

**KRISHNA KANTA HANDIQUI STATE OPEN UNIVERSITY  
(KKHSOU)**

**PROGRAMME PROJECT REPORT  
ON  
MASTER OF SCIENCE IN INFORMATION TECHNOLOGY (M.Sc. IT)**

**Submitted to  
UNIVERSITY GRANT COMMISSION  
BAHADUR SHAH ZAFAR MARG  
NEW DELHI – 110 002**

**Submitted by  
Krishna Kanta Handiqui State Open University  
Guwahati, Assam**



**October 2020**

*Dardwary*  
**Registrar  
Krishna Kanta Handique  
State Open University  
Guwahati**

## CONTENTS

1. Programme mission and objectives
2. Relevance of the programme with KKHSOU's mission and goals
3. Target group of programme and expected enrolment of learner
4. Appropriateness of the programme to be conducted in ODL mode to acquire specific skill and competence
5. Instructional design and teaching-learning scheme
  - 5.1 Curriculum design
  - 5.2 Course and credits distribution
  - 5.3 Credit hours
  - 5.4 Duration of the programme
  - 5.5 Faculty and support staff
  - 5.6 Instructional delivery mechanism
6. Procedure of admission, curriculum transaction and evaluation
  - 6.1 Continuous admission
  - 6.2 Curriculum transaction
  - 6.3 Eligibility criteria for M.Sc.IT programme
  - 6.4 Evaluation
  - 6.5 Fees structure
7. Requirement of the laboratory support and library resources
  - 7.1 Laboratory support
  - 7.2 Library support
8. Cost estimate of the programme and the provisions
  - 8.1 Programme development cost
  - 8.2 Programme delivery cost
  - 8.3 Programme maintenance cost
9. Quality assurance mechanism and expected programme outcomes
  - 9.1 Quality assurance mechanism
  - 9.2 Expected programme outcomes

Annexure I: Structure of the M.Sc.IT Programme

Annexure II: Detailed course wise syllabus of the M.Sc.IT Programme

**KRISHNA KANTA HANDIQUI STATE OPEN UNIVERSITY****PROGRAMME PROJECT REPORT****MASTER OF SCIENCE IN INFORMATION TECHNOLOGY (M.Sc.IT)****FOR THE ACADEMIC SESSION 2020-21****1. Programme mission and objectives :**

Master of Science in Information Technology (M.Sc.IT) is a two year post graduate degree programme under semester system. M.Sc.IT programme is designed for generating skilled IT post graduate professionals capable of taking leading roles in industry, academia, entrepreneurship and application.

The goal of the programme is to increase the number of skilled IT professionals and academicians in Assam. This programme comprises of 16 courses which includes practical and project work. There are four semesters in this programme, which consists of four courses each semester for the first, second and third semester. The fourth semester consists of three courses and one project work.

The main objectives of the programme are as follows:

- To produce skilled IT human resources.
- To enhance knowledge and basic computer skills of learners.
- To provide better job prospects for IT graduates.

With the above learning objectives in view, the programme would be able to serve the society by producing a dedicated staff and qualified IT professionals.

**2. Relevance of the programme with KKHSOU's Mission and Goals:**

The programme has been designed keeping in mind the needs of Information Technology Industry. The curriculum and syllabus have been designed with the help of academicians and industry experts incorporating both theory and practical components. While designing the

syllabus it is considered that the learners may come from very poor academic background and remote geographical area. One of the main objectives of this university is to provide quality education to the people of geographically remote location. As such it is assumed that this programme will certainly help the university to achieve its objectives.

### **3. Target Group of the programme and expected enrollment of learner**

The state of Assam is characterized by rich ethnic and cultural diversity. However, the region suffers from constraints of geographical remoteness and economic underdevelopment. But recently, due to initiatives taken like Advantage Assam, new jobs have been created. A large section of the young generation including girls, women and differently abled persons join work at an early age in different sectors like telecom, finance, shopping malls, drugs distributing companies, construction companies, IT, etc. for their livelihood. Most of them are deprived of the opportunity to pursue higher education due to various socio-economic conditions. In this context, the M.Sc.IT programme can help this section of people for getting access to higher education. The M.Sc.IT programme also caters to the needs of learners who have a keen interest in computers and information technology field. A post graduate degree in Information Technology will help the learner to bring an advantage to their qualification skill.

The University offered M.Sc.IT till 2016-17. At that time enrollment was about 50 learners. The University expects an enrollment of 100 learners.

### **4. Appropriateness of the programme to be conducted in ODL mode to acquire specific skill and competence:**

It is possible to offer M.Sc.IT programme in the Open and Distance learning mode like in higher educational institutes such as IGNOU and NIELIT (Previously DOEACC). The M.Sc.IT programme of KKHSOU could be offered through carefully designed SLMs, projects and assignments. It is observed that a large number of learners seek admission into this programme in ODL since all the learning materials will be available in blended mode. It could be appropriate to conduct the programme through ODL mode to meet the needs of the learners.

## 5. Instructional Design and Teaching-Learning scheme:

### 5.1 Curriculum design:

The syllabus is designed with the help of the departmental faculty members along with some subject experts from other reputed universities of Assam. At the time designing the M.Sc.IT syllabus, the following members were actively involved.

Sl. No.	Name	Designation	Organization
1	Prof. Anjana Kakoti Mahanta	Professor, Dept. of Computer Science, Gauhati University	Gauhati University
2	Prof. Pran Hari Talukdar	(Retd.) Professor & Head, Dept. of Instrumentation & USIC	Gauhati University
3.	Prof. Jyotiprakash Goswami	Associate Professor, Dept. of Computer Applications	Assam Engineering College, Guwahati
4	Prof. Shikhar Kumar Sarma	Professor, Department of Information Technology	Gauhati University, Guwahati
5	Dr.Sanjib Kr.Kalita	Assistant Professor, Dept. of Computer Science	Gauhati University, Guwahati
6	Dr. Tapashi Kashyap Das	Assistant Professor, Dept. of Computer Science	KKHSOU
7	Dr. Sruti Sruba Bharali	Assistant Professor, Dept. of Computer Science	KKHSOU

The syllabus is designed in such a way that even without any prerequisite computer knowledge, learners can take admission in this course.

### 5.2 Course and credits distribution:

The semester-wise structure of the M.Sc.IT programme for different courses is enclosed in **Annexure I** and detailed course wise syllabus is enclosed in **Annexure II**.

### **5.3 Credit hours:**

The University follows the system of assigning 30 hours of study per credit of a course. Thus, following this norm, a 4-credit course constitutes a total of 120 hours of study. Out of the total credit hours, a minimum of 10 percent, i.e., minimum 12 hours of counseling per course, is offered to the learners at their respective study centre's. In addition, the University is offering LMS support in four-quadrant approach for the learners.

### **5.4 Duration of the programme:**

The minimum duration for completion of M.Sc.IT is two years and the maximum is double the minimum duration i.e., four years as per the new regulation 13(A)2 of UGC.

### **5.5 Faculty and support staff:**

The Department of Computer Science, KKHSOU has the following teaching staff.

<b>Sl. No.</b>	<b>Name</b>	<b>Designation</b>	<b>Qualification</b>
1	Dr. Tapashi Kashyap Das	Assistant Professor	M.Sc., Ph.D.
2	Dr. Sruti Sruba Bharali	Assistant Professor	M. Tech, Ph.D., UGC NET Qualified
3	Mr. Harekrishna Deka	Assistant Professor	M.Sc., SLET Qualified
4	Dr. Nabankur Pathak	Assistant Professor	M.Sc., Ph.D.

### **5.6 Instructional delivery mechanism:**

All the study centre's of KKHSOU, including the city study centre, which is in-house study centre of KKHSOU, provide counseling sessions every Sunday of the week. In addition to this, the faculty members of the University offer weekly online classes. The counseling methods is

mainly lecture based method. In certain situations, the following techniques are also used to benefit the learners.

- a. Learning Management System (LMS)
- b. YouTube videos
- c. Online open source content
- d. NPTEL lecture notes and videos

The Self-Learning Materials (SLMs) for the first two semester of M.Sc.IT Programme have already been prepared by the university and are ready for delivery. Based on the print SLM and the e-SLM, the counseling sessions as stated above will be conducted.

#### **6. Procedure for admission, curriculum transaction and evaluation:**

The procedure for the admission is listed below:

1. The admission for the academic session 2021 of the University will be through online mode. A learner who desires to take admission in KKHSOU will have to submit his/her application through the online admission link provided in the University website [www.kkhsou.in](http://www.kkhsou.in). The learner has to carefully go through the instructions for filling up the online admission form and complete the process accordingly. In the online admission system, the learner has to register with his/her mobile no/email id, and has to carefully verify the subjects of his/her choice available in the respective study centers.
2. For admission to a particular programme, the course fee is to be paid through online transaction mode i.e., through credit card/debit card/net banking or any other available online mode of payment.
3. The learner after successful submission of the online admission form has to take a print out and submit the same to the study centre for hard copies of SLMs.
4. The verification of online application form will be done in the University and after the completion of the verification process, the e-SLMs will be sent to the respective Email-id of the learner.
5. The learners who have submitted incomplete application may be given conditional admission at the University's discretion, subject to fulfillment of other eligibility criteria.

6. All the enrolled learners will be provided with registration numbers, SLMs and Identity cards.
7. The learner who is unable to complete the programme within specified period is required to register himself/herself as a fresh learner by paying the requisite fee.
8. Pattern of question paper for end semester and term end examination

The evaluation for the M.Sc.IT programme would include two types of assessments; continuous assessment in the form of assignments/MCQs/Periodic Tests and summative assessment in the form of end semester examination. In addition, there will also be a project work to be evaluated in the last semester.

Question papers will include both objective type and subjective type questions of varying marks. Pattern of question will be of different types including simple, average, and advanced level questions in terms of difficulty with the following break-up:

Simple	Average	Advanced
30%	50%	20%

9. Pass/fail criteria: The learners will have to get a minimum of 35% in aggregate and 35% individually in each course to obtain the degree of M.Sc.IT.

The learners will also have to submit a **Major Project** in the last semester for the M.Sc.IT degree.

For learners not able to complete the whole programme may also opt for the PGDCS (Post Graduate Diploma in Computer Science) after completion of first two semesters. Those learners opting for **PGDCS** will have to however submit a **Minor Project** work in the second semester in place of the course **Open Source Software**.

### 6.1 Continuous admission:

1. After completion of a particular semester, admission into the next semester is required within one month from the last examination of the previous semester. It does not depend on whether the candidate appeared in examination or his/her result. Admission will have to be taken continuously in the programme without any break. A learner will be allowed



to appear in all the examinations, including back courses, within the stipulated time of a programme.

2. A learner will have to take admission to the next semester within one month from the last date of examination of the previous semester.
3. A learner will be allowed to take admission to the next semester beyond one month, but within two months from the last date of examination of the previous semester with a fine of Rs 500/-.
4. A learner may be allowed to take admission even after the issue of notification for filling up of examination forms, but such learners will be allowed to appear in the examination of that semester in the next year only.

## **6.2 Lateral entry:**

A candidate may be allowed lateral entry into the 3<sup>rd</sup> semester of M.Sc.IT programme provided they have successfully completed two semesters of the M.Sc.IT/MCA or PGDCA/PGDCS programme from the KKHSOU or any recognized Indian/Foreign University/Institutions.

## **6.3 Curriculum transaction:**

The following support services are provided to the learners of M.Sc.IT programme other than SLM:

- a) Counseling sessions at the respective study centre.
- b) **LMS Support:** The University is offering LMS support for the learner in 4-quadrant approach. An LMS delivers and manages all types of content, including video, courses, and documents. All the courses are developed as per the following approach.

*Quadrant 1* consists of e-Tutorial (Video).

*Quadrant 2* consists of e-Content in the form of e-SLM, and links of Open Educational Resources (OER).

*Quadrant 3* consists of Assessment in the form of MCQs, Fill in the blanks, True/False type questions etc.

*Quadrant 4* consists of Discussion Forum for clarifying doubts/questions.

c) **ICT Support:** ICT support is a major component of any ODL system of education. Our University has as such given emphasis on this. Some ICT-based support systems provided by the University for the learners of M.Sc.IT are listed below:

- **Website:** We have developed full-fledged official website [www.kkhsou.in](http://www.kkhsou.in) for our learners and general public. Here we have provided all necessary information to our learners. The Website is also linked with the social-networking site like Facebook (KKHSOU FB Official Group) for interaction among the learners, faculty members and stakeholders. The website also includes the customised study centre-search facility based on district or programme. And most of the Audio-Video programmes are also made available online through YouTube.
- **Community Radio Service: Jnan Taranga** (90.4 MHz) of KKHSOU is the first Community Radio of the North Eastern part of the country. The Community Radio, being a platform for the community for taking up community issues, is also a platform to broadcast several educational programmes that includes debates, discussions, and talk shows.
- **Ekalavya:** With the help of Prasar Bharati, our University has launched a special educational programme namely *Ekalavya*. It is aired every Saturday from 8.00 PM to 8.30 PM through All India Radio, Guwahati and Dibrugarh.
- **Akashvani Phone-in Programme:** Our University offers one hour live **phone-in** counselling programme through AIR, Guwahati and Dibrugarh where officers and experts from this University clarify queries of listeners/learners via telephone. The phone in programme is aired every Thursday from 09.15 AM to 10.15 AM.
- **e-SLM:** An e-learning portal by the name of e-SLM (<http://eslm.kkhsou.in/>) has been launched by the university. It is also a digital repository where the study materials are uploaded for the benefit of the learners. All the study materials of the programmes (including Degree, Master Degree etc.) can be assessed in this portal.
- **Open Access Journals Search Engine (OAJSE):** To provide easy access to various open access journal across the world, KKHSOU has developed the Open Access Journals Search Engine (OAJSE) which is available for the users from the

URL [www.kkhsou.in/library/oajse](http://www.kkhsou.in/library/oajse) or <http://oajse.kkhsou.in> . OAJSE aims to cover journals in all subjects that are published in English language. There are now 4,500+ journals in the directory. All are searchable at article level.

- **KKHSOU Mobile App:** Our University has developed a mobile application “KKHSOU” to help the learners to connect 24x7 with the university. It can be freely downloaded from Google Play Store (for android user).
- **SMS and e-mail Alert Facility:** University has initiated an SMS and e-mail alert facility for learners regarding any news, events and learner-related information of the university.
- **E-mail services:** Learners can write emails regarding any queries related to SLM to the faculty members at departmental email id: [csc@kkhsou.in](mailto:csc@kkhsou.in).  
For general university information learners can write emails to any officials in university’s general mail id: [info@kkhsou.in](mailto:info@kkhsou.in)  
Queries raised through to these email ids are readdressed by concerned official/faculty members of the university.
- **Official WhatsApp Group:** Year and programme wise WhatsApp group has been created to keep in contact with the learners.

d) The University conducts semester examination twice in a year.

e) The home assignments are a part of the teaching learning process and are compulsory. The home assignments marks are filled out of 30 for theory papers.

#### 6.4 Eligibility criteria for the M.Sc.IT programme:

Academic Programme	Eligibility Criteria
Master of Science in Information Technology (M.Sc.IT)	Any graduate from KKHSOU or any other University recognized by UGC.

--	--

### 6.5 Evaluation:

The academic quality and performance of the learners are evaluated through home assignment and end semester examination. The University adopts both ongoing and end term evaluation. Ongoing evaluation would be conducted in two modes: internal and external. The internal evaluation is to be undertaken by the learner himself. For this, the University has designed some Check Your Progress questions, which would help the learners to self-check his progress of study. However, this is undertaken at the learners' end themselves and is non-credit based. For overall evaluation of a course, the University follows the following two types of evaluation:

The weightage for different components of assessments for theory courses shall be as under:

- Continuous assessment in the form of assignment (in semester): 30 percent.
- Summative assessment (end semester examination):70 percent.

The weightage for different components of assessments for course having practical shall be as under:

- Continuous assessment in the form of assignment (in semester): 20 percent.
- Summative assessment (end semester examination):80 percent including conduct of practical examination.

The details are placed at Annexure I

**6.6 Fees structure:** There are four semesters in the M.Sc.IT programme. The learners are required to pay fees every semester. The structure of fee is given below:

Programme	Sem	Enrolment Fee	Course Fee	Exam Fee	Practical Fee	Exam Centre Fee	Mark-sheet Fee	Dessertation Fee	Total Fees to be paid	Arrear Subjects
M.Sc.IT	1	300	8,000	400	400	300	100	....	9,500	Rs.200 per paper + Practical
	2	....	8,000	200	600	300	100	....	9,200	
	3	....	8,000	600	200	300	100	....	9,200	

	4	....	8,000	600	200	300	200	1000	10,300	Fee(if applicable) + Centre Fee + Marksheet Fee Rs.100 + Consolidated Marksheet Rs.100
--	---	------	-------	-----	-----	-----	-----	------	--------	---

## 7. Requirement of the laboratory support and library resources:

### 7.1 Laboratory support:

The study centre offering M.Sc.IT programme must have a well equipped computer laboratory. There should be at least 15 (fifteen) computers along with sufficient UPS backup facility and high speed internet connection. Depending upon the enrolment the number of computers may be more than 15. The learner to computer ratio should be at most 2:1.

### 7.2 Library resources:

The Central Library, Krishna Kanta Handiqui State Open University plays a vital role in the collection, development and dissemination of academic, scientific and technical information to meet the present and future needs of the University. The Central Library, KKHSOU is located at the Rani Campus, Guwahati. The library is in the 2nd Floor of the Main Building. The library remains open from 10.00 am to 5.00 pm in all working days. The library is fully computerized with an ILS (Integrated Library System) and also equipped with RFID (Radio-frequency Identification) technology.

The Central Library has the following resources:

**Physical Resources:**

• <i>Books-</i>	18,164
• <i>Theses-</i>	8
• <i>Report-</i>	1
• <i>Journals-</i>	35
• <i>Magazines-</i>	12
• <i>News Papers-</i>	5
• <i>Audio CD/DVD-</i>	49
• <i>Video CD/DVD-</i>	6
• <i>CD/DVD with Textual documents-</i>	66

As on 16/03/2020, the Central Library of KKHSOU has a collection of more than 18000 books.

**E-resources:**

- ***E-Journals:*** The Central Library of KKHSOU subscribed e-journals from JSTOR ([www.jstor.org](http://www.jstor.org)), and the resources are very much necessary for academic and research community of the University.
- ***Digital Library:*** Digitization has become deeply embedded into every aspect of education today. Hence, the Central Library of KKHSOU has started the Digital Library initiative. The mission of the “Digital Library at KKHSOU” is to locate, digitize, preserve, collect and make accessible the accumulated wisdom of the institute's output to the global community. The resources of the Digital Library include Administrative Documents, Conference/Seminar Proceedings, Faculty Publications, Journal of Open Learning and Research Communication (JOLRC), KKHSOU in News and Media, Newsletters, Annual Reports, MPhil/PhD Theses, Public Lectures, Convocation Addresses, Working Papers, etc. URL: <http://dlkkhsou.inflibnet.ac.in>
- ***Open Access Journals Search Engine (OAJSE):*** To provide easy access to various open access journal across the world, KKHSOU developed the Open Access Journals Search

Engine (OAJSE) which is available for the users from the URL [www.kkhsou.in/library/oajse](http://www.kkhsou.in/library/oajse).

- ***KKHSOU at Shodhganga***: Krishna Kanta Handiqui State Open University (KKHSOU) has joined Shodhganga for depositing their theses which is available for the users from the URL <http://shodhganga.inflibnet.ac.in/handle/10603/145533>. Shodhganga repository is the reservoir of Indian intellectual output stored, hosted and maintained by the INFLIBNET Centre, an IUC of UGC.

## **8. Cost estimate of the programme and the provisions:**

The University is fully committed to bear the cost of SLM preparation for the learners of M.Sc.IT programme. The office of the Finance Officer of KKHSOU keeps all the records of finances regarding print of SLMs, honorarium paid to the members of the Expert Committee, honorarium to be paid to Content Writers, Content Editors, Language Editors, Translators, Proof Readers and also the expenditure related with organizing counselors' workshops, meeting of the co-coordinators of the study centre's etc. Moreover, the finance office also maintains records of purchase of computers, online space, books, journals etc. The accounts are maintained as per the laid down procedures of government. In this regard, the cost of programme development, programme delivery, and programme maintenance, the finance office conducted an exercise in 2017 based on historical costing method to arrive at indicative figures of cost. The findings are presented below in respect of the M.Sc.IT programme.

### **8.1. Programme development cost:**

The office of the Finance Officer of KKHSOU has worked out the following details:

- a. SLM Development Cost for Master Degree Programme per UNIT - Rs. 7,300/-
- b. Printing Cost per SLM- Rs. 56/-
- c. Cost of CD per UNIT-Rs. 23/-

### **8.2 Programme delivery cost:**

The SLMs prepared have to be delivered to various study centre's located at the far flung remote areas. On an average, the University delivers about 15 kg's of study materials per student. The cost of delivery of 1 kg of such material is Rs.10. Accordingly, depending upon the number of

candidates; the cost for the M.Sc.IT programme will be provisioned by the University. The office of the Finance Officer has calculated the delivery cost of SLM per student at Rs. 150/-

### **8.3 Programme maintenance cost:**

The University will keep financial provision for organizing stake holders' meetings, counseling workshops etc. as per the academic plan and academic calendar approved by the Academic Council of the university. The workshops conducted by the University will not only benefit the learners of the programme, but will also benefit the learners of other programmes. The university will also bear the cost of organizing the meeting of Syllabus Revision Committee etc. and also for supply of additional study materials if required for improving the quality of the programme.

Moreover, the university will keep on investing in developing the IT infrastructure so that the learners can benefit from the ICT enabled programme. The university will keep adequate financial provision for development, delivery, and maintenance of the programme presented as per the Programme Project Report.

## **9. Quality assurance mechanism and expected programme outcomes:**

### **9.1 Quality assurance mechanism:**

With regard to the quality concerns of the course materials, the department is involved in the following activities:

- a) The programme design and structure is decided upon after a series of discussions and deliberations with a team of a few carefully chosen subject experts, who are mostly eminent scholars and professionals from the reputed institutions of higher education. Formed with due approval from the University authority, this expert Committee is helped by the in-house department faculties while preparing the framework of the programme.
- b) The next step after the completion of the framework preparation is the allotment of the assigned courses to the assigned authors. The in-house faculties prepare a carefully chosen list of authors for the task. The in-house faculties also write the units, besides the outsourced authors, who are mostly research scholars and faculty members from higher educational institutions.



- c) In the next step content editors are assigned. The content editors, who are mostly academics from reputed higher educational institutions, examine the content of the units and provide their suggestions and feedbacks to be included by the coordinator of the programme.
- d) The CIQA Office is planning to conduct stakeholders' meetings and SLM and Counseling workshops which are expected to provide the University and the Department with required inputs for quality enhancement.
- e) In order to keep the programme updated, the programme would be revised and necessary changes would be incorporated for the benefit of the learners, based on the inputs received from the mechanism as mentioned above.

## **9.2 Expected programme outcomes:**

The outcomes of the M.Sc.IT programme are manifold. The learners will be able to:

- a) Pursue higher education programme like M. Tech, Ph.D.
- b) Work as software developers in Govt. and private sectors
- c) Work as system analyst
- d) Work as system/network/database administrator
- e) Impart gained knowledge as computer educators
- f) Open up software firms as entrepreneurs
- g) Develop dynamic web application and smart phone based applications (mobile apps)
- h) Setup computer laboratory including computer network installation and configuration

**ANNEXURE I**  
**M.Sc.IT PROGRAMME STRUCTURE**

<b>Course Code</b>	<b>Sem</b>	<b>M.Sc.IT</b>	<b>Marks</b>	<b>Credit</b>
M.SC.IT(S1)01	1st	Computer Fundamentals and PC Software	20a+50t+30p	4
M.SC.IT(S1)02		Digital Techniques	30a+70t	4
M.SC.IT(S1)03		Computer Programming using C	20a+50t+30p	4
M.SC.IT(S1)04		Fundamentals of Networking and Web Technology	20a+50t+30p	4
M.SC.IT(S2)05	2nd	Computer Organization and Architecture	30a+70t	4
M.SC.IT(S2)06		Data Structure through C Language	20a+50t+30p	4
M.SC.IT(S2)07		Fundamentals of Database Management System	20a+50t+30p	4
M.SC.IT(S2)08		Open Source Software / * <b>Minor Project</b>	20a+50t+30p / * <b>100</b>	4
M.SC.IT(S3)09	3rd	Introduction to Discrete Mathematics and Formal Languages and Automata	30a+70t	4
M.SC.IT(S3)10		Object-Oriented Programming through C++	20a+50t+30p	4
M.SC.IT(S3)11		Operating System	30a+70t	4
M.SC.IT(S3)12		System Analysis and Design	30a+70t	4
M.SC.IT(S4)13	4th	Programming in Java	20a+50t+30p	4
M.SC.IT(S4)14		Computer Graphics	30a+70t	4
M.SC.IT(S4)15		Linux System Administration	20a+50t+30p	4
M.SC.IT(S4)16		<b>Major Project</b>	200	8
<b>Total Marks:</b>			<b>1700</b>	<b>68</b>

- ❖ For theory courses, the mark distribution is 30a+70t i.e., 30 marks for Home assignment and 70 marks for theory. For courses having practical, the marks distribution is 20a+50t+30p i.e., 20 marks for Home assignment, 50 marks for theory and 30 marks is for practical.
- ❖ M.Sc.IT programme is a modular programme at KKHSOU. Learners not able to complete the whole M.Sc.IT programme will have to submit a Minor Project work in the second semester in place of the course Open Source Software to get the Post Graduate Diploma in Computer Science (PGDCS).

1 credit = 30 hours of learning

4 credit=30\*4=120 hours

**ANNEXURE II**  
**M.SC.IT DETAILED COURSE WISE SYLLABUS**

**M.SC.IT (S1) 01: Computer Fundamentals and PC Software**  
**4 credits: 120 hours of learning**

**Unit 1: Introduction to Computer [5 hours, 5 marks]**

Block Diagram of Computer, Evolution, Generations, Classification and its Application

**Unit 2: Number System [10 hours, 8 marks]**

Representation of numbers (only a brief introduction to be given) and characters in computer, Binary, Hexadecimal, Octal, BCD, ASCII, EDCDIC and Gray codes, Conversion of bases, Representation of signed integers, Sign magnitude, 1's complement and 2's complement representation, Arithmetic operations using 2's complement representation and conditions for overflow/underflow and its detection.

**Unit 3: Basic Components of Computer [7 hours, 8 marks]**

Concept of Bit and Byte; CPU, ALU, CU; Computer Memory: Primary and Secondary; Input/Output Devices; Buses: Address, Data and Control.

**Unit 4: Introduction to Computer Security [5 hours, 5 marks]**

Computer Virus, Worm, SpyWare, Malware, Trojan horse, Antivirus Software

**Unit 5: Hardware Configuration [7 hours, 5 marks]**

Different hardware configuration (Laptop/desktop), Typical RAM/ Hard disk size, Mother board series, different OEM(original equipment manufacturer), Processor series, FCC & UL for quality measure, Introduction to different standard ports/buses and display technology.

**Unit 6: Introduction to OS [7 hours, 5 marks]**

Definition and functions of an Operating System, Types of OS (Single User, Multi user, Single tasking, Multitasking, Real time, Network OS, Distributed OS)

**Unit 7: MS DOS Operating System [7 hours, 6 marks]**

Introduction to DOS, System files of DOS, concept of Booting, Files and Directory Structure, Concept of Paths, Internal and External commands, Batch File.

**Unit 8: MS Windows Operating System [7 hours, 6 marks]**

Features of Windows 7, Exploring Components of Windows: The Desktop, The Icons, Working with Windows, The Start Menu and Taskbar, Quitting Windows; Customizing the Desktop, Files and Folders.

**Unit 9: LINUX Operating System [10 hours, 8 marks]**

Open Source and Free Software, Advantages and Disadvantages of Linux Operating System, Concept of Path, Basic Linux Commands, File Permission, Text Editor vi.

**Unit 10: Word Processor -Part I [10 hours, 8 marks]**

Starting MS-Word, Document Window and its Components, Different Bars, Document View, Creating a New Document, Saving a Document, Opening an Existing Document, Exiting MS-Word, Working with Text, Working with Paragraph, Bullets and Numbering, Find and Replace, Copy, Cut and Paste

**Unit 11: Word Processor-Part II [10 hours, 8 marks]**

Spelling and Grammar Checking, Undo and Redo option, Header and Footer, Page Setup, Printing Documents, Inserting Picture, Working with Tables: Inserting Table, Deleting Table, Traversing Table, Selecting a Table, Rows and Columns, Deleting Rows and Columns, Merge and Split Cells; Creating Multiple Columns

**Unit 12: Spreadsheet-Part I [10 hours, 7 marks]**

Starting MS-Excel, Working with Toolbars, Row, Column and Cell, Working with Excel: Creating a New Workbook, Working with Cells and Fonts, Merging Cells, Inserting and Deleting Rows and Columns; Saving a Workbook, Closing a Workbook;

**Unit 13: Spreadsheet-Part II [10 hours, 8 marks]**

Different Operators used in Excel; Working with Formula and Functions; Sorting Data; Working with Charts.

**Unit 14: Introduction to Documentation and Presentation [10 hours, 8 marks]**

Starting MS-PowerPoint, Creating a New Presentation, Working with Slides, Applying Text and Graphics, Applying Themes, Customizing Slide Show, Saving, Running and Closing a Presentation, Opening an Existing Presentation

**Unit 15: Threats and Legal Framework [5 hours, 5 marks]**

Cyber Crimes against Individuals, Institution and State, Hacking , Digital Forgery, Cyber Stalking/Harassment, Cyber Pornography, Identity Theft & Fraud, Cyber terrorism, Cyber Defamation, Different offences under IT Act, 2000

\*\*\*\*\*

**M.SC.IT (S1) 02: Digital Techniques**  
**4 credits: 120 hours of learning**

**Unit 1: Introduction to Number Systems [8 hours, 5 marks]**

Decimal, Binary, Hexadecimal and Octal number system, Number system conversion

**Unit 2: Binary Arithmetic [8 hours, 6 marks]**

Complement: r's and (r-1)'s complement, Binary addition, Binary subtraction, Binary Multiplication, Binary division.

**Unit 3: Data Representation [8 hours, 6 marks]**

Fixed Point representation and Floating point representation

**Unit 4: Code Conversion Technique [8 hours, 5 marks]**

Gray code, BCD, Code conversion technique, ASCII, EBCDIC, Unicode, ISO

**Unit 5: Boolean algebra [8 hours, 5 marks]**

Introduction, Properties of Boolean Identities, Properties of Positive and Negative Logic

**Unit 6: De-Morgan's Theorem and Application [6 hours, 6 marks]**

De-Morgan's Theorem, Application of De-Morgan's theorem.

**Unit 7: Basic Logic Gates [6 hours, 5 marks]**

Logic Gates: AND, OR, NOT.

**Unit 8: Universal Gates [10 hours, 5 marks]**

NAND, NOR, XOR; Conversion of the Logic Gates, NAND and NOR Implementation of Basic Gates.

**Unit 9: Introduction to IC [6 hours, 6 marks]**

LSI, MSI, VLSI.

**Unit 10: Reduction Techniques [8 hours, 10 marks]**

Boolean Expression, Simplification of Boolean expression by Algebraic method and Karnaugh Map, SOP, POS, Standard and Canonical form, Conversion of SOP to POS and vice-versa, Reduction upto 3-variables.

**Unit 11: Combinational Circuit [12 hours, 8 marks]**

Definition and Properties of Combinational Circuit, Introduction to Multiplexer, 4-to-1 multiplexer, Demultiplexer, Encoder, Decoder,

**Unit 12: Binary Arithmetic Circuits [6 hours, 7 marks]**

Half adder, Full adder, Binary Half subtractor, Full subtractor

**Unit 13: Sequential Circuit [12 hours, 10 marks]**

Definition and Properties of Sequential Circuit, Block Diagram of Sequential Circuit, Types of Sequential Circuit, Introduction to Flip-Flop and its different types: RS, JK; Master-Slave JK Flip-Flop.

**Unit 14: Registers and Counters [8 hours, 8 marks]**

Shift Register: Introduction, Properties and Applications, Types of Shift Registers: SISO, PISO, SIPO, PIPO; Counter, Synchronous and Asynchronous Counter, Limitations of Asynchronous Counter, Frequency Division Counter.

**Unit 15 Memory Types [6 hours, 7 marks]**

Random Access Memory (RAM), Read Only Memory (ROM), Static RAM, Dynamic RAM, Volatile and Non-Volatile memory

\*\*\*\*\*

**M.SC.IT (S1) 03: Computer Programming using C**  
**4 credits: 120 hours of learning**

**Unit 1: Introductory Concepts [5 hours, 5 marks]**

Basic definition of Pseudo Code, algorithm, flowchart, program

**Unit 2: Elements of C Programming [6 hours, 5 marks]**

Characters used in C, Identifiers, Keywords, Tokens, Constants, Variables, Types of C variables, Receiving input and output

**Unit 3: Variables and Data types [6 hours, 5 marks]**

Integer, character floating point and string; Initialization of variable during declarations; Symbolic Constants, type conversion in assignment

**Unit 4: Operators and Expressions [8 hours, 5 marks]**

Expression in C, Different types of operators: Arithmetic, Relational and Logical, Assignment, Conditional, Increment and decrement, Bitwise, Comma and other operator (size of, period etc). Precedence and associativity of operators, type casting

**Unit 5: I/O Functions [10 hours, 6 marks]**

Header Files (stdio, conio), Formatted Input/Output Functions (scanf, printf), Escape Sequences, Character Input/Output Functions (getch, getchar, putchar, gets, puts, getch, clrscr)

**Unit 6: Preprocessor Directives [5 hours, 5 marks]**

Features of C preprocessor, Macro expansion, Macros with arguments, #if and #elif directives,

**Unit 7: Conditional Statements [7 hours, 8 marks]**

Conditional Statement- if, if- else, nested if-else, switch-case; break, continue, goto

**Unit 8: Loop Control Structures [10 hours, 8 marks]**

Concept of Loops, Types of loop: while, do-while, for; nested loops

**Unit 9: Storage Class [5 hours, 5 marks]**

Automatic, External, Static, Register, Scope and lifetime of variables, Macro, Preprocessor directive

**Unit 10: Arrays [10 hours, 8 marks]**

Array, Array Declaration, 1-Dimensional array, 2-Dimensional array

**Unit 11: Strings [10 hours, 7 marks]**

String, String Handling Functions: strlen(), strcmp(), strcpy(), strrev(), strcat(), etc

**Unit 12: Functions [10 hours, 8 marks]**

Function, Function declaration, Function definition, Function call, Formal and Actual parameter, Recursive function

**Unit 13: Pointers [10 hours, 7 marks]**

Pointer, Pointer declaration, Passing pointer to a function, Pointer and one-dimensional arrays, Dynamic memory allocation

**Unit 14: Structures and Union [10 hours, 10 marks]**

Structure Declarations, Definitions, Defining your typedef, Array of Structure, Pointer to Structure. Union Declaration, Definition, Declaration, Uses

**Unit 15: File Handling [8 hours, 8 marks]**

Concept of File, File Pointer, File Opening in various modes, closing a file, reading and writing on files, Formatted Input/Output, fseek(), ftell(), rewind()

\*\*\*\*\*

**M.SC.IT (S1) 04: Fundamentals of Networking and Web Technology  
4 credits: 120 hours of learning**

**Unit 1: Introduction to Computer Network [10 hours, 8 marks]**

Goals of Computer Network, Types of Computer Network: LAN, MAN, WAN, LAN Transmission Methods, Peer-to-Peer LANs, Broadcast and Point-to-Point Networks, Connection-Oriented and Connection-Less Services.

**Unit 2: Network Topology [7 hours, 5 marks]**

Definition of Network Topology, Types of Network Topology: Bus, Ring, Star, Mesh, Tree.

**Unit 3: Data Communication Modes [10 hours, 8 marks]**

Introduction to Signals and Systems, Types of Communication (Analog, Digital), Modes of Communication (Simplex, Half-Duplex, Full-Duplex), Modulation.

**Unit 4: Network Devices [5 hours, 5 marks]**

Network Interface Card (NIC), Modem, Switch, Router, Gateway.

**Unit 5: Data Transmission [8 hours, 8 marks]**

Parallel Transmission, Serial Transmission, Bandwidth, Baud length, Switching Techniques: Circuit Switching, Message Switching, and Packet Switching.

**Unit 6: Network Models [8 hours, 8 marks]**

ISO-OSI Reference Model: Functions of each Layer; Various Terminology used in Computer Network; Connection-Oriented and Connectionless Services, TCP/IP Reference Model, Comparison of ISO-OSI and TCP/IP Model.

**Unit 7: Transmission Media [8 hours, 8 marks]**

Transmission Medium, Guided Media: Coaxial Cable, Twisted Pair, Fiber Optics Cable; Unguided Media: Radio Waves, Bluetooth, Infrared, Microwave, Satellite, Wireless LANs (IEEE 802.11).

**Unit 8: Internet [8 hours, 8 marks]**

Definition of Internet, Internet Architecture, Peer-to-Peer, Client-Server, Accessing Technique, Internet Service Providers, Organization of Internet, Internet Protocol Suite, IP Address, Domain Name System, Uniform Resource Locators (URL), Socket, Application of Internet.

**Unit 9: Word Wide Web [8 hours, 7 marks]**

Web Page, Web Browsers, Web Server, Web Search Engines, Web Cookies, Technologies in WWW.

**Unit 10: Introduction to HTML [8 hours, 6 marks]**

Basics of HTML, HTML Editor, HTML Tags, Document Structure Tags, Formatting Tags, Hyperlink and Image tags

**Unit 11: HTML Lists and Tables [8 hours, 6 marks]**

HTML Lists: Unordered, Ordered, Definition Lists; HTML Table tags;

**Unit 12: Advanced HTML Tags [8 hours, 5 marks]**

Frame tags, HTML Form, Additional Advanced HTML Tags.

**Unit 13: Introduction of XML [8 hours, 5 marks]**

Introduction to XML, Comparison of HTML and XML, XML Basics, Introduction to DTD

**Unit 14: Introduction to CSS [8 hours, 8 marks]**

Cascading Style Sheets (CSS), Inline Style, Embedded Style, External Style Sheet, Imported Style Sheet, Ruleset, @ rule, Class Selector, ID Selector, Contextual Selector, Attribute Selector, CSS Properties – background properties, text properties, and border properties

**Unit 15: Dynamic HTML [8 hours, 5 marks]**

Dynamic HTML, Document Object Model, Features of DHTML

\*\*\*\*

**M.SC.IT (S2) 05: Computer Organization and Architecture**  
**4 credits: 120 hours of learning**

**Unit 1: Basic organization of the computer [5 hours, 5 marks]**

Basic organization of the computer and block level description of the functional units from program execution point of view; Fetch, decode and execute cycle



**Unit 2: Digital Components [8 hours, 8 marks]**

Half adder, Full Adder, Half subtractor, Full subtractor, Coder-Decoder, Multiplexer, Demultiplexer, Magnitude Comparator, Flip-Flops, Counter, Register

**Unit 3: Data Representation [8 hours, 5 marks]**

Data representation, computer arithmetic and their implementation; control and data path, data path components, design of ALU and data path, control unit design.

**Unit 4: Computer Arithmetic [8 hours, 5 marks]**

Integer representation, sign magnitude representation, twos complement representation, integer arithmetic

**Unit 5: Instruction Sets [8 hours, 6 marks]**

Elements of a machine instruction, instruction representation, Simple instruction format, Instruction types, number of addresses, Types of operands, Types of operations. Different Instruction Formats, Instruction Types, Instruction Execution, Assembly language notation

**Unit 6: Addressing modes [8 hours, 5 marks]**

Addressing: Immediate, Direct, Indirect, Registrar, Registrar indirect, Relative Index.

**Unit 7: Input-Output Organization [8 hours, 8 marks]**

Different I/O techniques (Programmed I/O, Interrupt-Driven I/O), DMA (Direct Memory Access), I/O Processors

**Unit 8: Introduction to Cache and Virtual Memory [10 hours, 8 marks]**

Memory Hierarchy, Semiconductor memories, internal organization of typical RAM and ROM Memory, Switches, Cache memory, Cache memory access techniques; Mapping functions, Virtual memory, Locality of reference, Paging, Cache Coherence Problem

**Unit 9: Memory and I/O access [10 hours, 8 marks]**

Memory Read Write operations, Concept of handshaking, Polling Techniques (Serial and Hub Polling) and Interrupt driven I/O, Priority and Daisy Chaining Technique, Introduction to Memory Mapping.

**Unit 10: Memory and I/O Interfacing [8 hours, 8 marks]**

I/O processor, Priority Encoder, Device Scheduler, Interfacing with the I/O Devices, keyboard, printer and display interfaces

**Unit 11: External Memory [8 hours, 8 marks]**

Magnetic Disk, Magnetic read write operation, sector, track, inter track and inter sector gap, cylinder, fixed head disk, seek time, access time, transfer time, rotational delay, RAID, Optical memory, Magnetic tap.

**Unit 12: Processor structure and Function [10 hours, 8 marks]**

Processor organization: Fetch instruction, Interpret instruction, fetch data, process data, write data, Registrar organization, Control and status registrar, Instruction cycle, Instruction pipelining (definition only)

**Unit 13: Introduction to Parallel Processing [5 hours, 5 marks]**

Introduction to Pipelining and Basics of Parallel Processing, Scalable Architecture

**Unit 14: Introduction to CISC and RISC Architecture [5 hours, 5 marks]**

CISC (Complex Instruction Set Computers), RISC (Reduced Instruction Set Computers), Examples of CISC and RISC

**Unit 15: Parallel Architectures [10 hours, 8 marks]**

SISD, SIMD, MISD, MIMD, Scalar, Flynn's Classification of Computer Architecture, Vector, superscalar and pipelined processor, Pipelining, Instruction pipeline, pipeline bubbles, Hazards: - resource conflicts, data dependency, branch difficulty. Vector computing, arithmetic pipeline, vector and scalar register, chaining, scatter gather operations, vector-register processor, memory-memory vector processor. Array processor

\*\*\*\*\*

**M.SC.IT (S2) 06: Data Structure through C Language**

**DETAILED SYLLABUS**

**4 credits: 120 hours of learning**

**Unit 1: Introduction to Data Structure [10 hours, 10 marks]**

Basic concept of data, data type, Elementary structure, Arrays: Types, memory representation, address translation functions for one & two dimensional arrays and different examples.

**Unit 2: Algorithms [5 hours, 5 marks]**

Complexity, time-Space, Asymptotic Notation

**Unit 3: Linked List [10 hours, 8 marks]**

Introduction to Linked List, representation of single linked list, linked list operations: Insertion into a linked list, deletion a linked list, searching and traversal of elements and their comparative studies with implementations using array structure.

**Unit 4: Stack [8 hours, 7 marks]**

Definitions, representation using array and linked list structure, applications of stack.

**Unit 5: Queue [8 hours, 7 marks]**

Definitions, representation using array, linked representation of queues, application of queue.

**Unit 6: Searching [7 hours, 6 marks]**

Linear and Binary search techniques, Advantages and disadvantages, Analysis of Linear and Binary search

**Unit 7: Sorting [10 hours, 8 marks]**

Sorting algorithms (Complexity, advantages and disadvantage, implementation), bubble sort, insertion sort, selection sort, quick sort

**Unit 8: Trees [8 hours, 7 marks]**

Definition and implementation: Binary Tree, Tree traversal algorithms (inorder, preorder, postorder), postfix, prefix notations; Binary Search Tree: Searching in BST, insertion and deletion in BST.

**Unit 9: Dictionary ADT [8 hours, 7 marks]**

Search trees, balancing of search trees – AVL trees, Red-Black trees, multi way search trees, 2-3 trees, splay trees, Insertion and Deletion in each of the above data structures, Hashing.

**Unit 10: Advance Sorting and Selection Techniques [10 hours, 6 marks]**

Heap sort, Shell sort, sorting in linear time, Counting sort, Radix sort. Medians and order Statistics Selection and Adversary arguments. Lower bound on sorting

**Unit 11: Priority Queue ADT [8 hours, 6 marks]**

Heaps-extended priority queue, min(max) heaps, binomial heap, fibonacci heap and its amortized analysis.

**Unit 12: Partition ADT [5 hours, 5 marks]**

Union-find algorithms through weighted merge and path compression

**Unit 13: Data Structure for external storage operations [7 hours, 5 marks]**

B-tree, insertion and deletion in B-trees, external sorting, B<sup>+</sup> tree

**Unit 14: Red Black Tree [6 hours, 5 marks]**

Definition, properties, Creation, Insertion, left and right rotation, balancing red black tree, deleting node from red black tree

**Unit 15: Graph [10 hours, 8 marks]**

Introduction to Graph, Graph representation: adjacency matrix, adjacency list, Traversal of graph: depth first search and breadth first search.

\*\*\*\*\*

**M.SC.IT (S2) 07: Fundamentals of Database Management System  
4 credits: 120 hours of learning**

**Unit 1: File Structure and Organization [8 hours, 4 marks]**

Data and Information, Concept of Field, Key Field; Records and its types, Fixed length records and Variable length records; Files, operation on files, Primary file organization.

**Unit 2: Database Management System [8 hours, 5 marks]**

Definition of DBMS, File processing system vs. DBMS, Advantages and Disadvantages of DBMS, Database Architecture, Data Independence, Data Dictionary, DBMS Language, Database Administrator.

**Unit 3: Data Models [8 hours, 6 marks]**

Data Models: Object Based Logical Model, Record Base Logical Model, Relational Model, Network Model, Hierarchical Model.

**Unit 4: Entity-Relationship Model [8 hours, 5 marks]**

Entity Set, Attribute, Relationship Set, Entity Relationship Diagram (ERD), Extended features of ERD.

**Unit 5: Relational Databases [8 hours, 8 marks]**

Relational data model; Terms: Relation, Tuple, Attribute, Cardinality, Degree, Domain; Keys : Super Key, Candidate Key, Primary Key, Foreign Key;

**Unit 6: Relational Algebra [6 hours, 6 marks]**

Operations: Select, Project, Union, Difference, Intersection, Cartesian Product, Natural join.

**Unit 7: SQL (Part I) [10 hours, 8 marks]**

Introduction of SQL, characteristic of SQL, Basic Structure, DDL Commands, DML, DQL, SELECT Statement, WHERE Clause, Useful Relational Operators, Aggregate Functions, SUM Function, AVG Function.

**Unit 8: SQL (Part II) [10 hours, 8 marks]**

Compound Conditions and Logical Operators, AND Operator, OR Operator, Combining AND and OR Operators, IN Operator, BETWEEN Operator, NOT Operator, Order of Precedence for Logical Operators, LIKE Operator, Concatenation Operator, Alias Column Names, ORDER BY Clause, Handling NULL Values, DISTINCT Clause

**Unit 9: Normalization of Database [10 hours, 10 marks]**

Introduction to Normalization, Anomalies of un-normalized Database, Normalization of Database: 1NF, 2NF, 3NF, BCNF.

**Unit 10: Database Design [10 hours, 8 marks]**

Design of Relational Database, Functional Dependency Diagram, Dependency-preserving property, lossless join property, algorithms to ensure dependency-preserving property and lossless join property.

**Unit 11: System Implementation Techniques [8 hours, 8 marks]**

Query processing and optimization- translation between SQL queries and relational algebra;

**Unit 12: Transaction Processing [8 hours, 8 marks]**

Transaction and System concepts, Desirable properties, Schedules and Recoverability

**Unit 13: Concurrency Control [6 hours, 6 marks]**

Locking Techniques, Concurrency Control based on timestamp ordering, Multiversion Concurrency Control Techniques

**Unit 14: Database Recovery [6 hours, 5 marks]**

Concepts and techniques, recovery in multi database systems

**Unit 15: Security and Authentication [6 hours, 5 marks]**

Issues, access control techniques, introduction to multilevel security

\*\*\*\*\*

**M.SC.IT (S2) 08: Open Source Software  
4 credits: 120 hours of learning**

**Unit 1: Installation of LaTeX**

Installation of LaTeX, Understanding Latex compilation

**Unit 2: Introduction to LaTeX**

Basic Syntax, Writing equations, Matrix, Tables

**Unit 3: Page Layout – I**

Page Layout – Titles, Abstract Chapters, Sections, References, Equation references, citation, Table of contents

**Unit 4: Page Layout – II**

List making environments, Generating new commands, Figure handling, table & figure numbering, List of figures, List of tables, Generating index

**Unit 5: Packages**

Packages: Geometry, Hyperref, amsmath, amssymb, algorithms, algorithmic graphic, color, tilez listing

**Unit 6: Classes**

Classes: article, book, report, beamer, slides, letter

**Unit 7: Applications of LaTeX**

Applications: Writing Resume, Writing question paper, Writing articles/ research papers, Presentation using beamer, inserting graphics, drawing graphics, putting equations like :

$$(x + a)^n = \sum_{k=0}^n \binom{n}{k} x^k a^{n-k},$$

$$(1 + x)^n = 1 + \frac{nx}{1!} + \frac{n(n-1)x^2}{2!} + \dots,$$

$$f(x) = a_0 + \sum_{n=1}^{\infty} \left( a_n \cos \frac{n\pi x}{L} + b_n \sin \frac{n\pi x}{L} \right)$$

$$e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots, -\infty < x < \infty$$

**Unit 8: Installation of Scilab**

Installation of Scilab (both windows & Linux)

**Unit 9: Introduction to Scilab**

Introduction to scilab, Basic syntax, Mathematical Operators, Predefined constants, Handling .sci files, Installation of additional packages e.g. optimization

**Unit 10: Functions in Scilab**

Built in functions, Complex numbers, Polynomials, Vectors, Matrix operations (functions like inv(), spec(), zeros(), ones(), eye(), rand()). Handling these data structures using built in functions. Functions

**Unit 11: Conditional Statements in Scilab**

Loops (for & while), Conditional statements

**Unit 12: Graphics in Scilab**

Graphics handling: 2D, 3D, Generating .jpg files, Function plotting, Data plotting, GUI in scilab, Plotting 2D graphs

**Unit 13: Applications of Scilab**

Applications: Numerical Linear Algebra (Solving linear equations, eigen values etc.) solving Ordinary Differential Equations, Numerical Analysis – iterative methods, Comparison with C/C++/Matlab

**Unit 14: Introduction to Python**

Introduction to Python, The procedure to install Python, How to open Python console

**Unit 15: Basic Python Commands**

Basic Python commands, Python programming

**OR**

**M.SC.IT (S2) 08: Minor Project**

**4 credits**

The guidelines for the project are enclosed in Annexure III.

\*\*\*\*\*

**M.SC.IT (S3) 09: Introduction to Discrete Mathematics and Formal Languages and Automata**

**4 credits: 120 hours of learning**

**PART I: Discrete Mathematics**

**Unit 1: Sets, Relations and Functions [6 hours, 7 marks]**

Sets – the Empty Set, Finite and Infinite Set, Equal and Equivalent set, Subsets, Power set, Universal set, Venn diagram, Complement of a set, set operations; Concept of relation: identity and inverse relation, types of relation, equivalence relation; Concept of function: identity and constant function, types of function.

**Unit 2: Lattices [8 hours, 5 marks]**

Lattices as partially ordered sets, their properties. Lattices and algebraic systems; Sub lattices, direct products and homomorphism. Some special lattices for example complemented and distributive lattices.

**Unit 3: Propositional Logic [8 hours, 6 marks]**

Statements, logical connectives, truth tables; Tautologies, contradictions, logical equivalence, Applications to everyday reasoning

**Unit 4: Boolean Algebra [8 hours, 6 marks]**

Boolean Algebra, Relation of Predicate Calculus to Boolean algebra

**Unit 5: Counting Principles [8 hours, 6 marks]**

The Pigeonhole principle - counting; Permutation and Combination: Definition of Permutation and combination, Simple application of permutation and combination, Principle of Inclusion-Exclusion

**Unit 6: Basic Algebraic Structure [8 hours, 6 marks]**

Binary operations, identity and inverse of an element, group, subgroup, coset, cyclic group, normal subgroup, quotient group; Ring, Commutative Ring, Integral domain and Field

**Unit 7: Graph Theory [10 hours, 8 marks]**

Basic concepts- finite and infinite graphs, incidence and degree, isolated and pendant vertices, null graph; Paths and Circuits- isomorphism, subgraphs, walks, connected and disconnected graphs and components, Euler graphs, Bi-partite graphs, Hamiltonian paths and circuits;

**Unit 8: Trees [8 hours, 6 marks]**

Trees, Properties of trees, distance and centers, rooted and binary trees, on counting trees, spanning, fundamental circuits, spanning trees in weighted graphs; Cut-sets- properties, connectivity and separability, network flows; Matrix representation of graphs- incidence matrix, submatrices, circuit matrix, cut-set matrix, path matrix, adjacency matrix;

## **PART II: Formal Languages and Automata**

### **Unit 9: Mathematical preliminaries [6 hours, 6 marks]**

Set, Relations and Functions; Properties of Relations, Closure of Relations, Symbols and Alphabets, Strings and their properties, Languages, Principle of Induction.

### **Unit 10: The Theory of Automata [8 hours, 8 marks]**

Definition of Automaton, Finite Automata, Transition Systems, Properties of Transition Functions, Acceptability of a String by a Finite Automata, Finite Automata with Epsilon-transitions;

### **Unit 11: Types of Finite Automata [10 hours, 8 marks]**

Deterministic Finite Automata (DFA), Non-Deterministic Finite Automata (NFA); The Equivalence of DFA and NDFA; Minimization of Finite Automata; Application of Finite automata;

### **Unit 12: Formal languages [8 hours, 7 marks]**

Basic Definition, Definition of a Grammar, Derivation and language generated by a grammar, Chomsky Classification of Languages;

### **Unit 13: Regular Expressions and Regular Grammars [8 hours, 8 marks]**

Regular Set and Regular Grammars; Closure Properties of Regular Languages ; Regular Expressions; Relationship between the Finite Automata and Regular Expressions; The Pigeon-hole principle; Applications of Regular Expressions;

### **Unit 14: Context-Free Grammars and Languages [8 hours, 8 marks]**

Context-Free grammars; Derivation tree, Parse trees; Applications; Ambiguity in Grammars and Languages

### **Unit 15: Properties of Context-Free Languages [8 hours, 5 marks]**

Normal forms for CFGs; The pumping lemma for CFGs; Closure properties of CFL

\*\*\*\*\*

## **M.SC.IT (S3) 10: Object-Oriented Programming through C++ 4 credits: 120 hours of learning**

### **Unit 1: Introduction to Object-Oriented Programming [5 hours, 5 marks]**

Basic concept of OOP, Comparison of Procedural Programming and OOP, Benefits of OOP, C++ compilation, Abstraction, Encapsulation, Inheritance, Polymorphism, Difference between C and C++



**Unit 2: Elements of C++ Language [8 hours, 5 marks]**

Tokens and identifiers: Character set and symbols, Keywords, C++ identifiers. Variables and constants: Integers & characters, Constants and symbolic constants, Dynamic initialization of variables, Reference variables, Basic data types in C++, Streams in C++, scope resolution operator

**Unit 3: Operators and expressions [8 hours, 5 marks]**

Operators, Types of Operators in C++, Precedence and Associativity, Manipulators, Enumerated data type, storage classes

**Unit 4: Decision and Control Structures [8 hours, 5 marks]**

if statement, if-else statement, switch statements, Loop: while, do-while, for; Jump statements : break, continue, goto

**Unit 5: Array and Structure [8 hours, 6 marks]**

Arrays, structure, unions, Runtime memory management: new and delete operator

**Unit 6: Pointer [7 hours, 6 marks]**

Introduction, Address operator, pointer variable, pointer definition, pointers and parameter passing, void pointer, pointer arithmetic, Runtime memory management: new and delete operator, Pointers to pointer, Passing address of a pointer, Array of Pointers, Pointers to functions

**Unit 7: Functions [7 hours, 6 marks]**

main() function, components of function : prototype, function call, definition, parameter; passing arguments; types of function, inline function, function overloading

**Unit 8: Introduction to Classes and Objects [8 hours, 6 marks]**

Classes in C++, class declaration, declaring objects, Defining Member functions, Inline member function, Array of objects, Objects as function argument, Static data member and member function, Friend function and friend class.

**Unit 9: Constructors and Destructors [7 hours, 6 marks]**

Constructors, Instantiation of objects, Default constructor, Parameterized constructor, Copy constructor and its use, Destructors, Constraints on constructors and destructors, Dynamic initialization of objects.

**Unit 10: Operator Overloading [10 hours, 10 marks]**

Overloading unary operators: Operator keyword, arguments and return value; Overloading Unary and binary operators: arithmetic operators, manipulation of strings using operators, Type conversions.

**Unit 11: Inheritance [10 hours, 8 marks]**

Derived class and base class: Defining a derived class, Accessing the base class member, Inheritance: multilevel, multiple, hierarchical, hybrid; Virtual base class, Abstract class.

**Unit 12: Virtual Functions and Polymorphism [10 hours, 10 marks]**

Virtual functions, Pure virtual functions; Polymorphism, Categorization of polymorphism techniques: Compile time polymorphism, Run time polymorphism.

**Unit 13: File Handling [8 hours, 8 marks]**

File classes, Opening and Closing a file, File modes, Manipulation of file pointers, Functions for I/O operations

**Unit 14: Templates [10 hours, 8 marks]**

Introduction, Function template, Function template overloading, Class templates, Template arguments

**Unit 15: Object Oriented Design [6 hours, 6 marks]**

Object Oriented Design Approaches, Object Modeling Techniques (OMT) tools: Object Model, Dynamic Model, and Functional Model. (Object Diagram, State Diagram, and DFD), Phases of Object-Oriented Development: Object Analysis, System Design, Object Design

\*\*\*\*

**M.SC.IT (S3) 11: Operating System  
4 credits: 120 hours of learning**

**Unit 1: Review of Computer Organization [5 hours, 5 marks]**

Major Subsystems, I/O Organization, Memory Organization, Bus Organization.

**Unit 2: Introduction to Operating System [8 hours, 5 marks]**

Definition of Operating System, Batch System, Multi-Programmed System, Time-Sharing System, Single User Operating System, Multi-User Operating System.

**Unit 3: Processes [8 hours, 8 marks]**

Process: process models, process hierarchies, process states; Threads: use, design issues of thread; Types and Application.

**Unit 4: Interprocess Communication [10 hours, 8 marks]**

Interprocess communication, race conditions, critical-sections, mutual exclusion, solution to race condition, disabling interrupt, Peterson's solution, sleep & wake up (The Producer Consumer Problem), Semaphores

**Unit 5: Scheduling [10 hours, 8 marks]**

Basic concepts, primitive and non-primitive scheduling, types of scheduling - batch, interactive and real-time, scheduling algorithms, goals of scheduling algorithms, first come first serve, shortest job first and round robin scheduling.

**Unit 6: Deadlocks [9 hours, 8 marks]**

Definition of deadlock, principles of deadlock (deadlock conditions & modelling), deadlock detection, recovery & prevention, deadlock avoidance (banker's algorithm)

**Unit 7: Memory Management [10 hours, 10 marks]**

Multiprogramming: fixed partitions, relocation and protection; Swapping and its basic concepts; Virtual Memory: Basic concepts, Paging and Page tables, Page Replacement Algorithms (FIFO, LRU; Cache Memory.

**Unit 8: Memory Mapping [9 hours, 8 marks]**

Associative Mapping, Set-Associative Mapping, Block Set-Associative Mapping, DMA.

**Unit 9: File System [9 hours, 8 marks]**

Definition of File, File naming, File types(directory, regular), Sequential access and Random access files, File attributes, Operations on file, Hierarchical directory structure, Path name(relative and absolute), Operation on directories, File system implementation techniques.

**Unit 10: I/O Management [9 hours, 6 marks]**

Basic principles I/O Operations, I/O Devices, Device controllers, DMA, Principles of I/O Software, its goals, Interrupt Handlers, Device Drivers.

**Unit 11: Protection [6 hours, 5 marks]**

Needs for protection, domain of protection, Example in UNIX, access matrix, Implementation of Access matrix

**Unit 12: Security [6 hours, 5 marks]**

The security problem, Authentication, Password, password vulnerabilities, Encrypted password, One time password(OTP), Biometrics and its types, Intrusion detection (definition only).

**Unit 13: Multiprocessor Systems [8 hours, 6 marks]**

Types of Multiprocessor Operating Systems, Multiprocessor OS Functions and Requirements, Multiprocessor synchronization

**Unit 14: Distributed Operating Systems [8 hours, 5 marks]**

Distributed Processing, Coping with Failures Models of Distributed systems, Remote procedure calls, distributed Shared Memory, Distributed File Systems.

**Unit 15: Introduction to Multiprogramming System [6 hours, 5 marks]**

Queue management, I/O supervisors, memory management. File system, Disk and Drum Scheduling.

\*\*\*\*

**M.SC.IT (S3) 12: System Analysis and Design**  
**4 credits: 120 hours of learning**

**Unit 1: System Concept [8 hours, 8 marks]**

System definition, Characteristics of a system: Organization, Interaction, Interdependence, integration, Elements of a system: inputs and outputs, Processors, control, feedback, environment, boundaries and interface, Types of systems: Physical or abstract system, open or closed system.

**Unit 2: System Development Life Cycle [10 hours, 8 marks]**

Introduction, Recognition of need, Feasibility study, Analysis, design, implementation, post implementation and maintenance, consideration for candidate system, prototyping,

**Unit 3: Role of System Analyst [8 hours, 6 marks]**

Introduction, Interpersonal skill, academic and professional qualification, multifaceted role of the analyst, analyst/user interface, conflict resolution, place of analyst in the MIS organization

**Unit 4: System Planning and Initial Investigation [10 hours, 8 marks]**

Introduction, bases for planning in system analysis, dimensions of planning, strategic MIS planning, Managerial and operational MIS planning, initial investigation, needs identification, determining the user's information requirements, background analysis, fact finding, review of written documents, on site observations

**Unit 5: Information Gathering [8 hours, 6 marks]**

Introduction, types of information needed, information about the organization, information about user staff, information about work flow, origin of information, review of literature, procedures and forms, interviews and questionnaires

**Unit 6: Tools of Structured Analysis [10 hours, 8marks]**

Introduction, Data flow diagram (DFD), DFD symbols, constructing a DFD, data dictionary, structured English, decision tree, decision table

**Unit 7: Feasibility Study [8 hours, 8 marks]**

Introduction, system performance definition, statements of constraints, identification of specific system objectives, feasibility consideration: economic feasibility, technical feasibility, behavioral feasibility, steps in feasibility analysis, feasibility report

**Unit 8: Cost/Benefit Analysis [6 hours, 5 marks]**

Introduction, data analysis, cost and benefit categories, procedure for cost/benefit determination

**Unit 9: The Process and Stages of System Design [10 hours, 8 marks]**

Introduction, The process of design : Logical and physical design, design methodologies, structured design, functional decomposition, Forms driven methodology, HIPO and IPO chart

**Unit 10: Input/Output and Form Design [8 hours, 6 marks]**

Introduction, Input design, input data, source data, input media and devices, online data entry, formatted form, screen design, output design, form design, requirements of form design, types of form, box design

**Unit 11: Database Design [10 hours, 8 marks]**

Introduction, objective of database, key terms in database, Logical and physical views of data, schemas and subschemas, Types of relationships, Types of data structure : hierarchical, network, relational, entity and attributes, role of dataset administrators, Normalization

**Unit 12: System Testing [6 hours, 6 marks]**

Introduction, Need for system testing, nature of test data, test plan, activity network for system testing, types of system test

**Unit 13: Quality Assurance [6 hours, 5 marks]**

Introduction, quality factor specification, levels of quality assurance, software requirement specification, software design specification.

**Unit 14: Implementation [6 hours, 5 marks]**

Introduction, conversion, activity network for conversion, file conversion, creating test files, training aids

**Unit 15: Project Scheduling [6 hours, 5 marks]**

Introduction, reason for system failure, project management, Planning tools: Gantt charts, program evaluation and review techniques (PERT), project management software.

\*\*\*\*\*

**M.SC.IT (S4) 13: Programming in Java  
4 credits: 120 hours of learning**

**Unit 1: Introduction to JAVA [5 hours, 4 marks]**

An overview of JAVA, Basic features of Java, JAVA Environment, Installing the Java SDK, Writing Java Programs

**Unit 2: Operators and Assignments [8 hours, 5 marks]**

Introduction, Assignment operator, Comparison Operators, Instance of Comparison, Arithmetic operators, Shift operator, Bitwise operator, Logical operator, bitwise operator, conditional operator, casting.

**Unit 3: Programming Basic [8 hours, 7 marks]**

Java Token & Keywords, Constants, Data types; Declaring a variable, The scope and lifetime of variable, Various Operators, Input/Output statements Decision Making and Control Statements : if statement, If-else, else-if, switch statement; for, while, do-while statements

**Unit 4: Class in Java [9 hours, 8 marks]**

Class fundamentals: Defining class, Accessing class members, Declaring objects, Passing Arguments to Methods, Returning Multiple Values from methods, Modifiers

**Unit 5: OOP in Java [10 hours, 6 marks]**

Class fundamentals: Defining class, Accessing class members, Declaring objects, Constructors, copy constructor; Passing Arguments to Methods, modifiers, Inheritance: the super class, Multilevel Inheritance, Final and abstract keyword, Static Members

**Unit 6: Arrays, Strings and Vectors [8 hours, 8 marks]**

Declaring Arrays, Creating Arrays, Initializing Arrays, Multi-Dimensional Arrays, Strings: string arrays, string methods, String Buffer class, Vectors

**Unit 7: Interfaces and Packages [8 hours, 6 marks]**

Interfaces: Defining an Interface, Implementing interfaces, Applying Interfaces, Packages: Defining a package, Accessing and Importing Packages

**Unit 8: Threads [8 hours, 6 marks]**

Introduction, new threads, creating new threads by extending the thread class, creating a thread by implementing Runnable Interface, Threads in the Running State, Sleeping and Interruptions, Signaling with wait, notify

**Unit 9: The java.lang.Math class [8 hours, 5 marks]**

Introduction, Methods of the java.lang.Maths: abs, ceil, floor, max, min, random, round, sin, cos, tan, sqrt, exp, log, pow.

**Unit 10: Exception Handling [8 hours, 8 marks]**

Exception Handling fundamentals, Exception types, Using *try* and *catch*, built-In exceptions in Java, User-defined exception

**Unit 11: File Handling [8 hours, 7 marks]**

I/O Basics: Streams, The Stream classes, The predefined streams, Reading console input, Writing console output, Reading and writing files

**Unit 12: Introduction to Applets [8 hours, 8 marks]**

Applets and the World Wide Web, The Applet Class, Applets and HTML , The Life Cycle of an Applet, Using Window Components, Event Handling, Adding Audio and Animation

**Unit 13: AWT and Swings [8 hours, 8 marks]**

AWT Basics, AWT Components, Event Handling, Application and Menus; Introduction to Swings, Swing Components, Event Handling, Display text and image in a window, Layout manager

**UNIT 14: Introduction to JDBC [8 hours, 7 marks]**

Basic steps to JDBC, API, JDBC Drivers, Connection Management, JDBC Design Considerations, Two Tier and Three Tier client server model, ResultSet, Prepared statement and callable statement, ResultSet Meta Data Object.

**Unit 15: Database programming using Java [8 hours, 7 marks]**

Keeping MySQL or NoSQL as backend and using java as front end good GUI should design to insert, update and delete record on a database table

\*\*\*\*\*

**M.SC.IT (S4) 14: Computer Graphics  
4 credits: 120 hours of learning**

**Unit 1: Introduction to Computer Graphics [5 hours, 5 marks]**

Definition, Application Areas of Computer Graphics (CAD, CAM, Education and Training, Entertainment, Image Processing, Computer Art etc.), Graphical User Interfaces (GUI)

**Unit 2: Graphics Systems [5 hours, 5 marks]**

Cathode Ray Tubes, Random Scan Displays, Raster Scan Displays, Color CRT Monitors, Flat-Panel Displays (Plasma-Panels, Liquid Crystal Displays(LCD), Electroluminescent displays), Graphics Software (GKS, PHIGS)

**Unit 3: Line Drawing Algorithms [8 hours, 7 marks]**

Points and Lines, Line Drawing Algorithms (DDA Algorithm, Bresenham's Line Algorithm)

**Unit 4: Circle and Ellipse Drawing Algorithms [8 hours, 7 marks]**

Circle drawing algorithms, Ellipse Drawing algorithms

**Unit 5: Filled area algorithms [8 hours, 6 marks]**

Filling (Scan-Line Polygon filling, Inside outside tests, Boundary-fill and Flood-fill algorithm)

**Unit 6: Transformations [10 hours, 8 marks]**

Basic 2-D Transformations (Rotation, Reflection, shearing, scaling), Homogeneous Coordinate Representation, Translation, 3-D transformations

**Unit 7: 2-D Viewing [10 hours, 8 marks]**

2-D Viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions

**Unit 8: Clipping Algorithms [10 hours, 8 marks]**

Line and polygon clipping algorithms (Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm)

**Unit 9: 3-D Object representation [10 hours, 8 marks]**

3-D Object representation: Polygon surfaces, quadric surfaces, spline representation, Basic illumination models, polygon rendering methods

**Unit 10: Bezier and B-spline curves [9 hours, 7 marks]**

Hermite curve, Bezier curve and B-spline curves, Bezier and B-spline surfaces

**Unit 11: Projections [9 hours, 8 marks]**

Projection Classification, Parallel projections, Perspective projections (One point, Two point), Hidden Layer Projection

**Unit 12: 3-D Geometric transformations [8 hours, 8 marks]**

Translation, rotation, scaling, reflection and shear transformations, composite transformations

**Unit 13: 3-D viewing [8 hours, 5 marks]**

Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping

**Unit 14: Basics in Animation [6 hours, 5 marks]**

Animation Basic, Computer Animation, Principles of Animation, Types of Animation, Animation Software (Maya, etc) and Hardware, Common Terms in Animation

**Unit 15: Animation Designing [6 hours, 5 marks]**

Design of Animation sequence, Morphing, Application of Computer Animation, Future of Animation

\*\*\*\*\*

**M.SC.IT (S4) 15: Linux System Administration**  
**4 credits: 120 hours of learning**

**Unit 1: Introduction to System Administration [6 hours, 5 marks]**

Introduction to System Administration, Role of System Administrator, Qualities of good System Administrator, System Administration Common administrative tasks, identifying administrative files – configuration and log files

**Unit 2: Introduction to LINUX Operating System [7 hours, 5 marks]**



Basic idea on Proprietary, Open Source, Free Software etc, Basic Features of the Linux operating system, Introduction of Various Linux Distribution (Red Hat Enterprise Linux, Cent OS, Fedora Projects, Debian Linux, Ubuntu, SUSE etc.)

**Unit 3: Installation of LINUX Operating System [10 hours, 5 marks]**

Installation Requirements, Partitioning the Hard drive in Linux, Installing the Linux system: Using Live CD, Virtual Machine, Direct Installation, Installing and Configuring software in Linux

**Unit 4: LINUX Kernel [10 hours, 8 marks]**

Linux kernel and device drivers, System Startup and Shutdown, Standard I/O, Standard error, Redirection and Piping

**Unit 5: Basics of LINUX File System [8 hours, 7 marks]**

Basics of Linux file system - File system types (ext3, ext4, xfs, jfs, ReiserFS, iso9660 etc.), Boot block, Super block, Inode table, Data blocks, How Linux access files, storage files, Linux standard directories, LILO, GRUB Boot Loader, three basic types of files (ordinary or regular, special or device and directory), I-nodes and file attributes, init and run levels

**Unit 6: File organization [7 hours, 8 marks]**

Files and File System (File Types and Permissions, Links, Size and Space, Date and Time); Working with Files: Reading Files, Searching for files, Copying, Moving, Renaming, Deleting, Linking, and Editing Files; Absolute and Relative path names, File system Mounting and Unmounting, Organization of the file tree, Standard directories and their contents, Disk related commands, checking disk free spaces.

**Unit 7: LINUX File Handling Commands [8 hours, 7 marks]**

Files and Directory handling Commands - ls, cd, cp, mv, rm, mkdir, rmdir, pwd, Commands for Creating and Viewing ordinary files – cat, more, less, pg

**Unit 8: LINUX Filter Commands [8 hours, 8 marks]**

Filter Commands – wc, head, tail, cut, tr, top, grep (with regular expressions),. Other commands –tar, unzip, nice, kill, netstat. Setting user and group ownership of files and Access permissions – chmod, chown, chgrp commands

**Unit 9: LINUX Shells [10 hours, 8 marks]**

Various types of Shell available in Linux, Comparisons between various Shells, Study of different Linux Shells (sh, bash, csh, zsh), Environment variables, Shell script basics (examples of some simple shell programming), Shell programming in bash, read command, conditional and looping statements, case statements, parameter passing and arguments, Shell variables, system shell variables, shell keywords, creating Shell programs for performing various tasks.

**Unit 10: Process [7 hours, 7 marks]**

Services and Process, Basic commands for starting and stopping processes, Basic process attributes and their role in Access control. Examining the list of running processes on the system

and understand the data presented there. Background process, Job control, Crontab file format, Backup and Restore procedure

**Unit 11: Printing Jobs [5 hours, 4 marks]**

Submit a print job, check the status of a print job, cancel a print job, configuring the Print Queue, Selecting the Print Driver, Editing the Printer configuration

**Unit 12: System Administration Tasks [10 hours, 8 marks]**

Getting Started: Login process, Creating Users Account and Group, Getting Help, Understanding the “root” account, Managing user accounts-adding, modifying and removing User accounts, changing permissions and ownerships, Creating and managing groups, modifying group attributes, becoming super user using su; limited su (sudo) Changing Password, System monitoring and logging, Monitoring memory usage, disk space usage and I/O activity, Temporary disable user’s accounts, creating and mounting file system, checking and monitoring system performance file security & Permissions, Getting system information with uname, host name, disk partitions & sizes, users, kernel. Backup and restore files, reconfiguration hardware with kudzu, installing and removing packages in Linux. Configure X-windows starting & using X desktop. KDE & Gnome graphical interfaces, changing X windows settings.

**Unit 13: Networking in LINUX [8 hours, 7 marks]**

Installation and configuration of a simple LAN; Installation and configuration of: Proxy server(Squid), DNS server(BIND), Mail server, Web server(Apache), File server(Samba), DHCP server; Installation and configuration of a SSH server and client; Installation and configuration of FTP server and client, rules governing IP address classes and netmasks, Network Address, Netmask and Gateway configuring Interface with ifconfig, ping, netstat, traceroute, telnet, understanding the significance of the /etc/services file and well known port numbers

**Unit 14: Network Protocols [8 hours, 7 marks]**

Basics of configuring NFS, NIS, DNS, FTP, Squid Proxy, DHCP server, ip tables and firewall

**Unit 15: Basic Network Security Issues [8 hours, 6 marks]**

Introduction to Basic Network Security Issues, Packet Sniffers, DOS Attacks, Linux Kernel Firewalling, Virtual Private Networks

\*\*\*\*\*

**M.Sc.IT (S4) 16: Major Project  
4 credits: 120 hours of learning**

The guidelines for the project are enclosed in Annexure III.

\*\*\*\*\*

### **ANNEXURE III PROJECT GUIDELINES**

#### **A. PROJECT GUIDE ELIGIBILITY CRITERIA:**

Full Time Faculties in the Department of Computer Science/ Information Technology of KKHSOU/ Colleges/ Institutions affiliated to any Indian University recognized by UGC and having minimum 2 years teaching experience.

OR

A person having minimum M.Tech., MCA, M.Sc. in Computer Science/Information Technology from a UGC recognized universities with 4 years experience in Industry/teaching.

#### **B. TYPE OF PROJECT**

Learner may choose any topics according to M.Sc.IT standards. Most of the project work falls under the following types

- a. Database oriented (e.g. payroll system, Loan management system etc.)
- b. Application oriented (e.g. Mobile apps development, web based development)
- c. R & D project (e.g. Image processing, speech processing, data mining, networking etc)

#### **C. PROJECT PROPOSAL (SYNOPSIS)**

The project proposal or the synopsis is the frame work for carrying out the project. It should be prepared in consultation with Guide. The necessary parts of a project proposal is given in the following form:

- \* Title of the Project.
- \* Introduction and Objectives of the Project.
- \* Project Category (RDBMS/ Application/ R & D).
- \* Tools, Platform, Hardware and Software Requirement specifications.
- \* Whether the project is done for any Industry/Client? The Name and Address of the Industry or Client is to be mentioned.

\* Methodology

Expected output

\* Conclusion

#### **D. APPLICATION AREAS & RELATED TOOLS**

A list of selected area for developing the project work is given below:

**APPLICATIONS** : Financial/ Manufacturing/ Multimedia/ Computer Graphics/ Instructional Design/ DatabaseManagement System/ Internet/ Intranet/ Computer Networking-Communication Software/E-Commerce/TCP/IP Internals/ Routing protocols/ Implementation of Switches & Routers/ Image processing,/ Mobile apps development/ etc..

#### **Related Tools :**

**FRONT END / GUI Tools** : PhP, Scripting languages etc.

**RDBMS/BACK END** : Oracle, MYSQL, No SQL, DB2 etc.

**LANGUAGES** : C, C++, Java, VC++, C#, Matlab, Python, Scilab etc.

**INTERNET TECHNOLOGIES** : DHTML, Java script, VB Script, HTML, Java, Active X, SWING, JSP,ASP, PHP, XML, Java Beans, Java Servlets, CSS, VB.Net,AWT, J2EE.

**NETWORKING TECHNOLOGIES** : ATM, Frame Relay, TCP/IP, SNMP, GSM, VoIP, PPP, IP-PSTN, SONET/SDH

**WIRELESS TECHNOLOGIES** : BlueTooth, 3G, ISDN, EDGE

**OPERATING SYSTEMS** : WINDOWS/ DOS / UNIX / LINUX /ANDROID.

#### **PROJECT REPORT GUIDELINE**

The Project report should prepared in well structured preferably typed in Latex. Depending on the type of project the report should be as follows

#### **Database project:**

Acknowledgement

Content with page number

Declaration Certificate

Certificate from Guide

#### **CHAPTER I : INTRODUCTION**

- 1.1 Brief idea about the project
- 1.2 Objective of the project
- 1.3 Scope of the project
- 1.4 Existing system
- 1.5 Proposed System
- 1.6 Platform used(Hardware & Software)
- 1.7 Project location

## **CHAPTER II : REQUIREMENT ANALYSIS**

- 2.1 Introduction
- 2.2 Tools used for Requirement gathering
- 2.3 Problem in Existing System
- 2.4 Conclusion

## **CHAPTER III : LOGICAL DESIGN**

- 3.1 Introduction
- 3.2 DFD(0<sup>th</sup>, 1<sup>st</sup>, 2<sup>nd</sup> level)
- 3.3 ER diagram
- 3.4 Use case diagram
- 3.5 Activity diagram
- 3.6 Conclusion

## **CHAPTER IV : PHYSICAL DESIGN**

- 4.1 Introduction
- 4.2 Database Design(Give your normalized database here)
- 4.3 Module design
- 4.4 Input/output design
- 4.5 Conclusion

## **CHAPTER V : IMPLEMENTATION**

- 5.1 Introduction
- 5.2 Process description (if any)
- 5.3 Output & Report
- 5.4 Conclusion

## **CHAPTER VI : TESTING**

- 6.1 Introduction
- 6.2 Types of testing performed
- 6.3 Conclusion

References

Appendix(if any)

## **R & D/ Application project:**

Acknowledgement

Content with page number

Declaration Certificate

Certificate from Guide

## **CHAPTER I : INTRODUCTION**

- 1.1 Brief idea about the project

- 1.2 Objective of the project
- 1.3 Scope of the project
- 1.4 Application of the project
- 1.5 Proposed System
- 1.6 Platform used(Hardware & Software)
- 1.7 Project location

## **CHAPTER II : LITERATURE REVIEW**

- 2.1 Introduction
- 2.2 Work already done in the area(Historical evidence)
- 2.3 Problem in Existing technology
- 2.4 Conclusion

## **CHAPTER III : THEORITICAL BACKGROUND**

- 3.1 Introduction
- 3.2 Theory used in the project
- 3.3 Conclusion

## **CHAPTER IV : RESULT AND DISCUSSION**

- 4.1 Introduction
- 4.2 Methodology
- 4.3 Result
- 4.4 Analysis on result
- 4.5 Conclusion

## **CHAPTER VI : Conclusion & Future work**

- 6.1 Introduction
- 6.2 Chapter wise conclusion
- 6.3 Future work

References

Appendix(if any)

[Note: All project reports(soft copy) must send to Computer Science Department, KKHSOU in the following email address [csc@kkhsou.in](mailto:csc@kkhsou.in)]

## CERTIFICATE OF ORIGINALITY FROM THE GUIDE

This is to certify that the project report entitled

.....  
 submitted to **Krishna Kanta Handiqui State Open University** in partial fulfilment of the requirement for the award of the degree of **MASTER OF SCIENCE IN INFORMATION TECHNOLOGY(M.Sc.IT)**, is an original work carried out by Mr./Ms..... Enrolment No.: ..... under the supervision of Dr./Mr./Ms.....

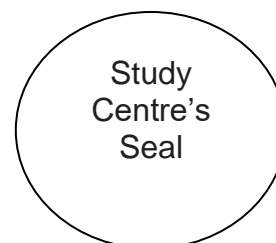
The matter embodied in this project is a genuine work done by the student and has not been submitted either to this University or to any other University/Institute for the fulfilment of the requirement of any course of study.

Signature of the Learner

Signature of the Guide

Name  
 Address  
 Enrolment No.:

Name  
 Designation  
 Address



**FORMAT OF THE PROJECT REPORT**

A Project Report on \_\_\_\_\_

Font type: Arial  
Size: 12, Bold

**TITLE OF THE PROJECT** \_\_\_\_\_

Font type: Arial  
Size: 16, Bold

In fulfillment of the requirement for the 6th Semester of  
Master of Science in Information Technology  
Programme



Submitted by

.....  
**(Name of the Learner)**  
Enrollment No.: .....  
Session: .....

Font type:  
Arial

Under the Guidance of

.....  
**(Name of the Project Guide)**

Study Centre

.....  
**(Name of the Study Centre)**

.....  
**(Location)**