) (Weightage-75%)		
			Max. Marks	Min. Marks	Duration	Max. Marks	Min. Marks
BCSL-013	Computer Basics and PC Software	2	100	40	2	100	40
BCSL-135	DBMS and C++ Lab	2	100	40	2	100	40
BCSL-146	Object Oriented Programming using Java Lab	2	100	40	2	100	40
BCSL-147	Web Programming Lab	2	100	40	2	100	40
BCSL-159	Introduction to Algorithm Design Lab	2	100	40	2	100	40

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:

(Practicalquestions–80%andViva-voce–20%)

Course Code	Duration of term-end practical exam.(Each Section gets equal time)	Term-end practical examination and viva-voce	
		MarksSection-1	MarksSection-2
MCSL-204 (2credits)	2hours	20(P)+5(V) =25marks	20(P)+5(V) =25marks
MCSL-205 (2credits)	2 hours	20(P)+5(V) =25marks	20(P)+5(V) =25marks
MCSL-209 (2credits)	2hours	20(P)+5(V) =25marks	20(P)+5(V) =25marks
MCSL-210 (2credits)	2hours	20(P)+5(V) =25marks	20(P)+5(V) =25marks

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.

Award of Final Division:

The final division of a student is awarded as follows:

Marks Range	Division
75% and above	First Division with Distinction
60% or more but less than 75%	First Division
50% or more but less than 60%	Second Division
40% or more but less than 50%	Third Division

5.2 Instructions for Assignments

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

1. **Tips for assignments**

The word limits for answering most of the questions are mentioned with them if no word limit is prescribed, and then assume it to be minimum 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) use of figure/ diagram to enhance your answer wherever required;

e) 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:

```
PROGRAMMETITLE :.......................    ENROLMENTNo.:...........................

COURSECODE:................................    NAME:...............................................

COURSE TITLE:...............................    ADDRESS:.........................................

ASSIGNMENTCODE :........................    SIGNATURE:....................................

LSC:...............................    DATE:...............................................
```

4. Read instructions for submission of assignments given here. The assignments response sheets should be hand written. However the s/w coding, snapshots, test cases etc. can be in the printed form. **Students should not reproduce their answers from the units sent to them by the University. If they reproduce from the units, they will get poor marks for the respective question**.

5. The students should write each assignment separately. All the assignments should not be written in continuity.

6. **The students should write the question number with each answer. Photocopy of the submitted assignment is to be retained by the student for his or her own record and future reference, if any.**

7. The students should use only A4 size paper for their response and tag all the pages carefully. Avoid using very thin paper. They should allow a 4-cm. margin on the left and at least 4 lines in between each answer. This may facilitate the evaluator to write useful comments on the margins at appropriate places.

8. **The students should not copy the assignments from others. If copying is noticed, the assignments of such students will be rejected, and disciplinary action will be taken against the students as per rules of the University.**

9. **The completed assignment response should be sent to the Coordinator of the LSC**. **Under no circumstances should they be sent to any other department or the School at Headquarters**, for evaluation. After submitting the assignment at the LSC 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 LSCs within one month of its submission for the feedback and for their future guidance.

10. In case the student has requested for a change of LSC, s/he should submit her/his

Assignments only to the original LSC until the University effects the change of LSC.

5.3   Guidelines for the Submission of Assignments

1. Visit your Regional Center website for latest update about Assignment Submission.

2. 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.

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 Co-ordinator of the LSC 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. In case of submitting assignment through post, Students should enclose a self-addressed stamped assignment remittance-cum-acknowledgement card 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 student, which may be downloaded from IGNOU website.

7. For their own record, students should retain a photocopy of all the assignment responses, which they submit to the Co-ordinator of their LSC. If they do not get back their duly Evaluated Assignment within a month after submission, they should try to get it from their LSC 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 LSC, so that s/he forwards the correct score to the concerned RC or to the Student Evaluation Division at 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, Student Evaluation Division, Indira Gandhi National Open University, Maidan Garhi, New Delhi - 110 068. While doing so they should give their complete Enrolment number, name, address, programme code.

11. In case of not successfully completed or missed; the fresh assignments should be submitted only, if your registration for that course is valid.

12. Please do not submit your assignment responses twice either at the same LSC or at different LSCs for evaluation.

Note: **Please submit your Assignments on or before the due date at your LSC.**

5.4 General Guidelines Regarding the Term-End Examination (it is also available at IGNOU website)

1. The examination form can be submitted online only. The fees and the guidelines are given below:

2. To be eligible to appear the Term-end Examination in any course, the students are required to fulfill the following conditions:

   a) they should have paid the fee due for that semester.

   b) they should have opted and pursued the prescribed course.

   c) they should have submitted the examination form through online with credit/debit/net banking requisite fees.

   d) they should have submitted the required number of assignments within due dates before taking the examination.

   e) their registration for the programme should be valid.

3. The University conducts term-end examinations twice a year, in June and December. The student can take the examination only after the minimum period prescribed for the course of study has elapsed.

4. (i) **Dates for the Submission of Online Term End Examination form**

   Please see the updated details at: http://www.ignou.ac.in

   (ii) **Examination fee and Mode of Payment**

Examination Fee	Payment Mode
@ Rs. 200/- per course theory @ Rs. 200/- per course practical/lab	Online mode through Credit Card / Debit Card /Net Banking

   In case, examination fee needs to be returned to student due to technical reasons, the fee will be refunded to the same account (Credit card/ Debit card/ Net Banking) from which the payment was made.

   Students are advised that they must ensure they are exercising adequate caution and care while filling the form and opting mode of payment.

   (iii) **Un-successful Submission of Exam Form**
   Step 1: Payment deducted through Credit Card / Debit Card /Net Banking, however the student is not able to get acknowledgement successfully. The student is required to approach the bank to take the charge back.

   Step 2: Re-submit the Examination Form on or before the last date of submission of exam form is over. (Step1).

   Step 3: Students can apply separately after the publication of Hall Ticket on IGNOU website for the refund of Examination Fee, if not refunded automatically by the Payment Gateway within 72 hours to email ID : termendexam@ignou.ac.in.

(v)   Related to Refund excess Examination Fee

a. Students who fill Exam Form online through Cyber Cafã©/ Other Agency, must ensure receipt of the Examination Fee and that their Fee is reached IGNOU through SEARCH Option at IGNOU website

b. The result shall be withheld/cancelled for the students who have taken back the examination fee through charge back process from the concerned bank and appeared in the examination illegally.

c.   The excess/unsuccessful fee amount will be adjusted/refunded as the case may be, to the account from which the payment was made after due verification of records of the concerned Bank.

(vi) Hall Ticket for Term End Examination

- Hall Ticket **for the eligible students** will be uploaded on the University Website (www.ignou.ac.in) approximately 7 to 8 days before the commencement of the Term-end examinations. Please take print out of Hall Ticket from University website (www.ignou.ac.in) and report at the Examination Centre along with the Identity Card issued by the Regional Centre/University.

- Students will be allowed to appear in Term-end Examination for the course(s) for which registration is valid and not time-barred and assignment(s) is/are submitted.

- Students must carry IGNOU Identity-Card in the Examination Hall for writing Examination. In case, students do not have IGNOU Identity card due to various reasons, they must get it issued (i.e. duplicate copy of IGNOU Identity card) from Regional Centre concerned well before the start of the Examination. Students are required to contact the RC in person (by post) and get the duplicate Identity card for attending Examination.

- Examination Fee once paid will not be refunded.

(vii) Contact Details

In case of non-receipt of Control number or any query pertaining to Examination Form please contact or send email at: termendexam@ignou.ac.in

Please visit IGNOU website for updated information related to Term End Examination

5.5 Guidelines and instructions for submission of online examination form at IGNOU website.

i)   Students are required to pay examination **fee for each course,** if the student is appearing for the first time or failed earlier examinations for theory as well as practical. Payment can be made through Credit Card, & Net banking through online mode. Please choose the suitable option for payment. For details of fee, please refer to examination form.

ii)   The examination form must submitted through online mode at IGNOU website www.ignou.ac.in

iii) Select and enter Programme code and Examination Centre Code from the options available. If the centre opted by the student is not activated as examination centre or not allotted for any other reason, alternative examination centre will be allotted.

iv)   Select courses carefully. Courses for theory as well as practical needs to be selected

separately from the drop down menu.

v) You have to submit on-line form and make payment through Credit Card & Net banking. Please note the auto generated control No. for further reference.

Date of Submission of Examination Forms & Fees

The Examination fees per course is @ ₹ 200/- per course (Theory/Practical/Lab). The dates are prone to change. Please check http//www.ignou.ac.in for latest dates & schedule at IGNOU website.

5. Please see the instructions under headline Instructions for submission of Examination forms.

6. Students should carry their **Identity Card and Hall Ticket** (download hall ticket from IGNOU website indicating Centre & Date of Examination) to the Examination Centre.

7. In case a student fails to receive the Hall ticket, may please contact to SED at email ID : termendexam@ignou.ac.in

8. 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 allotted shall not be changed.**

9. 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. 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.

10. The students can get their Term-end Examination result reevaluated. They should apply in prescribed form**.** A prescribed fee for reevaluation is charged per course. This amount is refunded if there is a mistake in checking of answer-book.

11. Duplicate Grade Card/marks sheet will be issued on a request from the students in prescribed form against payment of prescribed charge/fee by Demand Draft drawn on IGNOU, New Delhi.

12. 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.

13. **Obtaining Photocopy of Answer Scripts**
After the declaration of result, if the students are not satisfied with the marks awarded, they can request the University for Photocopy of Answer Scripts on payment of prescribed fee 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 Evaluation Centre concerned in the prescribed format along with the prescribed fee - per course in the form of Demand Draft in favour of IGNOU payable at the city where submitting the request for

Photocopy. Format is available in the Programme Guide or IGNOU website: www.ignou.ac.in

14. **Early Declaration of Results**

In order to facilitate the students who have got offer of admission and or selected for employment etc and are required to produce marks-sheet/grade card by a specified given date may apply for early process of their answer-scripts and declaration of the results for this purpose. The students are required to apply in the specified format available on the University website with a prescribed fee per course through Bank Draft drawn in favour of IGNOU along with the attested photocopy of the offer of admission/employment offer.

The students can submit their requests for early declaration before the commencement of the Term-end Examination i.e., before 1st June and 1st December respectively. The University in such cases will make arrangements for processing the answer-scripts and declare the results as a special case.

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

The University has replaced the scheme of rechecking with the re-evaluation where by the answer-scripts will be re-evaluated by another Evaluator in case the students are not satisfied with the marks/grades secured by them in Term-end Examination. Such students can apply for re-evaluation within one month from the date declaration i.e. the date on which the results are made available on the University Website on payment of prescribed fee per course in the prescribed application form available on the University Website. The better of the two courses or original marks/grades and re-evaluated marks/grades will be considered and the revised marks/grades shall be incorporated in the students' record as applicable and the revised grade card/marks sheet will be sent to the students within one month from the receipt of application. Re-evaluation is not permissible for Projects, Practical, Assignments and Seminars etc.

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 1st Division/2nd 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 prescribed fee per course through a Bank Draft drawn in favour of IGNOU payable at Delhi and submit the application and fee to the Registrar, SRE Division, IGNOU, Maidan Garhi, New Delhi.

The improvement is not permitted to those students who have completed their maximum duration of the programme including the re-admission period has expired. The students will be given only one opportunity to improve the marks/grades and they can apply for improvement a maximum of 25% of the credits for successful completion of the respective programme. However, the sealing for the number of courses in which the student can improve is five courses. The better of the two examinations i.e., marks already awarded and the marks secured in the improvement examination will be considered.

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6   OTHER USEFUL INFORMATION

6.1 Reservation of Seats

The University provides reservation of seats for Scheduled Castes, Scheduled Tribes, Physically Handicapped, OBC (Non-Creamy Layer), and Economically Weaker Sections 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 performa 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 LSC

Counselling facilities are not available for all the programmes at all the LSCs. As such, students are advised to make sure that counselling facilities are available, for the subject they have chosen, at the new centre opted for. Request for change of LSC 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 an NOC from the Regional Center where they are willing to get themselves transferred in view of the practical sessions involved in BCA_NEW.

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 (SRD), IGNOU, Maidan Garhi, New Delhi-110 068. Further, s/he has to obtain a certificate from the Co-ordinator of the LSC 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 LSC.

6.5 Procurement of Official Transcripts

The University provides the facility of obtaining official transcripts on request, made by the students on plain paper addressed to the Registrar, Student Evaluation Division (SED), Block 12, IGNOU, Maidan Garhi, New Delhi-110068. A prescribed fee is charged for this purpose.

6.6 Duplicate Grade Card

The student can apply for obtaining duplicate Grade Card in case the same has been lost/misplaced/damaged, by making a request in prescribed format along with precibed fee in the form of DD drawn in favour of IGNOU payable at New Delhi. Format is available in the Programme Guide or IGNOU website: www.ignou.ac.in . The request may be made to the Registrar, Student Evaluation Division, IGNOU, Maidan Garhi, New Delhi-110068

6.7 Study Materials for Your Programme of Study

[1]   After confirmation of admission, study materials are dispatched to the student's registered address by speed/ registered post.

[2]   Keep checking status of dispatch of study materials on the IGNOU website using the weblink, www.ignou.ac.in/ignou/aboutignou/division/mpdd/material, provided by MPDD.

[3]   If you received Study Material then visit Student Support Centre (LSC) concerned with ID card for schedule of classes/lab

[4]   If you not received Study Material then visit Regional Centre concerned only or write to mpdd@ignou.ac.in

6.8 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.

Term End Examination Form and other forms can be downloaded from http://www.ignou.ac.in

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7   SOME USEFUL ADDRESSES
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Telephone numbers of the Divisions/ Schools are provided on the website under the "Contact Us" option.

Students are advised to be in touch with their LSCs for advance / timely / day-to- day information or visit the website with URL www.ignou.ac.in

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 (SRD), Email: registrarsrd@ignou.ac.in

ii)	Exam Centres, Results, Rechecking of answer scripts, Discrepancies in Result, marks update etc.	Registrar (SED), Indira Gandhi National Open University , Maidan Garhi New Delhi -110068, Phone No: 011-29535828/2482 (SED), Phone No. 011-29572204/2205(SED), FAX No.011-29534429 068
iii)	Study Material and Assignments, Admission, Fees, Scholarship, Change of Course/Programme, Change of Address, LSC/ Regional Centre, Isssue of Bonafide Certificate, Migration Certificate, Duplicate Identity Card and Non-receipt of Self-learning/ Study Materials, Assignments etc.	Regional Director of concerned Regional Centre
iv)	Academic Matters	BCA_NEW Programme Coordinator SOCIS, C-Block, New Academic Complex IGNOU, Maidan Garhi, New Delhi - 110 068 Phone No. 011-29572902, Email: BCA@ignou.ac.in

v)	Administrative and counseling matters, missing score of Project assignments theory and practical assignments, Assessment Sheets	Co-coordinator of your LSC/Regional Director of the Regional Centre concerned
vi)	Issue of Degree/Diploma/Certificate, Dispatch of returned Degrees, verification of Degree	Dy. Registrar (Exam-I) Examination –I Indira Gandhi National Open University, Maidan Garhi New Delhi -110068, Phone No.011-29535438 Intercom No.2224/2213 e-mail exam1@ignou.ac.in
vii)	Issue of Provisional Certificates and Grade Cards	Dy Registrar (Exam-3) Phone No: 011-29536743; Intercom No. 2201
viii)	Declaration of pending results of TEE, Incorporation of practical marks, Verification of provisional certificate and grade card, Issue of transcripts	Dy. Registrar (Exam-3) Phone No: 011-29536103/6743 011-29572201/2211
ix)	Non incorporation of assignment marks	Assistant Registrar (Assignment) Phone No: 011-29532294 Intercom No. 1319/1325 E-mail: assignments@ignou.ac.in
(x)	**Online students grievances Portal**	**http://igram.ignou.ac.in/**

viii)	Students General Enquiries	Student Support Centre Indira Gandhi National Open University, Maidan Garhi New Delhi -110068, Phone: 011-29535714, 29572512, 29572514, 29533869 and 29533870 e-mail : ssc@ignou.ac.in

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 LSCs for advance/timely/day- to-day information or visit the website with URL : http://www.ignou.ac.in

8   LINK TO OLD QUESTION PAPERS

For your reference, old question papers of most of the programmes offered by the University are available at IGNOU Website. If you want to download the previous year's question papers (if applicable), 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: http://www.ignou.ac.in

The following is the process of downloading the question papers from IGNOU website:

Visit the IGNOU website at URL: http://www.ignou.ac.in and select the Download Button on IGNOU web site. On this Download Page select Question Papers link. The following page will be displayed (please note that URL of this page is: https://webservices.ignou.ac.in/Pre-Question/

Previous Year Question Papers

Term End Examination Question Papers

2008	2009
June 2010 || December 2010	June 2011 || December 2011
June 2012 || December 2012	June 2013 || December 2013
June 2014 || December 2014	June 2015 || December 2015
June 2016 || December 2016	June 2017 || December 2017
June 2018 || December 2018	June 2019 || December 2019
June 2020 || December 2020	June 2021

Entrance Examination Test Question Papers

Figure : The Previous Year Question Papers of IGNOU

Select the year of Question paper, this will display School wise list of Question papers, as the list is large you may use find on page option of your browser to find old question papers of respective course.

9   LINK TO FORMS AND ENCLOSURES

In this section, we are enclosing the IGNOU website links to various forms, which are useful for

Note: You must Download the Forms from the Website

you. Whenever you have to correspond with the university, please download the form from the Website and fill it carefully and send as per instructions therein. The detailed instructions for all these-forms are provided in form itself. Some of these links may change, in those cases please use search option to find the desired link.

Forms and Useful links
- Change of Address (Form No. 1)
- Assignments Remittance-Cum-Acknowledgement Card (Form No.2)
- Link to Latest Assignment(s)
- Link to Online Re-Registration for BCA_NEW Programme
- Link to Online Term end Examination form
- Link to form for early declaration of result
- Link to form for obtaining photocopy of the answer script
- Link to form for Re-evaluation of Answer script
- Link to Application form for improvement in Division/Class
- Link to form for obtaining Duplicate Grade Card / Mark-sheet
- Link to form for issue of Official Transcript
- Link to form for issue of Migration Certificate

Assignments related links

Assignment Remittance-cum-Acknowledgement (Form 2)
(It is attached on page No. 76)
Link to Latest Assignment(s)

https://webservices.ignou.ac.in/assignments/Bachelor-

Degree/BCA/BCA_NEW/bca_new.html

Re-registration

Link to Online Re-Registration for BCA_NEW Programme
https://onlinerr.ignou.ac.in /

> **Last date of Re-Registration is announced on the IGNOU website. In general, the re-registration is to be done 2-3 months prior to the start of session.**

Term end Examination and related links

Link to Term End Examination form
https://exam.ignou.ac.in/

Link to form for Early Declaration of Result
http://www.ignou.ac.in/userfiles/APPLICATION%20FORM%20FOR%20EARLY%20DECLARATION%20OF%20RESULT%20OF%20TERM-END%20EXAMINATION.pdf

Link to Application Form for Obtaining Photocopy of the Answer Script
http://www.ignou.ac.in/userfiles/Application%20Form%20for%20botaining%20photocopy%20of%20the%20answer%20script.pdf

Link to form for Re-evaluation of Answer script
http://www.ignou.ac.in/userfiles/Application%20form%20for%20Reevaluation%20of%20Answer%20Scripts.pdf

Link to Application form for Improvement of Division/Class
http://www.ignou.ac.in/userfiles/Improvement%20form.pdf

Link to form for Duplicate Grade Card/Mark-sheet
http://www.ignou.ac.in/userfiles/Duplicate%20mark%20sheet%20form.pdf

Link to form for Issue of Official Transcript
http://www.ignou.ac.in/userfiles/Official%20Transcript%20form.pdf

Link to form for Issue of Migration Certificate
http://ignou.ac.in/userfiles/Migration%20Certificate.pdf

(For Change of Address, send it duly filled-in to the concerned Regional Director, who will forward it to the Registrar (SRD), Maidan Garhi, New Delhi after verification)

Application for Change of Address

Date: _____

To

The Regional Director
IGNOU Regional Centre

_____

_____

THROUGH THE REGIONAL DIRECTOR CONCERNED

Enrolment No._____

Programme_____

Name (in caps)_____

1. DETAILS FOR CHANGE/CORRECTION OF MAILING ADDRESS

New Address   **Old Address**

_____   _____

_____   _____

_____   _____

_____   _____

_____   _____

City_____Pin_____   City_____Pin_____

State_____   State_____

_____
Signature of the Student

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

ASSIGNMENTS REMITTANCE -CUM-ACKNOWLEDGEMENT CARD

Enrol. No._____
Programme Title: _____

Name : _____

Course Code:_____Medium: _____

S.No.	Assignment No.	
		For Office Use Only
		S.No. _____
		Date of Receipt: ____
		Name of Evaluator: _

Signature of the Student
Date : _____

Date of despatch to the Evaluator:
_____

Date of receipt from the Evaluator:
_____

INDIRA GANDHI NATIONAL OPEN UNIVERSITY

ASSIGNMENTS REMITTANCE -CUM-ACKNOWLEDGEMENT CARD

Enrol. No._____   Programme Title: _____

Name :_____   Medium : _____

Course Code: _____

S.No.	Assignment No.	For Office Use Only
		S.No. _____
		Signature of the recevier _____
		Date : _____

Signature of the Student   Seal

Name : _____

Address of the Student : _____

Date : _____

(Please write your complete address and affix adequate postal stamp on reverse)

Affix Stamp Here

From:

The Coordinator
LSC concerned

To

(ADDRESS OF THE STUDENT)
…………………………..
…………………………..
…………………………..

प्रो. रजनीश जैन
सचिव

Prof. Rajnish Jain
Secretary

विश्वविद्यालय अनुदान आयोग
University Grants Commission

(शिक्षा मंत्रालय, भारत सरकार)
(Ministry of Education, Govt. of India)

बहादुरशाह जफर मार्ग, नई दिल्ली-110002
Bahadur Shah Zafar Marg, New Delhi-110002
Ph.: 011-23236288/23239337
Fax : 011-2323 8858
E-mail : secy.ugc@nic.in

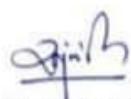F. No.3-5/2022(DEB-III)

PUBLIC NOTICE

August, 2022

0 2 SEP 2022

Equivalence of degree obtained through ODL and Online mode with degree
obtained through conventional mode

The Regulation 22 of the University Grants Commission (Open and Distance
Learning Programmes and Online Programmes) Regulations, 2020 stipulates as
under;

"**Equivalence of qualification acquired through Conventional or Open and
Distance Learning and Online modes.—** Degrees at undergraduate and
postgraduate level in conformity with UGC notification on Specification of Degrees,
2014 and post graduate diplomas awarded through Open and Distance Learning
mode and/or Online mode by Higher Educational Institutions, recognised by the
Commission under these regulations, shall be treated as equivalent to the
corresponding awards of the Degrees at undergraduate and postgraduate level and
post graduate diplomas offered through conventional mode."

This is for information of the general public, students and other
stakeholders.

(Rajnish Jain)

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QR Codes for some of the useful Web Links

eGyankosh
(for Online Course Materials)

Online Re-Registration Form

iGRAM

(IGNOU Grievance Redressal and Management)

To Watch Gyandarshan

Old Question Papers

Note: The above QR Codes can be scanned and open through QR Code Scanner.