HSNC UNIVERSITY, MUMBAI

Board of Faculty of Science & Technology

Board of Studies in the Subject of **Information Technology** Subject

1.) Name of Chairperson/Co-Chairperson/Coordinator: -

a) Dr. Rakhi O. Gupta : Chairperson (Assistant Professor and Head, Department of IT, K.C College, Churchgate)
rakhi.gupta@kccollege.edu.in 9619914191.

2.) Two to five teachers each having minimum five years teaching experience amongst the full-time teachers of the Departments, in the relevant subject.

a) Ms. Pragati V.Thawani : Co- Chairperson (Assistant Professor,Department of IT, K.C College, Churchgate**) pragati.thawani@kccollege.edu.in 9960782000.**

3.) One Professor / Associate Professor from other Universities or professor / Associate Professor from colleges managed by Parent Body; nominated by Parent Body; -

a.) **Dr**.**Rasika S. Mallya** (Associate Professor, Navinchandra Mehta Institute of Technology & Development, Mumbai.) rasikamallya@gmail.com **9819682436.**

4.) Four external experts from Industry / Research / eminent scholar in the field relevant to the subject nominated by the Parent Body;
a.) Dr. Hiren Dand (Head of Department (IT), Mulund College of Commerce) **Hiren.dand@mccmulund.ac.in 9821140717.**

b.) **Mr. Asif K. Rampurawala** (Vice Principal, Vidyalankar School of Information Technology)**asif.rampurawala@vsit.edu.in 9820765273.**

c.) **Mr. Kaushal Shah** (**Senior Manager Reliance Power Ltd.**)
Kaushalshah78@gmail.com 9869069203.

d.) **Mr. Prabhav Daga**(Proprietor &Partner Curaksha, Gianda Trading Solutions, LLP.)
prabhav@curaksha.com **9820809884.**

5.) Top rankers of the Final Year Graduate and Final Year Post Graduate examination of previous year of the concerned subject as invitee members for discussions on framing or revision of syllabus of that subject or group of subjects for one year.

a.) **Ms. Suwati Singh** (Undergraduate student- 18-19)

Contact - **8451926698**
Suwatisingh10@gmail.com

b.) **Ms. Sonali Tiwari** (Postgraduate student -18-19)

Contact - **8080452813**
 Sonali.tiwari0845@gmail.com

Part –I

Outline of Choice Based Credit System as outlined by University Grants Commission:

R. **** : The Definitions Of The Key Terms Used In The Choice Based Credit System And Grading System Introduced From The Academic Year 2020-2021 Are As Under:

1. **CoreCourse:** A course, which should compulsorily be studied by a candidate as a core requirement is termed as aCore course.

2. **Elective Course:** Generally, a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective Course.

   2.1 **Discipline Specific Elective (DSE) Course:** Elective courses may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective. The University/ Institute may also offer discipline related Elective courses of interdisciplinary nature (to be offered by main discipline/subjecttofstudy).

   2.2 **Dissertation/Project:** An elective course designed to acquire special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher/faculty member is called dissertation/project. A Project/Dissertation work would be of 6 credits. A Project/Dissertation work maybegiveninlieuofadisciplinespecific elective paper.

   2.3 **Generic Elective (GE) Course:** An elective course chosen generally from anunrelated discipline/subject,withanintentiontoseekexposure is called a Generic Elective.
   P.S.: Acorecourseofferedinadiscipline/subjectmaybetreatedasan electiveby otherdiscipline/subjectandviceversaandsuchelectivesmay also be referred toas Generic Elective.

3. **Choice Base Credit System :** CBCS allows students to choose inter- disciplinary, intra-disciplinary courses, skill orientedpapers(evenfromother disciplinesaccording totheirlearningneeds,interestsandaptitude)andmore flexibility forstudents.

4.   **Honours Program :** To enhance employability and entrepreneurship abilities among the learners, through aligning Inter Disciplinary / Intra Disciplinary courses with Degree Program. Honours Program will have
40 additional credits to be undertaken by the learner across three years essentially in Inter / Intra Disciplinary course.

A learner who joins Regular Undergraduate Program will have to opt for Honours Program in the first year of the Program. However, the credits for honours, though divided across three years can be completed within three years to become eligible for award of honours Degree.

5.   **Program:** A Program is a set of course that are linked together in an academically meaningful way and generally ends with the award of a Degree Certificate depending on the level of knowledge attained and the total duration of study, B.Sc. Programs.

6.   **Course:** A 'course' is essentially a constituent of a 'program' and may be conceived of as a composite of several learning topics taken from a certain knowledge domain, at a certain level. All the learning topics included in a course must necessarily have academic coherence, i.e. there must be a common thread linking the various components of a course. A number of linked courses considered together are in practice, a 'program'.

7.   **Bridge Course:** Bridge course is visualized as Pre semester preparation by the learner before commencement of regular lectures. For each semester the topics, whose knowledge is considered as essential for effective and seamless learning of topics of the Semester, will be specified. The Bridge Course can be conducted in online mode. The Online content can be created for the Bridge Course Topics.

8.   **Module and Unit:** A course which is generally an independent entity having its own separate identity, is also often referred to as a 'Module' in today's parlance, especially when we refer to a 'modular curricular structure'. A module may be studied in conjunction with other learning modules or studied independently. A topic within a course is treated as a Unit. Each course should have exactly 3 Units.

9.   **Self-Learning: 20% of the topics will be marked for Self-Learning.** Topics for Self-Learning are to be learned independently by the student, in a time- bound manner, using online and offline resources including online lectures, videos, library, discussion forums, fieldwork, internships etc.

Evaluative sessions (physical/online), equivalent to the credit allocation of the Self Learning topics, shall be conducted, preferably, every week for each course. Learners are to be evaluated real time during evaluative sessions. The purpose of evaluative sessions is to assess the level of the students' learning achieved

in the topics earmarked for Self-Learning.

The teacher's role in these evaluative sessions will be that of a Moderator and Mentor, who will guide and navigate the discussions in the sessions, and offer concluding remarks, with proper reasoning on the aspects which may have been missed by the students,inthecourseoftheSelf-Learningprocess.

The modes to evaluate self-learning can be a combination of the various methods such as written reports, handouts with gaps and MCQs, objective tests, case studies and Peer learning. Groups can be formed to present self- learning topics to peer groups, followedby Question and Answer sessions and open discussion. The marking scheme for Self-Learning will be defined under Examination andTeaching.

The topics stipulated for self-learning can be increased or reduced as per the recommendations of the Board of Studies and Academic Council from time to time. All decisions regarding evaluation need to be taken and communicated to the stakeholders preferably before the commencement of a semester. Some exceptions maybemadein exigencies,likethecurrentsituationarisingfromthe lockdown,butsuch ad hoc decisionsareto bekept totheminimumpossible.

10 **Credit Point:** Credit Point refers to the 'Workload' of a learner and is an index of the number of learning hours deemed for a certain segment of learning. These learning hours may include a variety of learning activities like reading, reflecting, discussing, attending lectures / counseling sessions, watching especially prepared videos, writing assignments, preparing for examinations, etc. Credits assigned for a single course always pay attention to how many hours it would take for a learner to complete a single course successfully. A single course should have, by and large a course may be assigned anywhere between 2 to 8 credit points wherein 1 credit is construed as corresponding to approximately 15 learning hours.

11. **Credit Completion and Credit Accumulation:** Credit completion or Credit acquisition shall be considered to take place after the learner has successfully cleared all the evaluation criteria with respect to a single course. Thus, a learner who successfully completes a 4 CP (Credit Point) course may be considered to have collected or acquired 4 credits. learner level of performance above the minimum prescribed level (viz. grades / marks obtained) has no bearing on the number of credits collected or acquired. A learner keeps on adding more and more credits as he completes successfully more and more courses. Thus, the learner 'accumulates' coursewise credits.

12. **Credit Bank:** A Credit Bank in simple terms refers to stored and dynamically updated information regarding the number of Credits obtained by any given learner along with details regarding the course/s for which Credit has been given, the course-level, nature, etc. In addition, all the information regarding the number of Credits transferred to different programs or credit exemptions given may also be stored with the individual's history.

13. **Credit Transfer:** (performance transfer) When a learner successfully completes a program, he/she is allowed to transfer his/her past performance to another academic program having some common courses and Performance transfer is said to have taken place.

14. **Course Exemption:** Occasionally, when two academic programs offered by a single university or by more than one university, may have some common or equivalent course-content, the learner who has already completed one of these academic programs is allowed to skip these 'equivalent' courses while registering for the new program. The Learner is 'exempted' from 'relearning' the common or equivalent content area and from re-appearing for the concerned examinations. It is thus taken for granted that the learner has already collected in the past the credits corresponding to the exempted courses.

Part-II

O***** The fees for transfer of credits or performance will be based on number of credits that a learner has to complete for award of the degree.

The Scheme of Teaching and Examination:

Theperformanceofthelearnersshallbeevaluatedintwocomponents: Internal Assessment with 40% marks by way of continuous evaluation and by Semester End Examination with 60% marks by conducting the theory examination.

INTERNAL ASSESSMENT:- It is defined as the assessment of the learners on the basis of continuous evaluation as envisaged in the credit based system by way of participation of learners in various academic and correlated activities in the given semester of the programme.

A). Internal Assessment– 40%   **40 marks**

Practical's (internal Components of the Practical Course

1. **For Theory Courses**

Sr. No.	Particulars	Marks
1	**ONE**classtest/onlineexaminationtobeconductedin the givensemester	15 Marks
2	One assignment based on curriculum(to be assessed by the teacher Concerned	10 Marks
3	Self-Learning Evaluation	10 Marks
4	Active participation in routine class instructional deliveries	05 Marks

2. For Courses with Practicals

Each practical course can be conducted out of 50 marks with 20 marks for internal and 30 marks for external

Practical's (Internal component of the Practical Course)

Sr. No	Evaluation type	Marks
1	Two Best Practicals /Assignments/Presentation /Preparation of models/ Exhibits **Or** One Assignment/ project with class presentation to be assessed by teacher concerned	10
2	Journal	05
3	Viva	05

The semester end examination (external component) of 60 % for each course will be as follows:

i) **Duration – 2 Hours** ii) **Theory Question**

Paper Pattern: -

1. There shall be four questions each of 15 marks. On each unit there will be one question and the fourth one will be based on entire syllabus.
2. All questions shall be compulsory with internal choice within the questions. (Each question will be of 20 to 23 marks with options.)
3. Question may be subdivided into sub-questions a, b, c… and the allocation of marks depend on the weightage of the topic.

The marks will be given for all examinations and they will be converted into grade (quality) points. The semester-end, final grade sheets and transcripts will have only credits, grades, grade points, SGPA and CGPA.

3. Project and Assignment:

- Project or Assignment, which can in the following forms
  - Case Studies
  - Videos
  - Blogs
  - Research paper (Presented in Seminar/Conference)
    Field Visit Report

- Presentations related to the subject (Moot Court, Youth Parliament, etc.)
- Internships (Exposition of theory into practice)
- Open Book Test
- any other innovative methods adopted with the prior approval of Director Board of Examination and Evaluation.

4. Self-Learning Evaluation

- **20% OF THE TOPICS OF CURRICULUM ARE LEARNED BY THE STUDENT THROUGH SELF LEARNING USING ONLINE / OFFLINE ACADEMIC RESOURSE SPECIFIED IN THE CURRICULUM.**
- **HENCE 20% OF THE LECTURES SHALL BE ALLOCATED FOR EVALUATION OF STUDENTS ON SELF LEARNING TOPICS**
- The identified topics in the syllabus shall be learnt independently by the students in a time bound manner preferably from online resources. Evaluative sessions shall be conducted by the teachers and will carry 10 Marks.

CLUB The self-learning topics into 3-4 GROUPS OF TOPICS ONLY FOR EVALUATION.

- **PRESCRIBE TIME DURATION (IN DAYS) FOR COMPLETION OF EACH GROUP OF TOPIC AND EARMARK SELF LEARNING EVALUATION LECTURES IN THE TIMETABLE. HENCE EACH GROUP OF TOPIC CAN BE ASSIGNED 3 REGULAR LECTURES FOR THIS EVALUATION FOR ENTIRE CLASS**

3 Sub Topics

Each evaluative session shall carry 3 Marks (3 x 3 Units = 9 Marks). Students who participate in all evaluative sessions shall be awarded 1 additional Mark.

4 Sub Topics

Each evaluative session shall carry 2.5 Marks (2.5 x 4 Units = 10 Marks)

- **EVALUATION OF SELF LEARNING TOPICS CAN COMMENCE IN REGULAR LECTURES ASSIGNED FOR SELF LEARNING EVALUATION IN THE TIMETABLE**

3 Evaluative sessions

Each evaluative session shall carry 3 Marks (3 x 3 = 9 Marks). Students who participate in all evaluative sessions shall be awarded 1 additional Mark.

4 Evaluative sessions

Each evaluative session shall carry 2.5 Marks (2.5 x 4 = 10

Marks). Methods for Evaluation of Self-learning topics:

− Seminars/presentation(PPTor poster),followedby Q&A − Objective questions /Quiz / Framing of MCQ

questions.
- Debates
- Group discussion
- You-Tubevideos(Marksshallbebasedonthequalityand viewership)
- Improvisation of videos
- Viva Voce
Any other innovative method

TEACHERS CAN FRAME OTHER METHODS OF EVALUATION ALSO PROVIDED THAT THE METHOD, DULY APPROVED BY THE COLLEGE EXAMINATION COMMITTEE, IS NOTIFIED TO THE STUDENTS AT LEAST 7 DAYS BEFORE THE COMMENCEMENT OF THE EVALUATION SESSION AND IS FORWARDED FOR INFORMATION AND NECESSARY ACTION AT LEAT 3 DAYS BEFORE THE COMMENCEMENT OF THE EVALUATION SESSION

SEMESTER END EXAMINATION: - It is defined as the examination of the learners on the basis of performance in the semester end theory / writtenexaminations.

B.SemesterEndExamination-60%   *60 Marks*

1)   Duration – These examinations shall be of 2 Hours duration.
2)   Question Paper Pattern: -
   i.   Thereshallbefourquestions each of 15 marks.
   All questions shall be compulsory with internal choice within the questions.
   iii.   Questionmaybesub-dividedintosub-questionsa, b,c, d&e onlyandthe allocation of marks depends on the weightage of thetopic.

THE MARKS OF THE INTERNAL ASSESSMENT SHOULD NOT BE DISCLOSED TOTHE STUDENTSTILLTHE RESULTS OFTHE CORRESPONDINGSEMESTERISDECLARED.

HSNC University Mumbai

(2020-2021)

Ordinances and Regulations

With Respect to

Choice Based Credit System

(CBCS)

For the Programmes Under

The Faculty of Science and Technology

For the Course

Information Technology

Curriculum – First Year Undergraduate Programmes

Semester-I and Semester -II

2020-2021

Section D

Information Technology

Part 1 - Preamble

The B.Sc. Information Technology program is started with an aim to make the students employable and impart industry-oriented training.

1. **Course Objective:** The main objectives of the course are:
- To think analytically, creatively and critically in developing robust, extensible and highly maintainable technological solutions to simple and complex problems related to human, technology and environmental factors.
- To apply their knowledge and skills to be employed and excel in IT professional careers and/or to continue their education in IT and/or related post graduate programs.
- To be capable of managing complex IT projects with consideration of various factors.
- To work effectively as a part of a team to achieve a common stated goal.
- To adhere to the highest standards of ethics, including relevant industry and organizational codes of conduct.
- To communicate effectively with a range of audiences both technical and non-technical.
- To develop an aptitude to engage in continuing educational and professional development.

  The syllabi is aimed to achieve the following objectives. The syllabus spanning three years covers the industry endorsed relevant courses. The students will be ready for the jobs available in different fields like:

- Software Development
- Website Development
- Mobile app development
- Embedded Systems Programming
- Embedded Systems Development

- Software Testing
- Networking
- Database Administration
- System Administration
- Cyber Law Consultant
- GIS (Geographic Information Systems)
- Introduction to Unity and C# in Unity
- IT Service Desk
- Security
- Digital Marketing
- Machine Learning
- Artificial Intelligence
- Graphics and Animation
- And many others

Students will also be trained in communication skills, green computing and will be sent to work in industry as interns.

2. Process adopted for curriculum designing:

The Department conducted multiple meetings with academic partners, industry partners. After discussion with them, personally, via mail, via messages, the changes in the syllabus were introduced.

3. Salient features, how it has been made more relevant:

After discussion and interaction with the industry partners and understanding the requirement of the industries certain changes in the syllabus are introduce.e.g. New subject 'Introduction to UNITY' is introduced as the industry is very favorable to gaming and Animation courses. Certain portion of mathematics syllabus is modified, and new subtopics are introduced in electronics subjects.

4. Learning Outcomes:

It is expected to improvise the soft skill, technical knowledge as well as hardware skills for the students. To keep them connected with latest changes in the field of Information Technology, new subject is introduced.

5. Input from stakeholders:

There are modifications suggested by the Industry personnel to make changes in the subject Mathematics. This has reduced the total span of the subject Mathematics over two years of course to one and half year. Electronic subjects are made more relevant to practical usage as compared to only study. Programming subjects are included with latest updated contents. New subject is added to give introduction of students to latest technology currently required as per the industry.

Part 2 - The Scheme of Teaching and Examination is as under:
Semester – I
Summary

Sr. No.	Choice Based Credit System			Subject Code	Remarks
1	Core Course (Information Technology)			US-FIT-101, US-FIT-102, US-FIT-103, US-FIT-104.	
				US-FIT-1P1, US-FIT-1P2, US-FIT-1P3, US-FIT-1P4.	
2	Elective Course	Discipline Specific Elective (DSE) Course			
		2.1	Interdisciplinary Specific Elective (IDSE) Course		
		2.2	Dissertation/Project		
		2.3	Generic Elective (GE) Course		
3	Ability Enhancement Compulsory Courses (AECC)			US-FIT-105	
				US-FIT-1P5	
	Skill Enhancement Courses (SEC)				

First Year Semester -I Internal and External Detailed Evaluation Scheme

Sr. No.	Subject Code	Subject Title	Periods Per Week (Period of 45min)						Internals				Total Marks
			Units	S. L.	L	T	P	Credit	S. L. E	CT+ AT= 15+5	PA	SEE	
1	US-FIT-101	Object Oriented Programming with C++	4	20%*	5	0	0	2	10	20	10	60	100
2	US-FIT-102	Digital Electronics	4	20%*	5	0	0	2	10	20	10	60	100
3	US-FIT-103	Operating System	4	20%*	5	0	0	2	10	20	10	60	100
4	US-FIT-104	Mathematics I	4	20%*	5	0	0	2	10	20	10	60	100
5	US-FIT-105	Professional Communication Skills	4	20%*	5	0	0	2	10	20	10	60	100
6	US-FIT-1P1	Practicals Based US-FIT-101	-	-	0	-	3	2				50 (40+10)	50
7	US-FIT-1P2	Practicals Based US-FIT-102	-	-	0	-	3	2				50 (40+10) 50 (40+10)	50
8	US-FIT-1P3	Practicals Based US-FIT-103	-	-	0	-	3	2				50 (40+10)	50
9	US-FIT-1P4	Practicals Based US-FIT-104	-	-	0	-	3	2				50 (40+10)	50

10	US-FIT-1P5	Practicals Based US-FIT-105	-	-	0	-	3	2				50 (40+10)	50
	Total Periods/ Credit		(25+45) per week/20					20					750

*One to two lectures to be taken for CONTINUOUS self -learning evaluation

First Year Semester I – Units – Topics- Teaching Hours

S.N	Subject Code & Title		Subject Unit Title	Lectures (45 min)	Total Lectures	Credit	Total Marks
1	US-FIT-101	1	Object Oriented Methodology, Principles of OOPS, Classes and Objects	15	60 L	2	100 (60+40)
		2	Constructors and Destructor, Program development using Inheritance, Virtual Functions	15			
		3	Polymorphism, Operator Overloading In C++	15			
		4	Working with Files, Exception Handling,Templates	15			
2	US-FIT-102	1	Number System, Binary Arithmetic	15	60 L	2	100 (60+40)
		2	Boolean Algebra and Logic Gates, Karnaugh Maps	15			
		3	Combinational Logic Circuits, Arithmetic Circuits, Multiplexer, Demultiplexer, Encoder and Decoder, Sequential Circuits, Flip-Flop	15			
		4	Counters, Shift Register, Memory organization and Signal Converters:	15			
3	US-FIT-103	1	Introduction, Processes and Threads	15	60 L	2	100 (60+40)
		2	Memory Management, File Systems	15			
		3	Input-Output, Deadlocks	15			
		4	Virtualization and Cloud, Multiple Processor Systems, Case Study, NACHOS (Not Another Completely Heuristic Operating System).	15			
4	US-FIT-104	1	Introduction, Set Theory, The Logic of Compound Statements, Elementary Number Theory and Methods of Proof	15	60 L	2	100 (60+40)
		2	Matrices, Sequences, Mathematical Induction, and Recursion	15			
		3	Functions, Relations	15			
		4	Counting and Probability	15			
5	US-FIT-105	1	The Seven Cs of Effective Communication, Understanding Business Communication	15	60 L	2	100 (60+40)
		2	Writing Business Documents, Developing Oral Skills:	15			
		3	Developing Skills for Business, Understanding Communication Needs, Specific Communication Needs	15			
		4	Presentation Process, Planning stage, Adding graphics to your presentation, Interactive hands on sessions on confidence building and placements. Continuous evaluation by the Teachers	15			
6	US-FIT-1P1	1	Practicals based on US-FIT-101 Object Oriented Programming with C++		36 L	2	50

					x3 batches= 108 lectures		
7	US-FIT-1P2	2	Practicals based on US-FIT-102 Digital Electronics		36 L x3 batches= 108 lectures	2	50
8	US-FIT-1P3	3	Practicals based on US-FIT-103 Operating System		36 L x3 batches= 108 lectures	2	50
9	US-FIT-1P4	4	Practicals based on US-FIT-104 Mathematics I		36 L x3 batches= 108 lectures	2	50
10	US-FIT-1P5	5	Practicals based on US-FIT-105 Professional Communication Skills		36 L x3 batches= 108 lectures	2	50
			TOTAL			20	750

- **Lecture Duration – 48 Minutes**
- **One Credit =15 Hours**

L: Lecture: Tutorials P: Practical Ct-Core Theory, Cp-Core Practical, SLE- Self learning evaluation CT-Commutative Test, SEE- Semester End Examination, PA-Project Assessment, AT-Attendance

Part 3: Detailed Scheme Theory

Curriculum Topics along with Self-Learning topics -To be covered, through self-learning mode along with the respective Unit. Evaluation of self-learning topics to be undertaken before the concluding lecture instructions of the respective UNIT

Course Code: US-FIT-101 Object Oriented Programming with C++

Unit	Content	No. of Lectures
1	**1.1 Object Oriented Methodology:** Introduction, Advantages and Disadvantages of Procedure Oriented Languages, what is Object Oriented? What is Object Oriented Development? Object Oriented Themes, Benefits and Application of OOPS. **1.2 Principles of OOPS:** OOPS Paradigm, Basic Concepts of OOPS: Objects, Classes, Data Abstraction and Data Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Message Passing. **1.3 Classes and Objects:** Simple classes (Class specification, class members accessing), Defining member functions, passing object as an argument, Returning object from functions, Friend classes, Pointer to object. **1.4 Array of pointer to object.** Use of arrays to represent textual data. Multidimensional arrays. Design of medium size programs. A miniature program for marks and ranks display. Command line arguments.	15
2	**2.1 Constructors and Destructors**: Introduction, Default Constructor, Parameterized Constructor and examples, Destructors. **2.2 Program development using Inheritance:** Introduction understanding inheritance, Advantages provided by inheritance, choosing the access specifier, Derived class declaration, derived class constructors, Class hierarchies, multiple inheritance, multilevel inheritance, containership, hybrid inheritance. **2.3 Virtual Functions**: Introduction and need, Pure Virtual Functions, Static Functions, this Pointer, a Abstract classes, virtual destructors.	15
3	**3.1 Polymorphism:** Introduction to polymorphism, Need of polymorphism. **3.2 Operator Overloading In C++:** Concept of function overloading, overloaded operators, Overloading unary and binary operators, overloading comparison operator, overloading arithmetic assignment operator, data	15

	conversion between objects and basic types.	
4	**4.1 Working with Files**: Introduction, Various File Modes, File Pointer and their Manipulation, File Operations. **4.2 Exception Handling**: Introduction, Exception Handling Mechanism, Concept of throw & catch with example. **4.3 Templates**: Introduction, Function Template and Examples, Class Template and Examples **4.4 Dynamic memory allocation**: Basic mechanisms and pitfalls. Design of a "String" class that has automated memory management. Copy constructors and destructors. Introduction to the standard library. Use of the standard library in designing programs.	**15**

Self-Learning topics (Unit wise):

Sub- unit	Topic
1.4	Use of arrays to represent textual data. Multidimensional arrays. Design of medium size programs. A miniature program for marks and ranks display. Command line arguments.
4.4	Dynamic memory allocation. Basic mechanisms and pitfalls. Design of a "String" class that has automated memory management. Copy constructors and destructors. Introduction to the standard library. Use of the standard library in designing programs.

Online Resources

https://nptel.ac.in/courses/106/105/106105151/

Reference Books:
US-FIT-101 Paper I

1. Object Oriented Programming with C++ by E. Balagurusamy, Tata McGraw Hill, 4th Edition.

2. Object Oriented Analysis and Design by Timothy Budd, TMH 3rd Edition.

3. Mastering C++ by K R Venugopal, Rajkumar Buyya, T Ravishankar, Tata McGraw Hill, 2nd Edition

4. C++ for beginners by B. M. Hirwani, SPD, 2013

5. Effective Modern C++ by Scott Meyers, SPD, 2014

Course Code: US-FIT-102 Digital Electronics

Unit	Content	No. of Lectures
1	**1.1 Introduction:** Relation between switching and logic operation; Use of Diode and Transistor as switch; Concept of noise margin, fanout, propagation delay; TTL, Schottky TTL, Tristate; CMOS Logic, Analog System, digital system, **1.2 Number System:** numbering system, binary number system, octal number system, hexadecimal number system, conversion from one number system to another, floating point numbers, weighted codes binary coded decimal, non-weighted codes Excess – 3 code, Gray code, Code conversion. Error detection and correction. **1.3 Binary Arithmetic:** Binary addition, Binary subtraction, Negative number representation, Subtraction using 1's complement and 2's complement, Binary multiplication and division, BCD multiplication and division.	15
2	**2.1 Boolean Algebra and Logic Gates**: Introduction, Logic (AND OR NOT), Boolean theorems, Boolean Laws, De Morgan's Theorem, Perfect Induction, Reduction of Logic expression using Boolean Algebra, Deriving Boolean expression from given circuit, exclusive OR and Exclusive NOR gates, Universal Logic gates, Implementation of other gates using universal gates. **2.2 Karnaugh Maps:** Introduction, min terms and sum of min term form, maxterm and Product of maxterm form, Reduction technique using Karnaugh maps – 2/3/4/5 variable K-maps, Grouping of variables in K-maps, K-maps for product of sum form, minimize Boolean expression using K-map and obtain K-map from Boolean expression.	15
3	**3.1 Combinational Logic Circuits:** Introduction, Multi-input, multi-output Combinational circuits, Code converters design and implementations. **3.2 Arithmetic Circuits**: Introduction, Adder, BCD Adder, Binary Subtractors, BCD Subtractor, Comparator. **3.3 Multiplexer, Demultiplexer, Encoder and Decoder:** Introduction, Multiplexer, Demultiplexer, Decoder, Encoders. **3.4 Sequential Circuits, Flip-Flop:** Introduction, Terminologies used, S-R flip-flop, D flip-fop, JK flip- flop, Race-around condition, Master – slave JK flip-flop, T flip-flop. Application of flip- flops.	15
4	**4.1 Counters:** Introduction, Asynchronous counter, Terms related to counters, IC 7493 (4-bit binary counter), Synchronous counter, Type T Design, Type JK Design, IC 7490. **4.2 Shift Register:** Introduction, parallel and shift registers, serial shifting, serial–in serial–out, serial–in parallel–out, parallel–in parallel–out, Ring counter, Johnson counter, Applications of shift registers, IC7495, Seven Segment displays. **4.3 Memory organization and Signal Converters**: Analog to digital converter,	15

| | digital to analog converter, Internal organization types of memory, RAM, ROM, EPROM technology used for memory construction.
Digital to analog converters: weighted resistor/converter, binary ladder, converter, accuracy and resolution; Analog to digital converter: quantization and encoding, different types of conversion, accuracy and resolution
Memory organization and operation: Memory expansion; Memory cell;
Different types of memory, ROM, PROM. | |

Self-Learning topics (Unit wise):

Sub- Unit	Topic
1.1	Relation between switching and logic operation; Use of Diode and Transistor as switch; Concept of noise margin, fanout, propagation delay; TTL, Schottky TTL, Tristate; CMOS Logic.
4.3	Weighted resistor/converter, binary ladder, converter, accuracy and resolution; Analog to digital converter: quantization and encoding, different types of conversion, accuracy and resolution Memory organization and operation, Memory expansion; Memory cell; Different types of memory, ROM, PROM.

Online Resources

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Reference Books:
US-FIT-102 Paper II

1. Modern Digital Electronics by R. P. Jain, Tata McGraw Hill ,3rd Edition

2. Digital Electronics and Logic Design by N. G. Palan ,Technova, 2nd Edition

3. Make Electronics by Charles Platt, O'Reilly, 1 st Edition, 2010

4. Digital Principles and Applications by Malvino and Leach, Tata McGraw Hill, 2nd Edition

5. Digital Electronics: Principles, Devices and Application by Anil K. Maini, Wiley, 2007

Course Code: US-FIT-103 Operating System

Unit	Content	No. of Lectures
1	**1.1 Introduction:** What is an operating system? Computer hardware, different operating systems, operating system concepts, system calls. **1.2 Processes and Threads:** Processes, threads, inter process communication problems. **1.3 Introduction to The UNIX Filesystem and Shell** : The Shell: Executing commands and command options, Interactive features: job control, history, The UNIX file system, File Utilities (cp, mv, rm, etc.), comm, cmp, diff , Tree walking: find, xargs, Editors: vi, emacs, Register, Address binding, Swapping, Allocation.	15
2	2.1 Memory Management: No memory abstraction, memory abstraction: Address spaces, virtual memory, page replacement algorithms. 2.2 File Systems: Files, directories, file system implementation, file-system management and optimization.	15
3	**3.1 Input-Output:** Principles of I/O hardware, Principles of I/O software, user interfaces: keyboard, mouse, monitor, thin clients, and power management. **3.2 Deadlocks:** Resources, introduction to deadlocks, deadlock detection and recovery, deadlock avoidance, deadlock prevention, issues. CPU Scheduler, dispatcher scheduling algorithm.	15
4	**4.1 Virtualization and Cloud:** Requirements for virtualization, type 1 and 2 hypervisors, Virtual appliances, Clouds. **4.2 Multiple Processor Systems:** Multiprocessors, distributed systems. Server-side architecture and Client-side Architecture. **4.3 NACHOS (Not Another Completely Heuristic Operating System).** **4.4 Case Study:** Case Study on WINDOWS and Case Study on ANDROID.	15

Self-Learning topics (Unit wise):

Sub-unit	Topic
1.3	Register, Address binding, Swapping, Allocation
3.2	CPU Scheduler, dispatcher scheduling algorithm

Online Resources

https://nptel.ac.in/courses/106/102/106102132/

Reference Books

US-FIT-103 Paper III

1. Modern Operating Systems by Andrew S. Tanenbaum, Herbert Bos Pearson ,4th Edition.
2. Operating Systems – Internals and Design Principles by William Stallings, Pearson, 8th Edition.
3. Operating System Concepts by Abraham Silberschatz, Peter B. Galvineg Gagne, Wiley 8th Edition.
4. Operating System by Godbole and Kahate, McGraw Hill, 3rd Edition

Course Code: US-FIT-104 Mathematics I

Unit	Content	No. of Lectures
1	**1.1 Set Theory**: Introduction: Variables, The Language of Sets, The Language of Relations and Function. **1.2 The Logic of Compound Statements**: Definitions and the Element Method of Proof, Properties of Sets, Disproofs, Algebraic Proofs, Boolean Algebras. **1.3** Logical Form and Logical Equivalence, Conditional Statements, Valid and Invalid Arguments. **1.5 Elementary Number Theory and Methods of Proof:** Introduction to Direct Proofs, Rational Numbers, Divisibility, Division into Cases and the Quotient-Remainder Theorem, Floor and Ceiling, Indirect Argument: Contradiction and Contraposition.	15
2	**2.1 Matrices:** Introduction to Matrices, Eigen Values, Vectors, Matrix multiplication, Invertibility, Review of elementary row operations, rank, determinants, Diagonalization, Characteristic polynomials, Adjoints, normal. **2.2 Sequences, Mathematical Induction, and Recursion:** Sequences, Mathematical Induction solving recurrence relations by iteration recurrence relations coefficients.	15
3	**3.1 Functions:** Functions Defined on General Sets, One-to-One and Onto, Inverse Functions, Composition of Functions. **3.2 Relations:** Relations on Sets, Reflexivity, Symmetry, and Transitivity, Equivalence Relations, Graphs and Trees: Definitions and Basic Properties, Trails, Paths, and Circuits, Matrix Representations of Graphs, Isomorphism's of Graphs, Trees, Rooted Trees, Isomorphism's of Graphs, Spanning trees and shortest paths.	15
4	**4.1 Counting and Probability:** Introduction, Possibility Trees and the Multiplication Rule, Possibility Trees and the Multiplication Rule, Counting Elements of Disjoint Sets: The Addition Rule, The Pigeonhole Principle, Counting Subsets of a Set: Combinations, r-Combinations with Repetition Allowed, Probability Axioms and Expected Value, Conditional Probability, Bayer's Formula, and Independent Events.	15

Self-Learning topics (Unit wise):

Sub-unit	Topic
2.1	Matrix multiplication, Invertibility, Review of elementary row operations, rank, determinants, Diagonalization, Characteristic polynomials, Adjoints, normal.

Online Resources

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Reference Books

US-FIT-104 Paper IV

1. Discrete Mathematics with Applications by Sussana S. Epp Cengage Learning 4th Edition.
2. Introductory Methods of Numerical Methods by S. S. Shastri, 3rd Edition
3. Discrete Mathematics, Schaum's Outlines Series Seymour Lipschutz by Marc Lipson Tata MCGraw Hill, 2007
4. Discrete Mathematics and its Applications by Kenneth H. Rosen Tata McGraw Hill, 7th Edition.
5. Discrete mathematical structures by B Kolman RC Busby, S Ross PHI, 2nd Edition
6. Discrete structures by Liu, Tata McGraw, 3rd Edition.

Course code: US-FIT-105 Professional Communication Skills

Unit	Content	No. of Lectures
1	**1.1 The Seven Cs of Effective Communication**: Completeness, Conciseness, Consideration, Concreteness, Clarity, Courtesy, Correctness. **1.2 Listening:** Concept, difference between hearing and listening, purpose of listening, process of listening, principles of effective listening, **1.3 Speaking:** Introduction, purpose principles of effective speaking, improving your speaking skills. **1.4 Understanding Business Communication**: Nature and Scope of Communication, Non-verbal Communication, Cross cultural communication, Technology-enabled Business Communication.	15
2	**2.1 Reading**: Concept, purposes, Types, Stages, Strategies for effective reading, techniques and practices, Concept, Purposes, Process of writing in classroom, Principles of effective writing, Different types of writing. **2.2 Writing**: Non-Technical Communication: Memorandum, noting and drafting, Meeting procedure. **2.3 Writing Business Documents**: Business writing, Business Correspondence, Business Reports and Proposals, Career building and Resume writing. **2.4 Developing Oral Skills**: Effective Listening, Business Presentations and Public Speaking, Conversations, Interviews.	15
3	**3.1 Developing Skills for Business**: Meetings and Conferences, Group Discussions and Team Presentations, Team Briefing, **3.2 Understanding Communication Needs**: Communication across Functional Areas. **3.3 Specific Communication Needs**: Corporate Communication, Persuasive Strategies Communication, Ethics in Business Communication, Business Communication Aids.	15
4	**4.1 Presentation Process**: Planning the presentations, executing the presentations, Impressing the audience by performing. **4.2 Planning stage**: Brainstorming, mind maps / concept maps, executing stage: chunking theory, creating outlines, Use of templates. **4.3 Adding graphics to your presentation**: Visual communication, Impress stage: use of font, color, layout, Importance of practice and performance. Interactive hands on sessions on confidence building and placements. **4.4 Active Learning:** Concept of Active learning, Major Characteristics of Active learning, Elements of active learning, Benefits of active learning, Requirements to create active learning classroom, Active learning techniques to achieve learning objectives at various levels of Blooms' Taxonomy, Classification of Active learning techniques, Barriers to active learning, Overcomes barriers to active learning.	15

Self-Learning topics (Unit wise):

Sub-Unit	Topic
1.2	Concept, difference between hearing and listening, purpose of listening, process of listening, principles of effective listening.
1.3	Introduction, purpose principles of effective speaking, improving your speaking skills
2.1	Concept, Purposes, Process of writing in classroom, Principles of effective writing, Different types of writing.
2.2	Concept of Active learning, Major Characteristics of Active learning, Elements of active learning, Benefits of active learning, Requirements to create active learning classroom, Active learning techniques to achieve learning objectives at various levels of Blooms' Taxonomy, Classification of Active learning techniques, Barriers to active learning, Overcomes barriers to active learning.
4.3	Concept, purposes, Types, Stages, Strategies for effective reading, techniques and practices.

Online Resources

https://nptel.ac.in/courses/109/104/109104031/

Reference Books

US-FIT-105 Paper V

1. Business Communication Edited by Meenakshi Raman and Prakash Singh, Oxford University Press,2nd Edition.
2. Professional Communication by Aruna Koneru Tata McGraw Hill, 1st Edition.
3. Strategies for improving your business Communication by Prof. M. S. Rao, Shroff Publishers, 2016.
4. Nonverbal Communication: Notes on the Visual Perception of Human Relations by Ruesh, Jurgen and Weldon Kees, 4th Edition.

Part - 4 Detailed Scheme Practicals

Course Code: US-FIT-1P1

Practical I	Object Oriented Programming	Total Credits: 2
Unit (1 to 5)	Content	No. of Lectures (108)
1	Practicals will be based on Classes and methods.	
2	Practicals will be based on friend functions	
3	Practicals will be based on Constructors and method overloading	
4	Practicals will be based on Operator Overloading	
5	Practicals will be based on Inheritance	
6	Practicals will be based on Virtual functions and abstract classes	
7	Practicals will be based on String handling	
8	Practicals will be based on Exception handling	
9	Practicals will be based on File handling	
10	Practicals will be based on Templates	

Course Code: US-FIT-1P2

Practical II	Digital Electronics	Total Credits: 2
Unit (1 to 5)	Content	No. of Lectures (108)
1	Study of Logic gates and their ICs and universal gate	
2	Implement the given Boolean expressions using minimum number of gates.	
3	Implement combinational circuits.	
4	Implement code converters Implement combinational circuits.	
5	Implement Adder and Subtractor Arithmetic circuits	
6	Implement Arithmetic circuits	
7	Implement Encode and Decoder and Multiplexer and Demultiplexers	
8	Study of flip-flops and counters	
9	Design of shift registers and shift register counters.	
10	Interfacing of A/D and D/A Signal converters	

Course Code: US-FIT-1P3

Practical III	Operating Systems	Total Credits: 2
Unit (1 to 5)	Content	No. of Lectures (108)
1	Demo on Installation of virtual machine software. and Installation of Windows operating system on virtual machine	
2	Demo on Installation of Linux operating system (Red Hat) on virtual machine Practical on Installation of Linux operating system (Ubuntu) on virtual machine	
3	Practical based on Linux commands	
4	Linux commands: Working with Directories.	
5	Linux commands: Working with files	
6	Windows (DOS) Commands – 1	
7	Windows (DOS) Commands – 2	
8	Exploring Internal utilities of linux	
9	Exploring Internal utilities of windows.	
10	Utilize android based system using Windows.	

Course Code:US-FIT-1P4

Practical IV	Mathematics I	Total Credits: 2
Unit (1 to 5)	Content	No. of Lectures (108)
1	Practical based on Set Theory	
2	Practical based on Functions and Algorithms	
3	Practical based on Counting	
4	Practical based on Probability Theory	
5	Practical based on Graph Theory	
6	Practical based on Directed Graphs	
7	Practical based on Properties of integers	
8	Practical based on Algebraic Systems	
9	Practical based on Boolean Algebra	
10	Practical based on Recurrence relations	

Practicals will be done using Scilab/MatLab software

Course Code:US-FIT-1P5

Practical V	Professional Communication Skills	Total Credits: 2
Unit (1 to 5)	Content	No. of Lectures (108)
1	A project should be done based on the field work carried out throughout the semester. A report of minimum 25 pages should be prepared.	
2	Report Writing- The report should have a font size of 12, Times new roman and 1.5 line spacing	
3	The headings should have font size 14. The report should be hard bound. The project can be done individually or a group of two students. The students will have to present the project during the examination	
4	Non verbal and Verbal communication	
5	Use of word processing tools for communication	
6	Memorizing power	
7	Group discussion	
8	Use of spreadsheet tools for communication	
9	Use of presentation tools for communication	
10	Practical based on Latex	

Part 5- The Scheme of Teaching and Examination is as under:

First Year Semester – II
Summary

Sr. No.	Choice Based Credit System			Subject Code	Remarks
1	Core Course (Information Technology)			US-FIT-201, US-FIT-202, US-FIT-203, US-FIT-204.	
				US-FIT-2P1, US-FIT-2P2, US-FIT-2P3, US-FIT-2P4.	
2	Elective Course	Discipline Specific Elective (DSE) Course			
		2.1	Interdisciplinary Specific Elective (IDSE) Course		
		2.2	Dissertation/Project		
		2.3	Generic Elective (GE) Course		
3	Ability Enhancement Compulsory Courses (AECC)			US-FIT-205	
				US-FIT-2P5	
	Skill Enhancement Courses (SEC)				

First Year Semester -II Internal and External Detailed Evaluation Scheme

Detail Scheme

SN.	Subject Code	Subject Title	Lectures Per Week (Lecture of 45 min)					Credit	Internals				Total Marks
			Units	SL	L	T	P		SLE	CT+ AT= 15+5	PA	SEE	
1	US-FIT-201	Python Programming	4	20%*	5	0	-	2	10	20	10	60	100
2	US-FIT-202	Microprocessor Architecture and Interfacing	4	20%*	5	0	-	2	10	20	10	60	100
3	US-FIT-203	Introduction to unity and graphics	4	20%*	5	0	-	2	10	20	10	60	100
4	US-FIT-204	Mathematics II	4	20%*	5	0	-	2	10	20	10	60	100
5	US-FIT-205	Green Computing	4	20%*	5	0	-	2	10	20	10	60	100
6	US-FIT-2P1	Practicals Based US-FIT-201	-	-	0	-	3	2				50 (40 +1 0)	50
7	US-FIT-2P2	Practicals Based US-FIT-202	-	-	0	-	3	2				50 (40 +1 0)	50
8	US-FIT-2P3	Practicals Based US-FIT-203	-	-	0	-	3	2				50 (40 +1 0)	50
9	US-FIT-2P4	Practicals Based US-FIT-204					3	2				50 (40 +1 0)	50

| 10 | US-FIT-2P5 | Practicals Based US-FIT-205 | | | | | 3 | 2 | | | | 50 (40 +10) | 50 |
| | Total Lectures / Credit | | (25+45) per week / 20 | | | 20 | | | | | | | 750 |

*One to two lectures to be taken for CONTINUOUS self -learning evaluation

First Year Semester – II Units – Topics – Teaching Hours

S.N	Subject Code & Title		Subject Unit Title	Lectures	Total Lectures	Credit	Total Marks
1	US-FIT-201	1	Introduction, Variables and Expressions, Conditional Statements, Control statements, Functions, Strings	15	60 L	2	100 (60+40)
		2	Lists, Tuples and Dictionaries, Files, Exceptions	15			
		3	Regular Expressions, Classes and Objects, Creating the GUI Form and Adding Widgets, LayoutManagement, StoringDatainOurMySQL	15			
		4	DatabaseviaOurGUI, Design and develop Client Server network applications using Python	15			
2	FIT-US-202	1	Microprocessor, microcomputers, and Assembly Language, Microprocessor Architecture and Microcomputer System ,8085 Microprocessor Architecture, Memory Interface, Interfacing of I/O Devices	15	60 L	2	100 (60+40)
		2	Introduction to 8085 Assembly Language Programming, Introduction to 8085 Instructions,	15			
		3	Programming Techniques With Additional Instructions, Counters and Time Delays, Stacks and Sub-Routines, Interrupts, Interfacing peripherals	15			
		4	The Pentium and Pentium Pro microprocessors ,Core 2 and later Microprocessors , SUN SPARC	15			
3	US-FIT-203	1	Introduction to Photoshop, Introduction to UI Creation using Photoshop, Introduction to Maya, Concepts of Modeling in 3d, Concepts of Texturing in 3d using Photoshop.	15	60 L	2	100 (60+40)
		2	Creating and Downloading Assets, Concepts of rigging and animation.	15			
		3	Introduction to Unity, Introduction to C# in Unity. Creating Assembly for Games, Creating Assembly for Virtual reality	15			
		4	Creating Assembly for Augmented reality with ARCore.	15			
4	US-FIT-204	1	Approximations and Round-Off Errors, Truncation Errors and the Taylor Series , Solutions of Algebraic and Transcendental Equations, Interpolation	15	60 L	2	100 (60+40)
		2	Solution of simultaneous algebraic equations (linear) using iterative methods ,Numerical integration, Sampling Theory.	15			

		3	Random variables, Moments, Skewness, and Kurtosis	15			
		4	Distributions, Least-Squares Regression, Correlation Theory, The Chi-Square Test	15			
5	US-FIT-205	1	Overview, Issues and Problems, Initiatives and Standards,	15	60 L	2	100 (60+40)
		2	Minimizing Power Usage, Cooling	15			
		3	Changing the Way of Work, Going Paperless, Recycling	15			
		4	Hardware Considerations, Greening Your Information Systems, Staying Green, To design Green Data Centre Metrics for software development , Data communication, ICT development.	15			
6	US-FIT-2P1		Python Programming		36 x3 batches= 108 lectures	2	50
7	US-FIT-2P2		Microprocessor Architecture and Interfacing		36 x3 batches= 108 lectures	2	50
8	US-FIT-2P3		Introduction to unity and graphics		36 x3 batches= 108 lectures	2	50
9	US-FIT-2P4		Mathematics II		36 x3 batches= 108	2	50

					lectures		
10	US-FIT-2P5				36 x3 batches= 108 lectures	2	50
			Green Computing				
			TOTAL			20	750

- **Lecture Duration – 48 Minutes**
- **One Credit =15 Hours**

Part 6: Detailed Scheme Theory

Curriculum Topics along with Self-Learning topics - to be covered, through self-learning mode along with the respective Unit. Evaluation of self-learning topics to be undertaken before the concluding lecture instructions of the respective UNIT

Course Code: US-FIT-201 Python Programming

Unit	Content	No. of Lectures
1	**1.1 Introduction:** The Python Programming Language, History, features, Installing Python, Running Python program, Debugging: Syntax Errors, Runtime Errors, Semantic Errors, Experimental Debugging, Formal and Natural Languages, The Difference Between Brackets, Braces, and Parentheses. **1.2 Variables and Expressions:** Values and Types, Variables, Variable Names and Keywords, Type conversion, Operators and Operands, Expressions, Interactive Mode and Script Mode. **1.3 Conditional Statements:** Order of Operations. if, if-else, nested if –else **1.4 Looping**: for, while, nested loops. **1.5 Control statements:** Terminating loops, skipping specific conditions. **1.6 Functions:** Function Calls, Type Conversion Functions, Math Functions, Composition, Adding New Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Variables and Parameters Are Local, Stack Diagrams, Fruitful Functions and Void Functions, Why Functions? Importing with from, Return Values, Incremental Development, Composition, Boolean Functions, More Recursion, Leap of Faith, Checking Types **1.7 Strings:** A String Is a Sequence, Traversal with a for Loop, String Slices, Strings Are Immutable, Searching, Looping and Counting, String Methods, The in Operator, String Comparison, String Operations.	15
2	**2.1 Lists:** Values and Accessing Elements, Lists are mutable, traversing a List, Deleting elements from List, Built-in List Operators, Concatenation, Repetition, In Operator, Built-in List functions and methods **2.2 Tuples and Dictionaries:** Tuples, Accessing values in Tuples, Tuple Assignment, Tuples as return values, Variable-length argument tuples, Basic tuples operations, Concatenation, Repetition, in Operator, Iteration, Built-in Tuple Functions **2.3 Files:** Creating a Dictionary, Accessing Values in a dictionary, Updating Dictionary, Deleting Elements from Dictionary, Properties of Dictionary keys, Operations in Dictionary, Built-In Dictionary Functions, Built-in Dictionary Methods, Text Files,	15

	The File Object Attributes, Directories. **2.4 Exceptions:** Built-in Exceptions, Handling Exceptions, Exception with Arguments, User-defined Exceptions.	
3	**3.1 Regular Expressions:** Concept of regular expression, various types of regular expressions, using match function. **3.2 Classes and Objects:** Overview of OOP (Object Oriented Programming), Class Definition, Creating Objects, Instances as Arguments, Instances as return values, Built-in Class Attributes, Inheritance, Method Overriding, Data Encapsulation, Data Hiding **3.3 Multithreaded Programming:** Thread Module, creating a thread, synchronizing threads, multithreaded priority queue Modules: Importing module, Creating and exploring modules, Math module, Random module, Time module **3.4 Creating the GUI Form and Adding Widgets:** Widgets: Button, Canvas, Check button, Entry, Frame, Label, List box, Menu button, Menu, Message, Radio button, Scale, Scrollbar, text, Toplevel, Spinbox, Paned Window, Label Frame, tkMessagebox. Handling Standard attributes and Properties of Widgets. **3.5 Layout Management:** Designing GUI applications with proper Layout Management features.Look and Feel Customization: Enhancing Look and Feel of GUI using different appearances of widgets. **3.6 Storing Data in Our MySQL:** Connecting to a MySQL database from Python, Configuring the MySQL connection,	15
4	**4.1 Database via Our GUI**: Designing the Python GUI database, Using the INSERT command, **4.2 Using the UPDATE command**, Using the DELETE command, Storing and retrieving data from MySQL database, Design and develop Client Server network applications using Python. **4.3Pandas data frame and data frame** related operations on dataset: Reading files, Exploratory data analysis, Data preparation and preprocessing •**Data visualization on dataset** using matplotlib and seaborn libraries **4.4 Control structures using dataset**: Scatter plot, Line plot, Bar plot, Histogram, Box plot, Pair plot.	15

Self-Learning topics (Unit wise)

Unit	Topics
1.3	Conditional Statements: Order of Operations. if, if-else, nested if –else
1.4	Looping: for, while, nested loops

4.3	Pandas dataframe and dataframe related operations on dataset: Reading files Exploratory data analysis Data preparation and preprocessing
4.4	Data visualization on dataset using matplotlib and seaborn libraries Control structures using dataset: Scatter plot Line plot Bar plot Histogram Box plot Pair plot

Online Resources

https://nptel.ac.in/courses/106/106/106106145/

Reference Books:

US-FIT-201 Paper I

1. Think Python by Allen Downey, Green Tea Press,1st Edition.

2. An Introduction to Computer Science using Python 3 by Montojo, Jennifer Campbell, Paul Gries, 2nd Edition.

3. Introduction to Problem Solving with Python by E. Balagurusamy, 4th Edition.

4. Python GUI Programming Cookbook by Burkhard A. Meie,2015

5. Object-oriented Programming in Python by Michael H. Goldwasser, David Letscher Pearson Prentice Hall, 2007

Course Code: US-FIT-202 Microprocessor Architecture and Interfacing

Unit	Content	No. of Lectures
1	**1.1 Micro-processor, micro-computers, and Assembly Language:** Microprocessor, Microprocessor Instruction Set and Computer Languages, From Large Computers to Single-Chip Microcontrollers, Applications. **1.2 Microprocessor Architecture and Micro-computer System:** Microprocessor Architecture and its operation's, Memory, I/O Devices, Microcomputer System, Logic Devices and Interfacing, Microprocessor-Based System Application **1.3 8085 Micro-processor Architecture, Memory Interface:** Introduction, 8085 Microprocessor unit, 8085-Based Microcomputer, Memory Interfacing, **1.4 Interfacing of I/O Devices:** Basic Interfacing concepts, Interfacing Output Displays, Interfacing Input Devices, Memory Mapped I/O, Testing and Troubleshooting I/O Interfacing Circuits.	15
2	**2.1 Introduction to 8085 Assembly Language Programming:** The 8085 Programming Model, Instruction Classification, Instruction, Data and Storage, Writing assembling and Execution of a simple program, Overview of 8085 Instruction Set, Writing and Assembling Program. **2.2 Introduction to 8085 Instructions:** Data Transfer Operations, Arithmetic Operations, Logic Operation, Branch Operation, Writing Assembly Languages Programs, Debugging a Program. **2.3 Programming Techniques with Additional Instructions:** Programming Techniques: Looping, Counting and Indexing, Additional Data Transfer and 16-Bit Arithmetic Instructions, Arithmetic Instruction Related to Memory, Logic Operations: Rotate, Logics Operations: Compare, Dynamic Debugging. **2.4 Counters and Time Delays:** Counters and Time Delays.	15
3	**3.1 Stacks and Sub-Routines:** Stack, Subroutine, Restart, Conditional Call, Return Instructions, Advanced Subroutine concepts **3.2 Interrupts:** The 8085 Interrupt, 8085 Vectored Interrupts, Restart as S/W, Instructions, Additional I/O Concepts and processes. **3.3 Interfacing peripherals:** Interfacing peripheral IC 8255 and 8155, interfacing 8255- modes of 8255, control word, i/o mode, hand shaking mode, buffered i/o mode, waveform generation using 8255, interfacing 8155- control word, modes of operation of 8155, timer of 8155, interfacing A/D	15

	converters and D/A converters. Interfacing examples – Part I Interfacing examples – Part II 8255 Interfacing Examples Interfacing of DC and Stepper Motors, Interfacing of Key board, Display, USART.	
4	**4.1 The Pentium and Pentium Pro micro-processors:** Introduction, Special Pentium registers, Memory management, Pentium instructions, Pentium Pro microprocessor, Special Pentium Pro features. **4.2 Core 2 and later Microprocessors:** Introduction, Pentium II software changes, Pentium IV and Core 2, i3, i5 and i7. **4.3 SUN SPARC Micro-processor:** Architecture, Register file, data types and instruction format. **4.4 AMD Processor Architecture**	**15**

Self-Learning topics (Unit wise)

Sub Unit	Topics
3.3	Interfacing examples – Part I Interfacing examples – Part II 8255 Interfacing Examples Interfacing of DC and Stepper Motors, Interfacing of Key board, Display, USART

Online Resources

https://nptel.ac.in/courses/108/105/108105102

Reference Books:
US-FIT-202 Paper II

1. Microprocessors Architecture, Programming and Applications with the 8085 byRamesh Gaonkar PENRAM 5th Edition.

2. Computer System Architecture by M. Morris Mano PHI, 3rd Edition.

3. Structured Computer Organization by Andrew C. Tanenbaum PHI, 5th Edition.

Course Code: US-FIT-203 Introduction to Unity

Unit	Content	No. of Lectures
1	**1.1 Introduction to Photoshop**: The important tool sets of Photoshop, Image editing and enhancement, Overview of Filters, Advanced Filters. **1.2 Introduction to UI Creation** using Photoshop: Use the Photoshop tools to create viable UI for Software's and Games. **1.3 Introduction to Maya**: Introduction to 3d graphics , concepts of 3d graphics using Maya. **1.4 Concepts of Modeling in 3d**: Concepts of 3d Modeling, Create basic 3d Models **1.5 Concepts of Texturing in 3d using Photoshop**: Process of creating color representations of the previously created 3d models.	15
2	**2.1 Creating and Downloading Assets**: Tweaking and cleaning when an asset is downloaded, tips and tricks, to create the asset making process faster. **2.2 Concepts of rigging and animation:** Process of rigging and animating characters and objects in 3D, MIXAMO, fastest tool of creating prototype animations.	15
3	**3.1 Introduction to Unity:** Cover introduction to Unity as an engine. Cross platform uses for unity, Case studies of few applications and games created using unity. **3.2 Introduction to C# in Unity**: Cover basic orientation of C# language, assignments involving syntax's, variable, conditions, and loops **3.3 Creating Assembly for Games**: Interactivity for games using unity, how to Assemble a working game with pre given assets. how to assemble a Virtual reality experiences by given assets. **3.4 Creating Assembly for Virtual reality**: Introduction to Virtual Reality, process, need and current industry standards to build a Virtual Reality Experience.	15
4	**4.1 Creating Assembly for Augmented reality with ARCore**: Introduction to Augmented Reality, process, need and current industry standards to build Augmented Reality Experience, the process of assembling a Augmented reality experiences by given assets. **4.2 Google SketchUp Installation**, Overview of working environment, 3D Modeling, Assignment	15

Self-Learning topics (Unit wise)

Sub Unit	Topics
1.1	Image editing and enhancement, Overview of Filters, Advanced Filters
4.2	Google SketchUp Installation, Overview of working environment, 3D Modeling, Assignment

Online Resources

https://nptel.ac.in/courses/117/105/117105079/
https://nptel.ac.in/courses/112/102/112102101/

Reference Books:
US-FIT-203 Paper III

1. Adobe Photoshop CC Classroom in a Book by Andrew Faulkner, Conrad Chavez, 2018

2. UX for Dummies by Donald Chesnut, 2014

3. An Introduction to 3D Modeling by 3d Extrude Tutorials, 2019

4. Adobe Photoshop CC 2019 for Beginners by Hitesh Kapte, 2019

5. User Friendly by Cliff Kuang, Robert Fabricant, 2019

6. Autodesk Maya 2018 Basics Guide by Murdoch Kelly, 2018

7. Digital Modeling 1st Edition by William Vaughan, 2012

8. Photoshop for 3D Artists by Consortium Book, 2011

9. Creating Games with Unity and Maya by Adam Watkins, 2011

10. The Animator's Survival Kit by Richard Williams, 2001

11. Unity 3D Game Development by Ryan Henson Creighton, 2010

12. Game Programming: Developing with Unity in C# for Beginners Ortus Publishing, 2018

13. Holistic Game Development with Unity Penny de Byl, 2011

14. Building Virtual Reality with Unity and Steam VR Murray Jeff W., 2017

15. Complete Virtual Reality and Augmented Reality Development with Unity Jesse Glover, Jonathan Linowes, 2019

Course Code: US-FIT-204 Mathematics - II

Unit	Content	No. of Lectures
1	**1.1 Mathematical Modeling and Engineering Problem Solving:** Simple Mathematical Model, Conservation Laws and Engineering Problems. Different types of data, Tables, charts, histograms, frequency distributions **1.2 Approximations and Round-Off Errors:** Significant Accuracy and Precision, Error Definitions, Round-Off Errors **1.3 Truncation Errors and the Taylor Series:** The Taylor Series, Error Propagation, Total Numerical Errors, Formulation Errors and Data Uncertainty**.** **1.4 Solutions of Algebraic and Transcendental Equations:** The Bisection Method, The Newton-Raphson Method, The Regula-falsi method, The Secant Method. **1.5 Interpolation:** Forward Difference, Backward Difference, Newton's Forward Difference Interpolation, Newton's Backward Difference Interpolation, Lagrange's Interpolation.	15
2	**2.1 Solution of simultaneous algebraic equations** (linear) using iterative methods: Gauss-Jordan Method, Gauss-Seidel Method. **2.2 Differentiation and Integration**-I: Numerical Differentiation. Newton-Cotes Quadrature. **2.3 Numerical integration**: Trapezoidal Rule, Simpson's 1/3rd and 3/8th rules. **2.4 Differentiation and Integration-II:** Gaussian Quadrature, Monte-Carlo Method and Double Integration. **2.5 Ordinary Differential Equations-I**: Runge-Kutta Methods. Predictor-Corrector Methods. **2.6 Sampling Theory:** Mean, median, mode, Normal Distribution, Binomial Distribution, Frequency Distribution in R. Confidence Intervals, Tests of Hypotheses and Significance, Degrees of Freedom,	15
3	**3.1 Random variables:** Discrete and Continuous random variables, Probability density function, Probability distribution of random variables, Expected value, Variance. **3.2 Moments, Skewness, and Kurtosis** : Moments , Moments for Grouped Data ,Relations Between Moments , Computation of Moments for Grouped Data, Charlie's Check and Sheppard's Corrections, Moments in Dimensionless Form, Skewness, Kurtosis, Population Moments, Skewness, and Kurtosis, Software Computation of Skewness and Kurtosis.	15
4	**4.1 Distributions**: Discrete distributions: Uniform, Binomial, Poisson, Bernoulli, Continuous distributions: uniform distributions, exponential, Normal distribution state all the properties and its applications.	15

| | **4.2 Least-Squares Regression:** Linear Regression, Polynomial Regression, Multiple Linear Regression, General Linear Least Squares, Nonlinear Regression Linear Programming: Linear optimization problem, Formulation and Graphical solution, Basic solution and Feasible solution
4.3 Correlation Theory: Correlation and Regression, Linear Correlation, Measures of Correlation, The Least-Squares Regression Lines, Standard Error of Estimate, Explained and Unexplained Variation, Coefficient of Correlation, Remarks Concerning the Correlation Coefficient, Product-Moment Formula for the Linear Correlation Coefficient, Short Computational Formulas, Regression Lines and the Linear Correlation Coefficient, Correlation of Time Series, Correlation of Attributes, Sampling Theory of Correlation, Sampling Theory of Regression. | |

Self-Learning topics (Unit wise)

Unit	Topics
1.1	Different types of data, Tables, charts, histograms, frequency distributions
2.2	Differentiation and Integration-I: Numerical Differentiation. Newton-Cotes Quadrature.
2.4	Differentiation and Integration-II: Gaussian Quadrature, Monte-Carlo Method and Double Integration.
2.5	Ordinary Differential Equations-I: Runge-Kutta Methods. Predictor-Corrector Methods.

Online Resources

https://nptel.ac.in/courses/111/105/111105038/

Reference Books:
US-FIT-204 Paper IV

1. Introductory Methods of Numerical Methods by S. S. Shastri, WordPress, 5th Edition
2. Numerical Methods for Engineers by Steven C. Chapra, Raymond P. Canale, 2010
3. Numerical Analysis by Richard L. Burden, J. Douglas Faires, 9th Edition, 2011

Course Code: US-FIT-205 Green Computing

Unit	Content	No. of Lectures
1	**1.1 Overview, Issues and Problems:** Toxins, Power Consumption, Equipment Disposal, Company's Carbon Footprint: Measuring, Details, reasons to bother, Plan for the Future, Cost Savings: Hardware, Power. **1.2 Initiatives and Standards:** Global Initiatives: United Nations, Basel Action Network, Basel Convention, North America: The United States, Canada, Australia, Europe, WEEE Directive, RoHS, National Adoption, Asia: Japan, China, Korea.	15
2	**2.1 Minimizing Power Usage:** Power Problems, Monitoring Power Usage, Servers, Low-Cost Options, Reducing Power Use, Data De-Duplication, Virtualization, Management, Bigger Drives, Involving the Utility Company, Low-Power Computers, Computer Settings, Storage, Monitors, Power Supplies, Wireless Devices, Software. **2.2 Cooling:** Cooling Costs, Power Cost, Causes of Cost, Calculating Cooling Needs, Reducing Cooling Costs, Economizers, On-Demand Cooling, HP's Solution, Optimizing Airflow, Hot Aisle/Cold Aisle, Raised Floors, Supply Air Directly to Heat Sources, Fans, System Design, Data centre Design, Centralized Control, Design for Your Needs, Put Everything Together**.**	15
3	**3.1 Changing the Way of Work:** Old Behaviors, starting at the Top, Process Reengineering with Green in Mind, Analyzing the Global Impact of Local Actions, Steps: Water, Recycling, Energy, Pollutants, Tele-workers and Outsourcing, Telecommuting, Outsourcing, how to Outsource. **3.2 Going Paperless:** Paper Problems, The Environment, Costs: Paper and Office, Practicality, Storage, Destruction, Going Paperless, Organizational Realities, Changing Over, Paperless Billing, Handheld Computers vs. the Clipboard, Electronic Data Interchange (EDI), Value Added Networks, Advantages, Obstacles. **3.3 Recycling:** Problems, China, Africa, Materials, Means of Disposal, Recycling, Refurbishing, Make the Decision, Life Cycle, from beginning to end, Life, Cost, Green Design, Recycling Companies, **3.4 Hardware Considerations:** Finding the Best One, Checklist, Certifications, Hard Drive Recycling, Consequences, cleaning a Hard Drive, , Change the mind-set **3.5 Greening Your Information Systems:** Certification Programs, EPEAT, RoHS, Energy Star, Computers,	15

	Monitors, Printers, Scanners, All-in-Ones, Thin Clients, Servers, Packaging, Toxins, Other Factors, Remote Desktop, Using Remote Desktop, Role of quality, minimization of natural resource utilization.	
4	**4.1 Staying Green:** Change Business Processes, Customer Interaction, Paper Reduction, Green Supply Chain, Improve Technology Infrastructure, Reduce PCs and Servers, Shared Services, Hardware Costs, Cooling. **4.2 Chief Green Officer**, Evolution, Sell the CEO, SMART Goals, Equipment Check-ups, Gather Data, Tracking the data, Baseline Data, Benchmarking, Analyze Data, Conduct Audits, Certifications, Benefits, Realities. **4.3 Concept of sustainability**, manufacturing, operations, processes, practices, Resources in manufacturing. Simulation models for manufacturing, validation, verification, output analysis, Concepts of optimization, numerical optimization through simulation. **4.4 Life Cycle Analysis**: remanufacture and disposal, tools for LCA, Optimization for achieving sustainability in unit manufacturing – Green manufacturing.	15

Self-Learning topics (Unit wise)

Unit	Topics
3.5	Role of quality, minimization of natural resource utilization
4.3	Concept of sustainability, manufacturing, operations, processes, practices,Resources in manufacturing. Simulation models for manufacturing, validation, veri_cation, output analysis,Concepts of optimization,numerical optimization through simulation.
4.4	Life Cycle Analysis: remanufacture and disposal, tools for LCA, Optimization for achieving sustainability,in unit manufacturing – Green manufacturing

Online resources

https://nptel.ac.in/courses/112/104/112104225/

Reference Books:

US-FIT-205 Paper V

1. Green IT Toby Velte, Anthony Velte, Robert Elsenpeter, McGraw Hill, 1st Edition
2. Green Data Center: Steps for the Journey by Alvin Galea, Michael Schaefer, Mike Ebbers Shroff Publishers and Distributers, 2011
3. Green Computing and Green IT Best Practice by Jason Harris Emereo, 2008
4. Green Computing Tools and Techniques for Saving Energy, Money and Resources by Bud E. Smith, CRC Press, 2014

Part 7 -Detailed Scheme Practical

Course Code: US-FIT-2P1

Practical I	Python Programming	Total Credits: 2
Unit (1 to 5)	Content	No. of Lectures (108)
1	Basic programs using Python	
2	Based on String related programs	
3	Programs based on lists	
4	Programs based on File operation	
5	Programs on Class operation	
6	Programs on Graphics using python	
7	Programs on Design widget and modifications	
8	Programs on Design database applications	
9	Programs based on Exception handling	
10	Additional programs	

Course Code: US-FIT-2P2

Practical II	Microprocessor Architecture and Interfacing	Total Credits: 2
Unit (1 to 5)	Content	No. of Lectures (108)
1	Assembly Language programs Perform the given Operations related to memory locations	
2	Simple assembly language programs	
3	Packing and unpacking operations programs	
4	Register Operations programs	
5	Multiple memory locations	
6	Calculations with respect to memory locations	
7	Assembly programs on memory locations	
8	String operations in assembly programs	
9	Calculations on memory locations	
10	Programming peripheral ICs 8255and 8155	

Course Code: US-FIT-2P3

Practical III	Introduction to UNITY and graphics	Total Credits: 2
Unit (1 to 5)	Content	No. of Lectures (108)
1.	Create a User Interface using Photoshop	
2.	Model the given Prop in 3d	
3.	Programs on Texturing and Animation	
4	Texture the given Prop	
5	Rig and Animate a Ball	
6	Create a calculator application using Unity and C#	
7	Create a Roll a ball game	
8	Programs on Augmented and Virtual Reality	
9	Created Augmented reality application for Object placement	
10	Created Virtual reality Machine Functionality application.	

Course Code: US-FIT-2P4 Mathematics II

Practical IV	Introduction to UNITY and graphics	Total Credits: 2
Unit (1 to 5)	Content	No. of Lectures (108)
1	Programs on Iterative Calculation	
2	Program on Solution of algebraic and transcendental equations	
3	Program on Interpolation	
4	Program on Solving linear system of equations by iterative methods	
5	Program on Numerical Differentiation	
6	Program on Numerical Integration	
7	Program on Solution of differential equation	
8	Program on Regression	
9	Program on Random variables and distributions	
10	Program on Distributions	

Course Code: US-FIT-2P5 Green Computing

Mini Working Project Guidelines:

1. A project should be done based on the objectives of Green Computing. A report of minimum 50 pages should be prepared. The report should have a font size of 12, Times new roman and 1.5 line spacing. The headings should have font size 14. The report should be hard bound.
2. The project can be done individually or a group of two students.
3. The students will have to present the project during the examination.
4. A certified copy of the project report is essential to appear for the examination.