PROGRAMME GUIDE
FOR
BACHELOR OF COMPUTER APPLICATIONS

(Online)

(Programme Code: BCA_NEWOL)

SCHOOL OF COMPUTER AND INFORMATION SCIENCES
INDIRA GANDHI NATIONAL OPEN UNIVERSITY
MAIDAN GARHI, NEW DELHI - 110 068
http://www.ignou.ac.in

Programme Guide:

January 2025.This is a Programme Guide for Bachelor of Computer *Applications (Online) (Programme Code: BCA_NEWOL) Programme offered by IGNOU from July, 2024 admission cycle.*

Further information on the Indira Gandhi National Open University courses can be obtained from the University's office at Maidan Garhi, New Delhi-110 068 or from its Regional Centres spread across the length and breadth of the country.

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MESSAGE FROM PROGRAMME COORDINATOR

Dear Student,

I welcome you to the Bachelor of Computer Applications (BCA_NEWOL) Programme. IGNOU's BCA_NEWOL Programme is structured as per latest developments in the field of Computer Science Applications and keeping in view the need and requirements of the Information Technology Industry. BCA_NEWOL Programme is on offer from July, 2024 session carries 120 credits.

This online Programme's learning content will be made available to you through the Learning Management System (LMS) of IGNOU's online Programmes through the link: https://iop.ignouonline.ac.in/programme/p76. In addition, you may also visit IGNOU websites https://iop.ignouonline.ac.in/ and Announcements https://iop.ignouonline.ac.in/announcements/0 for current information and updates relating to this Programme. In your case, IGNOU Regional Centre Delhi-3 is the Nodal Regional Centre and you will get support for theory online academic counseling, practical online counseling and other related academic activities.

Attending the counseling sessions with preparation will provide you an opportunity to clear your doubts in the respective course. It may be noted that in addition to LMS, the course materials are also available at http://www.egyankosh.ac.in. It is important to note that , 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. Assignments are one of the essential components of learning and evaluation. Assignments will be available on LMS portal , also you may download the assignments from the IGNOU website. Each course contains one assignment. Your all the assignments will be submitted online on LMS only. Assignments submitted through email will not be entertained. You need to submit requisite assignments before the due date to become eligible to appear for Term End Theory and Practical Examinations.

COE, IGNOU will be facilitating your online learning process. You may contact COE atcoe@ignou.ac.in and iopsupport@ignouonline.ac.in . Also, during the study, if you have any feedback, suggestions and comments to make about the LMS, please write to iopsupport@ignouonline.ac.in and coe@ignou.ac.in .

This Programme Guide contains instructional system of IGNOU online BCA_NEWOL (3 Years) Programme, syllabus of BCA_NEWOL (3 Years) Programme, details of evaluation scheme. You will get online counselling sessions for all the theory and practical courses, for which you will get communication from the Nodal Regional Centre (RC)/ Study Center designated by Nodal RC for BCA_NEWOL. You must have a computer system with the necessary software for the practical courses.

For your online counselling and assignments related queries, you may write at bcaol@ignou.ac.in (If you are BCA_NEWOL student) and rcdelhi3@ignou.ac.in. For any academic support or feedback, you may write to BCA_NEWOL Programme Coordinator at the email bcaolsocis@ignou.ac.in with a CC at bcaol@ignou.ac.in. You can also write to us on iGRAM (http://igram.ignou.ac.in). You must write your enrolment number and mention your Programme Code as BCA_NEWOL indicating that you are a student of the online mode in every communication with the University.

In addition to LMS access, there is need for you to be in constant touch with IGNOU Website as well as regularly check your email for communications from the Nodal Regional Center and other departments of IGNOU so that you can follow them. It is 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. It is expected from you to remain motivated throughout your Programme duration and come prepare in online counselling classes**.

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/ Nodal 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 from IGNOU website before you pay. Programme Guide is a very important document for you, as a distance student (Online Mode) you may have several queries, many of them would be answered by this booklet. Preserve this booklet until you successfully complete the BCA_NEWOL 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. 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_NEWOL 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, LMS Portal and your Nodal Regional Center Website for latest information and circulars, if any.** I wish you success in pursuing BCA_NEWOL 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_NEWOL Programme Coordinator

Email ID: bcaolsocis@ignou.ac.in

1. BASIC INFORMATION

1.1 BCA_NEWOLProgramme 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_NEWOL) 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_NEWOL 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

Re-registration:

You are required to re-register for the subsequent semester by paying the fee, for continuation of your study. You can re-register through online re-registration portal of IGNOU before a specified last date. Last date of Re-Registration is announced on the registration portal of IGNOU. In general, the re-registration is to be done about 2 months prior to the start of the next semester. Follow the updates from Announcements section at:
https://iop.ignouonline.ac.in/announcements/0 (for BCA_NEWOL students)

https://e-vbab.ignouonline.ac.in/announcements/0 (for e-Vidyabharti students)

1.3 Programme Fee

Get fee details from IOP Portal: https://iop.ignouonline.ac.in/programme/type/Bachelor/0
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) IGNOU or from Student Service Centre (SSC) IGNOU.

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 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 IGNOU Website.

1.7 BCA_NEWOL 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_NEWOL 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

1.8 Student Support

For the online learners IGNOU has created a Learning Management System (LMS) for online BCA_NEWOL, which is available through the IGNOU online website the link: https://iop.ignouonline.ac.in/programme/p76.

In addition, learners may also visit IGNOU website: http://www.ignou.ac.in for various information.

The University may not be able to communicate to all the students individually; therefore, one should visit the IGNOU online web site and IGNOU website on a regular basis, so as to get the latest information about assignments, submission schedules (assignments and examination forms), declaration of results, etc.

1.8.1 BCA_NEWOL Nodal Regional Centre:

The Nodal Regional center for BCA_NEWOL students is RC Delhi-3 **(Email ID: rcdelhi3@ignou.ac.in**) and for BCA_NEWOL students under e-Vidyabharti Project is RC Delhi-3 (**Email ID:** rcdelhi3@ignou.ac.in)

1. The responsibility of Nodal RC will be confined to the extent of holding academic counselling sessions.

2. Though Nodal RC will prepare the counselling schedule, the learners will submit the assignments on LMS. It will be the responsibility of the Nodal RC (to which student is attached) to get the assignments evaluated.

3. The online practical counselling for the learners will be conducted by the Nodal Regional Centres.

Contact details of Nodal RC (IGNOU RC Delhi-3)
Email ID – rcdelhi3@ignou.ac.in
Contact No. – 011-25774255, 25774256
Address: Delhi Library Association Building, Ranganathan Bhawan,
C-Block, Near Community Centre, Naraina Vihar, New Delhi-110028

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_NEWOL Programme Coordinator

Students may contact the BCA_NEWOL Programme Coordinator by sending a communication through email : bcaolsocis@ignou.ac.in

Postal Address is:

The BCA_NEWOLProgramme Coordinator,
SOCIS, Vishveswaraiah Bhavan, C-Block,
IGNOU Academic Complex, IGNOU,
Maidan Garhi, New Delhi – 110068,

2. INSTRUCTIONAL SYSTEM

The methodology of instruction for online mode in this University is different from that of the conventional universities. The online learning mode of the University system is more learner-oriented, and the student has to be an active participant in the teaching-learning process. The University follows a multi-channel approach for instruction. After admission is confirmed, learner will receive credentials through email for accessing the learning management system (https://iop.ignouonline.ac.in/programme/p76). In addition to the components, which are placed on the course pages of LMS, learner shall also get the support for learning through the following:

- self-instructional material (SIM) in pdf or other electronic form
- self-assessment questions, as check your progress, which are part of SIMs
- recorded video programmes for various courses
- online theory counselling
- compulsory online practical counselling
- eGyankosh
- web-based support
- assignments
- Gyan Darshan Channel, including teleconferencing,
- Gyan Vani.
- SWAYAM PRABHA-DTH (channel-13)

2.1 Self-Instructional Material

- Self-instructional materials and recorded video programmes are the primary form of instructional materials. A basic unit of material is called a block. Each block consists of several units. The size of a unit is such that the material given therein may be expected to be studied by a student in a session of about 4 to 6 hours of study. On LMS you will get the Study Material/SIM uploaded. 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 self-instructional material alone may not be sufficient to write assignments and prepare for the Term-end Examinations. The self-instructional material is made available through LMS on the IGNOU online website at the link: https://iop.ignouonline.ac.in/programme/p19.
- **There is no provision of hard copy of self-instructional material for online students.**

2.2 eGyankosh, SWAYAMPRABHA-DTH (Channel-13) and IGNOU eContent App

eGyankosh(www.egyankosh.ac.in) is a digital repository consists of the reference links Self instructional materials, recorded videos, YouTube-video archives etc. Various links for the eGyankosh related to SOCIS are:

eGyankosh Homepage: http://www.egyankosh.ac.in/

Self-Learning Material: https://egyankosh.ac.in/handle/123456789/106391

YouTube-Video Archives: http://www.egyankosh.ac.in/handle/123456789/35748

SWAYAM PRABHA-DTH Channel-13 (Professional and Vocational Education): It is funded by MoE, Govt. of India and Coordinated by IGNOU, New Delhi. This is an exclusive channel covering IGNOUs' Professional and Vocational Education Programmes. This channel

broadcasts visually high-quality and graphically enriched video content of IGNOUs' Certificate/Diploma/PG Diploma/PG Certificate/Undergraduate/Postgraduate courses pertaining to Computer Science/Application, Management Studies, Vocational Education, Engineering and Technology, Law Extension and Development Studies, Social Work, Journalism and New Media Studies, Performing Arts and Health Sciences. These video lectures are delivered by Faculty of IGNOU and also from renowned institutional in India, covering basics to advanced courses. Gradually, IGNOU is recording and pooling the videos on Channel-13

SWAYAM PRABHA homepage: https://www.swayamprabha.gov.in/ and

Swayam Prabha | Educational DTH channels | India

IGNOU eContent App

The self-instructional course material of various programmes of IGNOU are made available through IGNOU eContent APP:
https://play.google.com/store/apps/details?id=ac.in.ignou.Viewer&hl=en

2.3 Counseling Sessions

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

2.3.1 Theory Sessions

In Online mode of Open and Distance Learning (ODL) system, online live 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 virtually meet your fellow students.

You should note that the Online 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_NEWOL 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.

2.3.2 Practical Sessions and Compulsory Attendance

The practical sessions will be held only in online mode. In these sessions, the participants will be using required software packages at their own end. IGNOU will not provide any software or physical lab facility to its BCA_NEWOL Learners. 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 Nodal 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 during online practical counselling sessions.

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

vi) No hardware or software facility will be provided by IGNOU for the online students. They have to make their own arrangements.

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. Unless you have gone through the Units, there may not be much to discuss and a counseling session may not be fruitful.

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.

3. BROWSING IGNOU'S WEBSITE

The IGNOU's website is a dynamic source of latest information and is subject to continuous updates. Thus, various pages shown here may change in future. IGNOU itself is continuously changing to bring about improvement in quality of its services. You must visit IGNOU website for all the latest information, filling up or downloading various form, downloading of assignments, results etc.

3.1 Navigation from Home Page

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

Figure 1: IGNOU Website

From this **Home page** Select **about IGNOU** which will display an Option List select **School of Studies.** It will show you a page of all the schools of studies of IGNOU, Select **School of Computer and Information Sciences (SOCIS)** to display page of SOCIS (Figure 2).

School of Computer and Information Sciences (SOCIS) offers the Computer Programmes: PhD, MCA_New, MCAOL, BCA_NEW, BCA_NEWOL, CIT, CITOL as PGDCA_New and CMAD as shown in Figure 2.

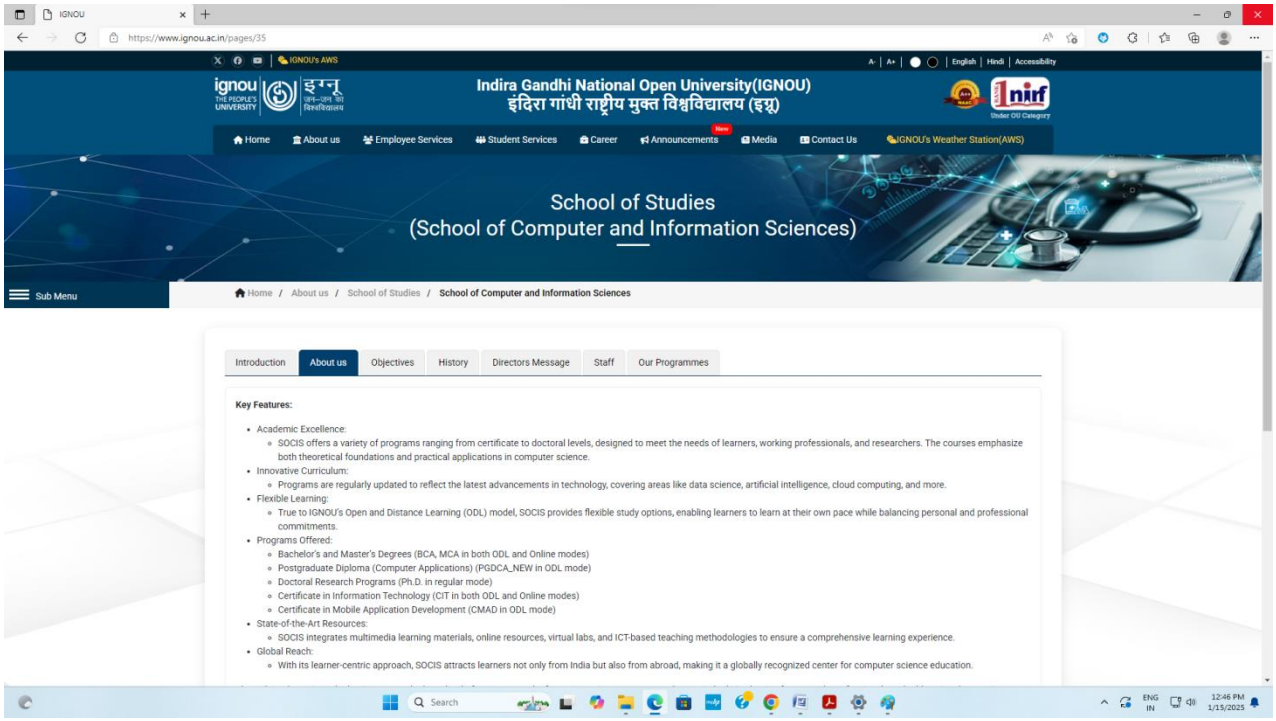

Figure 2: SOCIS Page on IGNOU Website

One of the most important link for students is Student Services which can be reached from Home page by selecting Student Services option . Figure 3 displays the options of the Student Services.

Figure 3: Student Services Page

3.2 Navigation from IGNOU's online Home Page

The learners can have access to IGNOU's online website at the following address (URL) ***https://iop.ignouonline.ac.in/*** . As students get connected to this site, the following page displays the Home Page of IGNOU's online web site (Figure 4). Students need to click on online program inside the programmes tab.

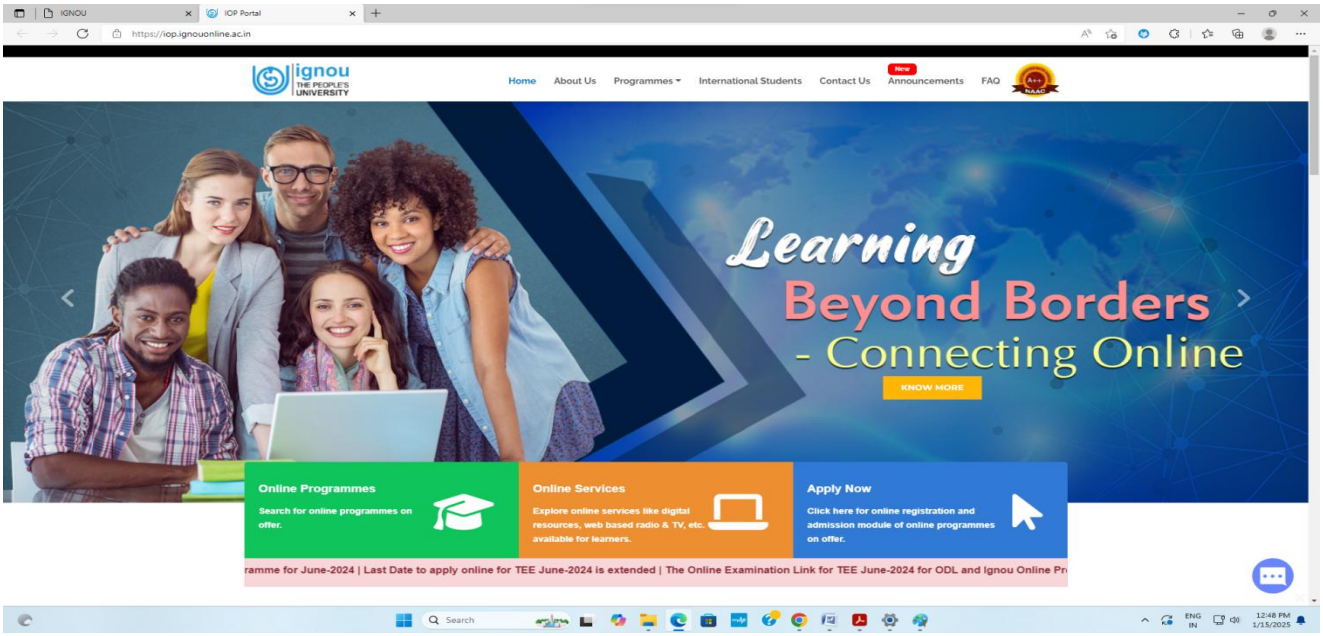

Figure 4: IGNOU's Online prograrmme home page

After successful login Students can go through Self Learning Materials and assignments course wise.

Navigation from eVidyaBharti Project

The learners can have access to eVidyaBharti online website at the following address (URL) https://e-vbab.ignouonline.ac.in/. As students get connected to this site, the following page displays the Home Page of eVidyaBharti web site (Figure 5). Students need to click on online program inside the programmes tab.

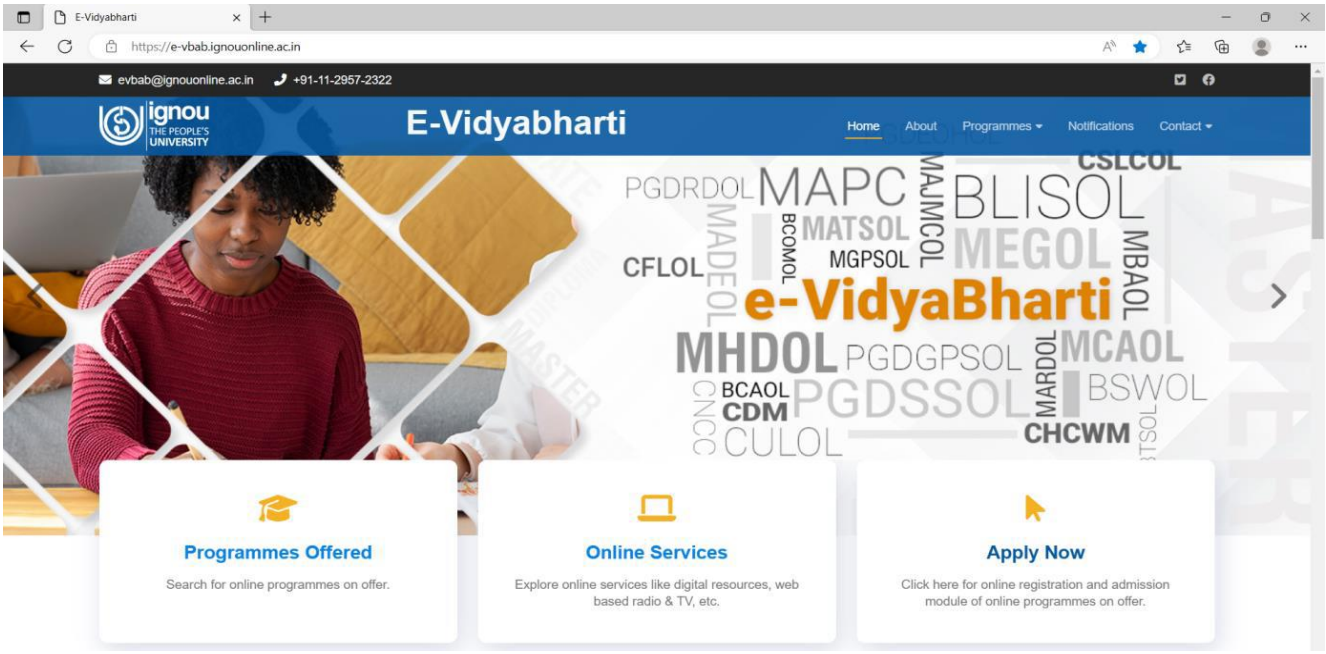

Figure 5: Home page of eVidyaBharti Portal.

4. BCA_NEWOL SYLLABUS

The following is the syllabus of all the six semesters of BCA_NEWOLprogramme.

4.1 Detailed Syllabus of BCA_NEWOL 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-2Preparing 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_NEWOL 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 Organistation , 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 theScheduling 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 fileManagement
  - Directories
  - Disk Space Management
  - Disk address translation
  - File related system services
  - Asynchronous Input / Output

Unit 4:Security and Protection

- Security Threats
- Security Policies and Mechanisms

- Authentication
  - Passwords
  - Alternative Forms of Authentication
- Protection in Computer Systems
- Security Models
  - Access-Control Matrix
  - Mandatory Access Control
  - Discretionary Access Control
  - Rule-Based Access Control
  - Role-Based Access Control
  - The Take-grant Model
  - Multilevel Models

BLOCK 3:Advanced Topics in Operating Systems

Unit 1:Multiprocessor Systems

- Multiprocessor and Processor Coupling
- Types of Multiprocessor Operating System
  - Separate Supervisors
  - Master/Slave
  - 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
- Pointer to a Pointer
- Null Pointer Assignment
- Pointer Arithmetic
- Passing Pointers to Functions
- A Function Returning More than One Value
- Function Returning a Pointer

- Arrays and Pointers
- Array of Pointers
- Pointers and Strings

Unit 8: File Handling

- File Handling in C Using File Pointers
  - Open a file using the function *f*open *( )*
  - Close a file using the function *f*close*( )*
- Input and Output using file pointers
  - Character Input and Output in Files
  - String Input / Output Functions
  - Formatted Input / Output Functions
  - Block Input / Output Functions
- Sequential Vs Random Access Files
- Positioning the File Pointer
- The 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_NEWOL 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
  - Row Major Representation
  - Column Major Representation
- Applications

Unit 3: Lists

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

BLOCK 2: Stacks, Queues and Trees

Unit 4: Stacks

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

Unit 5: Queues

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

Unit 6: Trees

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

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

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

Unit 8: Graphs

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

Unit 9: Searching and Sorting Techniques

- Linear Search
- Binary Search
- Applications
- Internal Sorting
  - Insertion Sort
  - Bubble Sort
  - Quick Sort
  - 2-way Merge Sot
  - 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
  - Structure
  - Operations
  - Disadvantages
  - 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: Descriptive Statistics

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: Probability Concepts

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: Probability Distributions

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: Tests of Significance

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: Forecasting and Time Series Analysis

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: Statistical Quality Control

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: Simple Random Sampling and Systematic Sampling

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: Cluster Sampling and Multistage Sampling

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:

After going through this course a student should be able to:

- Use XHTML tags to create simple static web pages;
- Format a simple Web page using Cascading Stylesheets;
- State the concepts applicable to web programming;
- Create an interactive and dynamic Website using JavaScript;
- Represent data over the Web using XML;
- Appreciate the use of Ajax and Rich Internet Applications, and
- Perform server side scripting using Java Server Pages (JSP).

BLOCK 1: Client Side

Unit1:Web 2.0 and XHTML

What Is Web 2.0? Introduction to Web 2.0 terms: Search, Content Networks, Blogging, Social Networking, Social Media, Rich Internet 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 of XHTML covering Basic Syntax, Images, Hypertext Links, Lists and Tables, Creation of an XHTML Form, Internal Linking and Meta Elements.

Unit2: Using Style Sheets

CSS: Inline Styles, Embedded Style Sheets, Linking External Style Sheets, Style Specification Formats Selector Forms, Colour, Property Value Forms, Font Properties, List Properties, Alignment of Text, The Box Model, Background Image, theand Tags.

Unit3: Introduction to XML

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

Unit4:Programming with Java Script–DOM and 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: Introduction to WAP and WML

WAP and WML Basics, WML formatting and links, WML input,WML tasks, 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_NEWOL 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_NEWOL 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_NEWOL 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_NEWOL 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_NEWOL final semester project. The courses studied by the students during the BCA_NEWOL 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_NEWOL

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_NEWOL are 32 (including a Project Course) and the total number of credits are 120.

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-135, BCSL-146, BCSL-147, 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%,
BCSL-013	(a) **Continuous Evaluation:** Max. Marks:100,Min.Marks:40,Weightage:25% **TermEndPracticalExamination:**Max.Marks:50,Min.Marks:20,Weightage:75%
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.Marks:100,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.

* Students need to submit BCSP-165 Project Proposal (Synopsis) in 5th Semester through LMS Portal, to get the approval on time. Further, learners will get sufficient time to work on the project to submit the Project Report in 6th Semester, so that they may **complete their BCA Programme in Minimum Duration.**

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 soft copy) (total 40 marks),
- Assignment questions (total 80 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(80)	Combined Viva (20)	Total marks (100)
MCSL-204	Section–1(20) Section–2(20)	Section–1(40) Section–2(40)	20	100
MCSL-205	Section–1(20) Section–2(20)	Section–1(40) Section–2(40)	20	100
MCSL-209	Section–1(20) Section–2(20)	Section–1(40) Section–2(40)	20	100

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

Course Code	Course Title	Credits	Continuous Evaluation Assignment (Weightage – 25%)		Term End Examination Practicals (for Lab courses only) (Weightage-75%) Online Viva-Voce Only	
			Max. Marks	Min. Marks	Max. Marks	Min. Marks
BCSL-013	Computer Basics and PC Software	2	100	40	100	40
BCSL-135	DBMS and C++ Lab	2	100	40	100	40
BCSL-146	Object Oriented Programming using Java Lab	2	100	40	100	40
BCSL-147	Web Programming Lab	2	100	40	100	40
BCSL-159	Introduction to Algorithm Design Lab	2	100	40	100	40
MSEI-023(P)	Cyber Security		100	50	100	50
MSEI-027(P)	Digital Forensics		100	50	100	50

(ii) Evaluation of term-end practical exam for Lab Courses FOR BCA_NEWOL will be in online mode (Viva – Voce only).

Practical Exam for MCSL-204 , MCSL-205 and MCSL-209 courses

The term-end examination of the practical courses may consists of several sections. Each section will be evaluated separately. The online viva-voce(Viva-voce–100%) exam for each section will be separate. The following table shows the details:

Course Code	Term-end practical Online viva-voce only	
	MarksSection-1 (Viva-Voce)	MarksSection-2 (Viva-Voce)
MCSL-204 (2 credits)	25marks	25marks
MCSL-205 (2 credits)	25marks	25marks
MCSL-209 (2 credits)	25marks	25marks

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:

Note:

1. SUBMISSION OF ASSIGNMENTS WILL BE ON LMS Portal ONLY IN PDF FILE FORMAT. Check the prescribed file size on LMS Portal before submitting the assignment(s)
2. You will get the assignments on your LMS Portal.
3. Also, you may get (download) the assignments from IGNOU Website.

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:.....
Nodal RC/RC:.....	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.

7. The students should use only A4 size paper for their response and tag all the pages carefully.

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.

5.3 Guidelines for the Submission of Assignments

1. Visit your LMS 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. 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 obtained on LMS and also can be downloaded from IGNOU website.
5. **As per the University norms, once the student's scores pass marks in an assignment, they cannot re-submit it for improvement of marks.**
6. In case of not successfully completed or missed; the fresh assignments should be submitted only, if your registration for that course is valid.

***Note*: Please submit your Assignments on or before the due date on your LMS Portal.**

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 Cafe/ 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.

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. must 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 on IGNOU Website. This form duly filled in is to be submitted to the **Regional Director concerned**.

6.4 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.

6.5 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 prescribed 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

6.6 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

7 SOME USEFUL ADDRESSES

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

Students are advised to visit the website with URL www.ignou.ac.in

For your information, the following officers deal with different educational aspects:

i)	Student Re-Registration related issues	COE/SRD/ Concerned RCRC
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)	LMS Portal Related Issues	COE
iv)	Academic Matters	BCA_NEWOLProgramme Coordinator SOCIS, C-Block, New Academic Complex IGNOU, Maidan Garhi, New Delhi - 110 068 Phone No. 011-29572902, Email: bcaolsocis@ignou.ac.in

v)	Counseling matters and theory and practical assignments	Nodal Regional Centre Email: rcdelhi3@ignou.ac.in
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)	Assignment marks related issues	SED, Nodal RC/Concerned RC
(x)	**Online students grievances Portal**	**http://igram.ignou.ac.in/**
viii)	Students General Enquiries	Student Support Centre Indira Gandhi National Open University, Maidan Garhi 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.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/

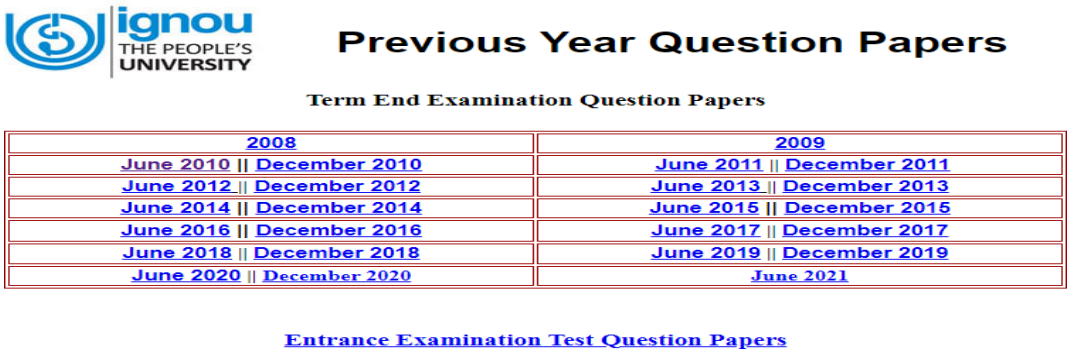

Figure 6: The Previous Year Question Papers of IGNOU

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.

For details relating to conduct of examination of ONLINE Mode Students refer Annexure -3

9. LIST OF SOFTWARE

Software requirement for BCA_NEW / BCA_NEWOL Laboratory Courses

S.No.	Course Code	Course Title	Software Requirement(s)
1.	BCSL-013	Computer Basics and PC Software Lab	Latest Windows OS(XP onwards) and Office 2005 onwards
2.	MCSL-204	WINDOWS AND LINUX Lab	Windows Operating System Linux Operating System
3.	MCSL-205	C and Python Lab	For C: Compilers of C/C++ for Windows or Unix. For Python Anaconda (open source software for Python), Google Colabs
4.	MCSL-209	Data Structures and Algorithms Lab	Any C programming language compiler
5.	BCSL-135	DBMS and C++ Lab	For DBMS Lab Two alternatives that can be used are: a) MS Access – this is a common and cheaply available software along with the MS Office Professional. It is very useful for making small data bases OR b) SQL with PHP interface. These are open source software that can be used to write SQL commands, PHP can be used to support interface. For C++ Lab Borland C++, VC++, Visual Studio etc.
6.	BCSL-146	Object Oriented Programming using Java Lab	Oracle JDK 8 onwards
7.	BCSL-147	Web Programming Lab	Java/J2EE and Tomcat Webserver, MySQL
8.	BCSL-159	Introduction to Algorithm Design Lab	Borland C/ Borland C++ /Visual studio (VC++).
9.	MSEI-023	Cyber Security	Internet Explorer, opera, SQL*Plus, Notepad
10.	MSEI-027	Digital Forensics	Any key logger, Internet access, Mac spoofers, Mail bombing tool, Windows/linux Operating System with Admin/Root privilege, Nessus/Win Audit, Any HTML Editor

10. SOME USEFUL URLs

Re-registration

Link to Online Re-Registration for BCA_NEWOL 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 theAnswerScript
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

Annexure-1

ज्ञान-विज्ञान विमुक्तये

प्रो. रजनीश जैन
सचिव
Prof. Rajnish Jain
Secretary

सत्यमेव जयते

विश्वविद्यालय अनुदान आयोग
University Grants Commission
(शिक्षा मंत्रालय, भारत सरकार)
(Ministry of Education, Govt. of India)
बहादुरशाह जफ़र 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-II)

August, 2022

02 SEP 2022

PUBLIC NOTICE

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)

Annexure-2

QR Codes for some of the useful Web Links

eGyankosh
(for Online Course Materials)

Online Re-Registration Form

iGRAM
(IGNOUGrievance Redressal and Management)

To Watch Gyandarshan

Old Question Papers

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

Annexure-3

Indira Gandhi National Open University
Maidan Garhi, New Delhi 110068
(Student Evaluation Division)

F.No.: IG/SED/Inter-Portability/2023/7566
Dated: 20th September, 2023

NOTIFICATION

The Academic Council vide Item No.AC 80.14.1 in its 80th meeting held on 7th July, 2023 approved the following as per details given below:

1. **CONDUCT OF EXAMINATION IN ONLINE MODE OUTSIDE INDIA FOR THE STUDENTS OF ODL PROGRAMMES**

   The Term-end-Examination will be conducted in online mode outside India for the students of ODL and online programmes on the basis of Examination Form filled by the Student after taking the examination fee applicable for the international students, i.e. $20 (USD 20) per course, which has been fixed as Rs.1700/- (1700 INR), in view of the difference in value of the various international currencies.

2. **SAME QUESTION PAPER FOR ODL PROGRAMMES AND REGULAR ONLINE PROGRAMMES OFFERED BY THE UNIVERSITY**

   The question paper will be same for the ODL programme and regular online programmes offered by the University as the syllabi, study materials, levels, standards and curriculum are the same for the ODL programmes and online programmes. The question paper will be different for e-VidyaBharti programmes which are offered to African students and GOAL programmes which are offered to Guyana students due to the wide difference of time zones.

3. **CONDUCT OF EXAMINATION IN PEN AND PAPER FOR THE STUDENTS OF ONLINE STUDENTS**

   The number of examination centres for online examination is very limited for conduct of examination on Computer Based Test (CBT) mode and the students are required to travel long distances. The students of online programmes are allowed to appear in offline mode, in pen and paper, at the examination centres identified for the conduct of Term-end examination for ODL programmes within the country. The students of online programmes are allowed to exercise option either to appear in the examination in online (CBT) mode or in offline (pen and paper) mode.

This issues with the approval of the competent authority.

20/9/2023

(Dr. V. B. Negi)
Registrar (SED)

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