COURSE STRUCTURE AND DETAILED SYLLABUS

for

B.Tech.

in

Information Technology

Effective from

Academic Year 2018-2019

Department of Information Technology
Course Structure

I B.Tech I Semester

S. No.	Subject			Hours			C
	Code	Type	Title	L	T	P	
01	18CMMAT1010	BS	Engineering Mathematics-I	3	1		4
02	18ITPHT1020	BS	Engineering Physics	3	1		4
03	18CMCST1030	ES	Programming for Problem Solving	3			3
04	18CMMEL1040	ES	Engineering Graphics	1		4	3
05	18ITPHL1050	BS	Engineering Physics Lab			3	1.5
06	18CMCSL1060	ES	Programming for Problem Solving Lab			4	2
07	18CMMEL1070	ES	Workshop/Manufacturing Practice	0		3	1.5
08	18CMCHN1080	MC	Environmental Science	3			0
				14	2	15	**19**
				31			

I B. Tech II Semester

S. No.	Subject			Hours			C
	Code	Type	Title	L	T	P	
01	18CMEGT2010	HS	Technical English	3			3
02	18CMMAT2020	BS	Engineering Mathematics-II	3	1		4
03	18CMCHT2030	BS	Engineering Chemistry	3	1		4
04	18CMEET2040	ES	Basic Electrical Engineering	3	1		4
05	18CMEGL2050	HS	English Communication Skills Lab			2	1
06	18CMCHL2060	BS	Engineering Chemistry Lab			3	1.5
07	18CMEEL2070	ES	Basic Electrical Engineering Lab			3	1.5
08	18CMMSN208	MC	Indian Constitution,	3			0

	0		Professional Ethics & Human Rights				
				15	3	8	**19**
				26			

II B. Tech I Semester

S. No.	Subject			Hours			C
	Code	Type	Title	L	T	P	
01	18CMMAT3010	BS	Engineering Mathematics-III	3	1		4
02	18ITECT3020	ES	Digital Electronics	3			3
03	18ITECT3030	ES	Analog Electronic Circuits	3			3
04	18ITITT3040	PC	Discrete Mathematics	3	1		4
05	18ITITT3050	PC	Data Structures	3			3
06	18ITECL3060	ES	Analog & Digital Electronics Lab			3	1.5
07	18ITITL3070	PC	IT Workshop Lab			3	1.5
08	18ITITL3080	PC	Data Structures Lab			3	1.5
				15	2	9	**21.5**
				26			

II B. Tech II Semester

S. No.	Subject			Hours			
	Code	Type	Title	L	T	P	C
01	18ITECT4010	ES	Signals & Systems	3			3
02	18CMCET4020	ES	Engineering Mechanics	3			3
03	18ITITT4030	PC	Computer Organization	3			3
04	18ITITT4040	PC	Algorithm Design and Analysis	3			3
05	18ITITT4050	PC	Java Programming	3			3
06	18ITITL4060	PC	Computer Organization Lab			3	1.5
07	18ITITL4070	PC	Algorithm Design and Analysis Lab			3	1.5
08	18ITITL4080	PC	Java Programming Lab			3	1.5
				15		9	**19.5**
				24			

III B. Tech I Semester

S. No.	Subject			Hours			
	Code	Type	Title	L	T	P	C
01	18CMBIT5010	BS	Biology for Engineers	3			3
02	18CMEGT5020	HS	Personality Development & Professional Communication	2			2
03	18CMMST5030	HS	Management Science	3			3
04	18ITITT5040	PC	Database Systems	3			3
05	18ITITT5050	PC	Operating Systems	3			3
06	18ITITL5060	PC	Advanced Java and Web Technologies Lab			3	1.5
07	18ITITL5070	PC	Operating Systems& UNIX Programming Lab			3	1.5
08	18ITITL5080	PC	Database Systems Lab			3	1.5
				14		9	**18.5**
				23			

III B. Tech II Semester

S. No.	Subject			Hours			C
	Code	Type	Title	L	T	P	
01	18ITITT6010	PC	Computer Networks	3			3
02	18ITITT6020	PC	Software Engineering	3			3
03	18ITITP603G	PE	Program Elective-I	3			3
04	18ITITO604G	OE	Open Elective-I	3			3
05	18CMMST6050	HS	Engineering Economics & Financial Management	3			3
06	18ITITL6060	PC	Software Engineering Lab			3	1.5
07	18ITITL6070	PC	Python Programming Lab			3	1.5
08	18ITITR6080	PROJ	Term Paper + Seminar			4	2
				14		9	**20**
				23			

Program Elective-I	
18ITITP603**1**	Wireless Sensor Networks
18ITITP603**2**	UI Design

IV B. Tech I Semester

S. No.	Subject			Hours			C
	Code	Type	Title	L	T	P	
01	18ITITT7010	PC	Cryptography and Network security	3			3
02	18ITITP702G	PE	Program Elective-II	3			3
03	18ITITP703G	PE	Program Elective-III	3			3
04	18ITITO704G	OE	Open Elective-II	3			3
05	18ITITO705G	OE	Open Elective-III	3			3
06	18ITITL7060	PC	Object Oriented Analysis and Design Lab			3	1.5
07	18ITITR7070	PROJ	Internship				2
08	18ITITR7080	PROJ	Project Phase – I			8	4

				15	0	11	**22.5**
				26			

IV B. Tech II Semester

S. No.	Subject			Hours			C
	Code	Type	Title	L	T	P	
01	18ITITP801G	PE	Program Elective-IV	3			3
02	18ITITP802G	PE	Program Elective-V	3			3
03	18ITITP803G	PE	Program Elective-VI	3			3
04	18ITITO8040	OE	Open Elective-IV	3			3
05	18ITITR8050	PROJ	Project Phase- II			14	7
06			Co-curricular/Extra-curricular Activities	2			1
				12		14	**20**
				26			

Distribution of Credits:

Semester	**HS**	**BS**	**ES**	**PC**	**PE**	**OE**	**PROJ**	**TOTAL**
I		9.5	9.5					19
II	4	9.5	5.5					19
III		4	7.5	10				21.5
IV			6	13.5				19.5
V	5	3		10.5				18.5
VI	3			9	3	3	2	20
VII				4.5	6	6	6	22.5
VIII					9	3	8	20
TOTAL	11	26	29.	48.	18	12	15	**160.0**

			5	5				
AICTE	12	24	29	49	18	12	15	159

Program Elective-II	
18ITITP7021	R Programming
18ITITP7022	Software Quality Assurance

Program Elective-III	
18ITITP7031	Cloud Computing
18ITITP7032	Software Testing Methodologies

Program Elective-IV	
18ITITP8011	Distributed Databases
18ITITP8012	Fault Tolerant Systems

Program Elective-V	
18ITITP8021	Big Data Analytics
18ITITP8022	Software Project Management

Program Elective-VI	
18ITITP8031	Open Source Software
18ITITP8032	Optimization Techniques

Open Electives (offered by IT chosen by Students other than IT Department)

Sl. No.	Subject Title
A	Office Automation
B	Internet & Web Hosting
C	Cloud Computing
D	E-Commerce
E	Statistics and R Programming
F	Open Source software
H	Mobile Application Development

Department of Information Technology

Detailed Syllabus

I SEMESTER (I-I)

ENGINEERING MATHEMATICS-I			
Subject Code	18CMMAT1010	IA Marks	30
Number of Lecture Hours/Week	3(L) + 1(T)	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 04			
Unit -1			**Hours**
First order and first degree Ordinary Differential Equations Exact, reducible to exact, linear and Bernoulli's differential equations. Orthogonal trajectories in Cartesian and polar form. Simple problems on Newton's law of cooling. Law of natural growth and decay.			**10**
Unit -2			
Linear differential equations with constant coefficients: Solutions of second and higher order differential equations - inverse differential operator methods, Method of variation of parameters. Application: LCR Circuits			**08**
Unit – 3			
Partial derivatives – Definition and Euler's theorem (without proof), total derivatives, partial differentiation of composite functions. Jacobian - Functional dependence. Taylor's and Maclaurin's theorems for function of two variables (statement only). Maxima and minima- LaGrange's method of undetermined multipliers			**10**
Unit – 4			
First order Partial differential equations: Formation of Partial differential equations by elimination of arbitrary constants and arbitrary functions – solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations **Higher order Partial differential equations:** Solutions of Homogeneous and Non Homogeneous partial differential equations with constant coefficients –Classification of partial differential equations.			**10**
Unit – 5			
Double and triple integrals: Evaluation of double and triple integrals. Evaluation of double integrals by changing the order of integration and by changing into polar co-ordinates. Beta and gamma functions and their properties **Vector Calculus** – Gradient – Divergence - Curl - Line integrals-definition and problems, surface and volume integrals definition, Green's theorem in a plane, Stokes and Gauss-divergence theorems (without proof) and problems.			**12**

Text(T) / Reference(R) Books:	
T1	Higher Engineering Mathematics, B S Grewal, Khanna Publishers, 44th edition, 2016
T2	Advanced Engineering Mathematics, Erwin Kreyszig, Wiley, 9th edition, 2013
R1	Higher Engineering Mathematics, B V Ramana, Tata Mc Graw-Hill, 2006
R2	A Text Book of Engineering Mathematics, NPBali and Manish Goyal, Laxmi publications
R3	Higher Engineering Mathematics, HKDass and Er. RajnishVerma, S.Chand publishing, 1st edition, 2011.

Course Outcomes: On completion of this course, students can	
CO1	Solve first order differential equations
CO2	Solve linear differential equations with constant coefficients
CO3	Find the extrema of a function
CO4	Solve partial differential equations
CO5	Evaluate multiple integrals
CO6	Verify vector integral theorems

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	2	3	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	3	-	-	-	-	-	-	-	-	-	-	-	-
CO6	2	3	-	-	-	-	-	-	-	-	-	-	-	-
Course	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

ENGINEERING PHYSICS Semiconductor Physics & Semiconductor Optoelectronics			
Subject Code	18ITPH1020	IA Marks	30
Number of Lecture Hours/Week	3(L) + 1(T)	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 04			
Unit -1			**Hours**
Electronic materials Free electron theory-Classical &Quantum theory, Density of states, Fermi level, Occupation probability, Bloch theorem, Kronig-Penny model (to introduce origin of band gap), E-k diagram and Effective mass. Types of electronic materials: metals, semiconductors, and insulators.			**10**
Unit -2			
Semiconductors Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Hall effect and its applications.			**10**
Unit – 3			
Light-semiconductor interaction Types of Semiconductor materials of interest for optoelectronic devices, band gap modification, Hetero structures, Optical transitions in bulk semiconductors: absorption, spontaneous emission, and stimulated emission, Joint density of states, Density of states for photons, Transition rates (Fermi's golden rule), Optical loss and gain, Photovoltaic effect.			**10**
Unit – 4			
Semiconductor light emitting diodes (LEDs) Direct and indirect band gap semiconductors, Injection Electro luminescence, LED: Device structure, materials, characteristics, Laser diode, Quantum-well, -wire, and -dot based lasers.			**10**
Unit – 5			
Photodetectors & Low-dimensional optoelectronic devices General properties of Photo detectors, Photo conductors, Types of semiconductor photo detectors -p-n junction, PIN, and Avalanche --- and their structure, materials, working principle, and characteristics, Noise limits on performance, Solar cells.			**10**

Text(T) / Reference(R) Books:	
T1	Solid State Physics, S O Pillai, New Age Publications
T2	Fundamentals of Photonics, B E A Saleh and M C Teich, John Wiley & Sons
R1	Engineering Physics, Ch Srinivas, Ch Seshubabu, Cengage learning publications
R2	Semiconductor Optoelectronic Devices, P Bhattacharya, Prentice Hall of India, 1997
R3	Semiconductor Optoelectronics, M R Shenoy, NPTEL Course
R4	Optoelectronic Materials and Devices, Monica Katiyar and Deepak Gupta, NPTEL Course

Course Outcomes: On completion of this course, students can	
CO1	Explain the conducting mechanism in metals
CO2	Estimate the concentration of charge carriers
CO3	Describe light-semiconductor interaction
CO4	Illustrate the working function of LEDs and diode lasers
CO5	Illustrate the working function ofphoto detectors
CO6	Illustrate the working function ofsolar cells

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	1	2	-	-	-	-	-	-	-	-	-	-	-
CO4	3	1	2	-	-	-	-	-	-	-	-	-	-	-
CO5	3	1	2	-	-	-	-	-	-	-	-	-	-	-
CO6	3	2	2	-	-	-	-	-	-	-	-	-	-	-
Course	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

PROGRAMMING FOR PROBLEM SOLVING (Common for all programs)			
Subject Code	18CMCST1030	IA Marks	30
Number of Lecture Hours/Week	03	EA Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits - 03			
Unit-I: Introduction to computer systems and programming			**Hours**
History & Hardware Computer Hardware, Components, Types of Software, Memory Units. **Introduction to Problem solving** Algorithm, Characteristics of Algorithms, Basic operations of algorithms, Pseudocode, Flowchart, Types of languages, Relation between Data, Information, Input and Output. **Basics of C** History and Features of C, Importance of C, Procedural Language, Compiler versus Interpreter, Structure of C Program, Program development steps, programming errors.			**08**
Unit-II: C Expressions, evaluation and control statements			
Overview of C Character Set, C-Tokens, Data Types, Variables, Constants, Operators, Operator precedence and Associativity, converting mathematical expressions to C-expressions, evaluation of C-expressions, Input/output functions. **Conditional Branching** if statement, if...else statement, Nested if...else statement, if…else…if ladder, switch statement. **Unconditional Branching** goto **Control flow statements:** break, continue. **Looping Constructs:** do-while statement, while statement, for statement.			**12**
Unit-III: Arrays and Functions			
Arrays Introduction, 1-D Arrays, Character arrays and string representation, 2-D Arrays (Matrix), Multi-Dimensional Arrays. **Functions** Basics, necessity and advantages, Types of functions, Parameter passing mechanisms, Recursion, Storage Classes, Command Line Arguments,			**10**

Conversion from Recursion to Iteration and vice-versa. **Strings** Working with strings, String Handling Functions (both library and user defined)	
Unit-IV: Derived and User Defined Data types	
Pointers Understanding Pointers, Pointer expressions, Pointer and Arrays, Pointers and Strings, Pointers to Functions. **Dynamic Memory Allocation** Introduction to Dynamic Memory Allocation malloc, calloc, realloc, free. **Structures and Unions** Defining a Structure, typedef, Advantage of Structure, Nested structures, Arrays of Structures, Structures and Arrays, Structures and Functions, Structures and Pointers, Defining Unions, Union within union, Structure within union, Union within structure, self-referential structures, bitfields, enumerations.	**12**
Unit-V: Preprocessing and File Handling	
Preprocessing Directives Macro Substitution, File Inclusion, conditional compilation and other directives **File Management in C** Introduction to File Management, Modes and Operations on Files, Types of files, Error Handling During I/O Operations.	**08**

Text(T) / Reference(R) Books:	
T1	Computer Programing ANSI C, E Balagurusamy, McGraw Hill Education
T2	Programming in C, Reema Thareja, Second Edition, Oxford Higher Education
R1	Computer Basics and C Programming, V Raja Raman, Second Edition

Course Outcomes: On completion of this course, students can	
CO1	Formulate algorithms, translate them into programs and correct program errors
CO2	Choose right control structures suitable for the problem to be solved
CO3	Decompose reusable code in a program into functions (Iterative and recursive)
CO4	Use arrays, pointers, structures and unions appropriately
CO5	Explain Memory allocation strategies
CO6	Store and Retrieve data from permanent storage

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	3	1	-	3	-	-	-	-	-	-	-	-	-
CO2	2	3	3	-	1	-	-	-	-	-	-	-	-	-
CO3	2	2	3	-	1	-	-	-	-	-	-	-	-	-
CO4	3	2	3	-	1	-	-	-	-	-	-	-	-	-
CO5	2	2	2	-	1	-	-	-	-	-	-	-	-	-
CO6	2	2	2	-	1	-	-	-	-	-	-	-	-	-
Course	**2**	**2**	**2**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

ENGINEERING GRAPHICS			
Subject Code	18CMMEL1040	IA Marks	30
Number of Lecture Hours/Week	1(L)+4(P)	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			
Unit -1			**Hours**
Introduction to Engineering Drawing covering, Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections – Ellipse, Parabola, Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;			**10**
Unit -2			
Projections of Points and lines inclined to both planes; Projections of planes inclined to one plane			**08**
Unit – 3			
Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes			**10**
Unit – 4			
Sections and Sectional Views of Right Angular Solids covering, Prism, Cylinder, Pyramid, Cone			**10**
Unit – 5			
Isometric Projections Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions **Introduction to AUTOCAD** The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows			**12**

Text(T) / Reference(R) Books:	
T1	Engineering Drawing, NDBhatt, Chariot Publications
T2	Engineering Drawing + AutoCAD, K Venugopal, V. Prabhu Raja, New Age Publishers
R1	Engineering Drawing, Agarwal & Agarwal, Tata McGraw Hill Publishers
R2	Engineering Drawing, KLNarayana& P Kannaiah, SciTech Publishers
R3	Engineering Graphics for Degree, KC John, PHI Publishers
R4	Engineering Graphics, PI Varghese, McGrawHill Publishers

Course Outcomes: On completion of this course, students can	
CO1	Construct Polygons using general methods, inscribe and describe polygons on circles,draw curves (parabola, ellipse and hyperbola, cycloids, involutes) by general methods
CO2	Read, Interpret and Construct plain scales, diagonal scales and Vernier scales
CO3	Draw orthographic projections of points, lines, Planes & Solids inclined to one reference plane and apply these concepts to solve practical problems related to engineering
CO4	Draw sections and sectional views of Solids
CO5	Draw isometric view of lines, plane figures and simple solids, Convert given isometric views into orthographic views, and apply these concepts to solve practical problems related to engineering
CO6	Draw objects using draw and modify toolbars of AutoCAD

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	-	3	-	-	-	-	-	-	3	-	2	-	-
CO2	2	-	3	-	-	-	-	-	-	3	-	2	-	-
CO3	2	-	3	-	-	-	-	-	-	3	-	2	-	-
CO4	2	-	3	-	-	-	-	-	-	3	-	2	-	-
CO5	2	-	3	-	-	-	-	-	-	3	-	2	-	-
CO6	2	-	3	-	-	-	-	-	-	3	-	2	-	-
Course	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**2**	**-**	**-**

ENGINEERING PHYSICS LABORATORY			
Subject Code	18ITPHL1050	IA Marks	50
Number of Practice Hours/Week	3(P)	Exam Marks	50
Total Number of Practice Hours	36	Exam Hours	03
Credits – 1.5			

List of Experiments

Exercise 1

Study the atomic levels in Neon- Argon gases-Franck- Hertz experiment.

Exercise 2

Determine the resistivity of wire using four probe methods.

Exercise 3

Determine the Boltzmann constant using PN junction diode.

Exercise 4

Determine the Energy band gap of P-N junction diode.

Exercise 5

Determine the Hall coefficient-Hall effect.

Exercise 6

Study the spectral response of photo diode-Planck's constant.

Exercise 7

Draw the LED current-voltage characteristics.

Exercise 8

Draw the diode laser (LD) current-voltage characteristics.

Exercise 9

Draw the Photo diode current-voltage characteristics.

Exercise 10

Measure the current-voltage characteristics of a solar cell (Photovoltaic cell) at different light intensities.

Course Outcomes: On completion of this course, students can	
CO1	Understand the existence of the energy levels in gases
CO2	Study the resistivity variation with temperature in conductor
CO3	Determine the energy band gap of semiconductor diode
CO4	Understand the phenomenon of Hall Effect
CO5	Understand the interaction of the light with semiconductor
CO6	Study the characteristic curves of the LEDs, Laser diode & Solar cells

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	3	1	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	1	3	-	-	-	-	-	-	-	-	-	-	-
CO4	3	1	3	-	-	-	-	-	-	-	-	-	-	-
CO5	3	1	3	-	-	-	-	-	-	-	-	-	-	-
CO6	3	1	3	-	-	-	-	-	-	-	-	-	-	-
Course	**3**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

PROGRAMMING FOR PROBLEM SOLVING LAB (Common for all branches)			
Subject Code	18CMCSL1060	IA Marks	50
Number of Practice Hours/Week	4(P)	Exam Marks	50
Total Number of Practice Hours	48	Exam Hours	03
Credits - 02			

List of Experiments

Exercise 1 (Familiarization with programming environment)

a) Familiarization of CODE BLOCKS C++ Editor to edit, compile, execute, test and debugging C programs.
b) Familiarization of RAPTOR Tool to draw flow charts and understand flow of control.
c) Acquittance with basic LINUX commands.

Exercise 2 (Simple computational problems using arithmetic expressions)

a) Write a C Program to display real number with 2 decimal places.
b) Write a C Program to convert Celsius to Fahrenheit and vice versa.
c) Write a C Program to calculate the area of triangle using the formula
area = $\sqrt{s(s-a)(s-b)(s-c)}$ where $s = \frac{a+b+c}{2}$
d) Write a C program to find the largest of three numbers using ternary operator.
e) Write a C Program to swap two numbers without using a temporary variable.

Exercise 3 (Problems involving if-then-else structures)

a) Write a C Program to check whether a given number is even or odd using bitwise operator, shift operator and arithmetic operator.
b) Write a C program to find the roots of a quadratic equation.
c) Write a C Program to display grade based on 6 subject marks using if…else…if ladder.
d) Write a C program, which takes two integer operands and one operator form the user, performs the operation and then
e) prints the result using switch control statement. (Consider the operators +, -, *, /, %)

Exercise 4 (Iterative problems)

a) Write a C Program to count number of 0's and 1's in a binary representation of a given number.
b) Write a C program to generate all the prime numbers between two numbers supplied by the user.
c) Write a C Program to print the multiplication table corresponding to number supplied as input.

Exercise 5 (Iterative problems)

a) Write a C Program to Find Whether the Given Number is
i) Armstrong Number ii) Palindrome Number
b) Write a C Program to print sum of digits of a given number

Exercise 6 (Series examples)

a) Write a C Program to calculate sum of following series

b) 1+2+3+…. n b)1+1/2+1/3+……+1/n c)1+x+x^2+x^3……+x^n

Exercise 7 (1D Array manipulation)

a) Write a C program to interchange the largest and smallest numbers in the array.

b) Write a C program to search an element in an array (linear search).

c) Write a C Program to print the following pattern using a character array

S

SA

SAS

SASI

Exercise 8 (Matrix problems, String operations)

a) Write a C program to add two matrices.

b) Write a C program to multiply two matrices if they are compatible or print an error message "incompatible matrix sizes" otherwise.

c) Write a C program to check given matrix is symmetric or not.

d) Implement the following string operations with and without library functions.

i) copy ii) concatenate iii) length iv) compare

Exercise 9 (Simple functions)

a) Write a C Program demonstrating the following function types

i. With arguments and with return value.
ii. With arguments and without return value
iii. Without arguments and without return value.
iv. Without arguments and with return value.

b) Write a C Program illustrating call by reference

Exercise 10 (Recursive functions)

Write a C Program illustrating the following with Recursion without Recursion

a) Factorial b) GCD c) Power d) Fibonacci

Exercise 11(Pointers and structures)

a) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.

b) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function.

Note: Understand the difference between the above two programs.

c) Write a C Program to read and print student details using structures.

Exercise 12 (File operations)

a) Write a C program to open a file and to print its contents on screen.

b) Write a C program to copy files

c) Write a C program merges two files onto a new file.

d) Write a C program to delete a file.

Course Outcomes: On completion of this course, students can	
CO1	Attain knowledge on using CODE BLOCKS and RAPTOR tools in solving problems
CO2	Examine and analyze alternative solutions to a problem
CO3	Design asolution to a problem using problem decomposition and step-wise refinement
CO4	Demonstrate conversion of iterative functions to recursive and vice-versa
CO5	Demonstrate usage of arrays, structures and unions
CO6	Demonstrate reading from and writing to files along with simple file operations

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	-	3	-	-	-	-	-	-	-	-	-
CO2	2	3	3	-	2	-	-	-	-	-	-	-	-	-
CO3	2	3	3	-	2	-	-	-	-	-	-	-	-	-
CO4	2	3	3	-	2	-	-	-	-	-	-	-	-	-
CO5	2	3	3	-	2	-	-	-	-	-	-	-	-	-
CO6	2	3	3	-	2	-	-	-	-	-	-	-	-	-
Course	**2**	**3**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

WORKSHOP/MANUFACTURING PRACTICE			
Subject Code	18CMMEL1070	IA Marks	50
Number of Practice Hours/Week	3(P)	Exam Marks	50
Total Number of Practice Hours	36	Exam Hours	03
Credits – 1.5			

List of Experiments

Exercise 1 (lectures & Videos)

a) Manufacturing Methods: casting, forming, machining, Joining, Advanced methods
b) CNC machining, Additive manufacturing

Exercise 2 (lectures & Videos)

a) Fitting operations & power tools
b) Electrical & Electronics
c) Carpentry

Exercise 3(lectures & Videos)

a) Plastic molding, glass cutting
b) Metal casting
c) Welding (arc welding & gas welding), brazing

Exercise 4(Black smithy)

a) S-Hook
b) Square Rod to Round Rod

Exercise 4(Carpentry)

a) T-Lap Joint
b) Cross Lap Joint

Exercise 6(Foundry)

a) Mold for solid
b) Mold for split pattern

Exercise 7(Fitting)

a) Square fitting
b) V-fitting

Exercise 8(Welding)

a) Butt Joint
b) Lap Joint

Exercise 9(Machine Tools)

a) Turning
b) Knurling

Exercise 10(Plastic Molding)

c) Key Chain Molding

Course Outcomes: On completion of this course, students can	
CO1	Make use of basic carpentry joints to make furniture
CO2	Fabricate mechanical engineering assemblies using fitting joints
CO3	Produce various machine components by using foundry, black smithy, machining and plastic molding techniques

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	1	-	-	-	1	-	-	-	-	-
Course	**3**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**

ENVIRONMENTAL SCIENCE			
Subject Code	18CMCHN1080	IA Marks	30
Number of Lecture Hours/Week	04	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 00			

Unit -1 (MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES)	**Hours**
Environment Definition, Introduction, Scope and Importance, Global environmental challenges, global warming & climate change, Acid rains, ozone layer depletion, Carbon credits, Sustainability, Stockholm & Rio Summit, Population growth & explosion, Role of Information Technology in Environment and human health. **Ecosystem** Concept, Structure and function, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of the different ecosystems	**10**
Unit -2 (RESOURCES)	
Natural Resources Renewable and non-renewable resources, Natural resources and associated problems **Forest resources** Use and over exploitation, deforestation, Timber extraction, Mining, dams and other effects on forest and tribal people **Water resources** Use and over utilization of surface and ground water, Floods, drought, conflicts over water, dams – benefits and problems **Mineral resources** Use and exploitation, environmental effects of extracting and using mineral resources. **Food resources** World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. **Energy resources** Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.	**12**
Unit – 3 (BIODIVERSITY AND ITS CONSERVATION)	
Introduction, Definition, genetic, species and ecosystem diversity,	**06**

Biogeographicalclassification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aestheticand option values, Biodiversity at global, National and local levels. India as a mega-diversity nation, Hot-spots ofbiodiversity, Threats to biodiversity: habitat loss, Endangered andendemic species of India, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.	
Unit – 4	
Environmental Pollution Definition, Cause, effects and control measures of :Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards **Solid waste Management** Causes, effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution, Pollution case studies.	**12**
Unit – 5	
Social Issuesand the Environment Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people its problems and concerns. **Environment Protection Acts** Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness. **Field work** Visit to a local area to document environmental assets: River/forest/grassland/hill/mountain Visit to a local polluted site: Urban/Rural/industrial/Agricultural Study of common plants, insects, birds Study of simple ecosystems: pond, river, hill slopes, etc.	**10**

Text(T) / Reference(R) Books:	
T1	Environmental Studies, E Bharucha, University Publishing Company, New Delhi, 2003
T2	Environmental Science and Engineering, JG Henry and GW Heinke, 2nd edition, Prentice Hall of India, New Delhi, 2004
T3	Introduction to Environmental Engineering and Science, G M Masters, 2nd edition, Prentice Hall of India, New Delhi, 2004
R1	Environmental Studies, Deeshita Dave & P Udaya Bhaskar, Cengage Learning
R2	Environmental Studies, KVSGMurali Krishna, VGS Publishers, Vijayawada
R3	Environmental Studies, PNPaliniswamy, P Manikandan, A Geeta and K Manjula Rani, Pearson Education

Course Outcomes: On completion of this course, students can	
CO1	Explain importance of Environmental studies and the measures to be taken to overcome global environmental challenges
CO2	Describe the concept of ecosystem and its diversity
CO3	Describe knowledge on natural resources
CO4	Explain concept of biodiversity
CO5	Explain knowledge on environmental pollution
CO6	Debate knowledge on environmental legislation and global treaties

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	-	3	-	-	-	-	-	-	-	-	-
CO2	2	3	3	-	2	-	-	-	-	-	-	-	-	-
CO3	2	3	3	-	2	-	-	-	-	-	-	-	-	-
CO4	2	3	3	-	2	-	-	-	-	-	-	-	-	-
CO5	2	3	3	-	2	-	-	-	-	-	-	-	-	-
CO6	2	3	3	-	2	-	-	-	-	-	-	-	-	-
Course	**2**	**3**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

II SEMESTER (I-II)

TECHNICAL ENGLISH			
Subject Code	18CMEGT2010	IA Marks	30
Number of Lecture Hours/ Week	2(T)	Exam Marks	70
Total Number of Lecture Hours	30	Exams Hours	03
Credits -02			
Unit-1 (Principles of Scientific Vocabulary)			**Hours**
short and simple words, compact substitutes for wordy phrases, redundant words and expressions, Avoid hackneyed and stilted phrases, verbosity and incorrect use of words, role of roots in word building, prefixes and suffixes, confusing words and expressions. 1-4 chapters of Karmayogi non-detail text book (N1)			**10**
Unit-2 (Writing Skills)			
Distinguishing between academic and personal styles of writing, use of clauses in technical phrases and sentences, Techniques of Sentence and paragraph writing**,** Measuring the clarity of a text through Fog Index or Clarity Index 5-8 chapters of Karmayogi non-detail text book (N1)			**10**
Unit-3 (Common Errors in Writing)			
Subject-verb agreement, concord of nouns, pronouns and possessive adjectives, Common errors in the use of articles, prepositions, adjectives and adverbs, Punctuation, Technical Guidelines for Communication, Avoiding the pitfalls 9-12 chapters of Karmayogi non-detail text book (N1)			**10**
Unit-4 (Nature and Style of Sensible Technical Writing)			
Academic Writing Process, Describing, processes and products, Defining,Classifying, Effective use of charts, graphs, and tables 13-16 chapters of Karmayogi non-detail text book (N1)			**10**
Unit-5 (Report writing and Letter writing)			
Writing Technical Reports, Précis writing, Letter Writing, Essay writing 17-20 chapters of Karmayogi non-detail text book (N1)			**10**

Text(T) / Reference(R) Books:	
T1	Effective Technical Communication by Barun K Mitra, Oxford University Publication
N1	Karmayogi: A Biography of E Sreedharan, M S Ashokan
R1	Communication Skills, Sanjay Kumar &PushpaLatha, OUP
R2	Study Writing, Liz Hamp-Lyons and Ben Heasly, Cambridge University Press
R3	Remedial English Grammar, F T Wood, Macmillan 2007
R4	Practical English Usage, Michael Swan, Oxford University Press
R5	English Collocations in Use, Michael McCarthy & Felicity O'Dell
R6	Effective Technical Communication, Arsahf Rizvi

R7	Essential English Grammar, Raymond Murphy, CUP, 2017

Course Outcomes: On completion of this course, students can	
CO1	Use scientific vocabulary confidently
CO2	Apply basic principles of writing clear sentences and paragraphs
CO3	Writeerror free simple technical passages
CO4	Frame sentences corresponding to different writing styles
CO5	Confidently write clear and coherent letters and technical reports
CO6	Convert inspirations in the form of achievements and values upheld by renowned technocrats to writeups

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	-	-	-	-	-	-	-	-	2	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	2	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	2	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	2	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	2	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	2	-	-	-	-
Course	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**

ENGINEERING MATHEMATICS-II			
Subject Code	18CMMAT2020	IA Marks	30
Number of Lecture Hours/Week	3(L)+ 1(T)	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 04			

Unit -1 (Linear Algebra)	**Hours**
Rank of a matrix by elementary transformations, solution of system of linear equations: Gauss-elimination method, Gauss-Jordan method, Jacobi method and Gauss-Seidel method, Eigen values and Eigen vectors, Properties of Eigen values and Eigen vectors, Linear transformation, Diagonalization of a square matrix. Cayley-Hamilton theorem (without proof), Reduction of Quadratic form to Canonical form.	**10**
Unit -2 (Laplace Transforms)	
Laplace transforms of standard functions, shifting theorems, Transforms of derivatives and integrals, Unit step function, Dirac's delta function Inverse Laplace transforms, Convolution theorem (without proof) Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms	**10**
Unit – 3 (Numerical Methods-I)	
Numerical solution of algebraic and transcendental equations Regula-Falsi Method and Newton-Raphson method **Finite differences** Error functions, Forward, backward and central differences, Newton's forward and backward interpolation formulae. Gauss`s forward and backward interpolation formulae, Lagrange's interpolation formula (all formulae without proof)	**10**
Unit – 4 (Numerical Methods-II)	
Numerical integration Trapezoidal rule - Simpson's $(1/3)^{rd}$ and $(3/8)^{th}$ rules. **Numerical solutions of ordinary differential equations** Taylors series method, Picard's method, Euler's method, Modified Euler's method, Runge-Kutta method	**10**
Unit – 5 (Fourier Series and Transforms)	
Fourier Series Periodic functions, Dirichlet's condition, Fourier Series of periodic functions with period 2π and with arbitrary period. Fourier series of even and odd functions, Half range Fourier Series. **Fourier Transforms** Infinite Fourier transforms, Fourier sine and cosine transforms, Inverse Fourier	**10**

transforms.	

Text(T) / Reference(R) Books:	
T1	Higher Engineering Mathematics, B S Grewal, 44th Edition, Khanna publishers, 2016
T2	Advanced Engineering Mathematics, Kreyszig, 9th Edition, Wiley, 2013
R1	Higher Engineering Mathematics, B V Ramana, Tata McGrawHill, 2006
R2	A text book of Engineering Mathematics, N P Bali and Manish Goyal, 7th edition, Laxmi publications
R3	Higher Engineering Mathematics, H. K Dass and Er. Rajnish Verma, 1st edition, S. Chand publishing, 2011
R4	Engineering Mathematics, Volume II, Dr.KVNageswara Reddy and Dr.BRamaBhupal Reddy, Scitech Publications, 2017

Course Outcomes: On completion of this course, students can	
CO1	Solve system of linear equations and find eigen values and eigen vectors of a matrix
CO2	Solve initial value problems by using Laplace transforms
CO3	Find the solution of algebraic/transcendental equations and also interpolate the functions
CO4	Evaluate numerical integration and to solve ordinary differential equations by using numerical methods
CO5	Find Fourier series of a periodic function and to determine the Fourier transform of a function

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	2	3	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	3	-	-	-	-	-	-	-	-	-	-	-	-
Course	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

ENGINEERING CHEMISTRY			
Subject Code	18CMCHT2030	IA Marks	30
Number of Lecture Hours/Week	3(T) + 1(T)	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 04			

Unit -1	**Hours**
Periodic Properties Effective nuclear charge of chlorine and magnesium, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electro negativity, oxidation states, coordination numbers 2 & 3 and geometries, hard soft acids and bases.	**10**
Unit -2 (Use of Free Energy in Chemical Equilibria)	
Thermodynamic functions State and Path functions, First and second laws of thermodynamics, Gibbs Helmholtz Equation, concept of entropy and enthalpy. **Electro chemistry** Introduction, electrode potential, standard electrodes: Hydrogen and Calomel electrodes, Nernst equation and applications. **Water chemistry** Surface and subsurface water quality parameters: turbidity, pH, total dissolved salts, chloride content, break point chlorination. **Corrosion** Wet chemical theory, control methods: proper designing, cathodic protection, Sacrificial anodic and impressed current cathodic protection.	**10**
Unit – 3	
Stereochemistry Principles of stereochemistry, representations of 3-dimensional structures of organic compounds, geometrical and stereoisomers, configuration and symmetry, enantiomers. **Organic Reactions and Synthesis of a Drug Molecule** Introduction to reactions involving Substitution: SN^1& SN^2 with mechanism, Addition, Free radical, Elimination: E1 & E2 with examples (mechanism is not involved), Synthesis of aspirin drug molecule.	**10**
Unit – 4	
Atomic, Molecular Structure and Advanced Materials Schrodinger equation. Particle in a box solution and their applications for conjugated molecules. **Nanoparticles** Introduction, preparation methods: Sol-gel method, Chemical reduction	**10**

method, properties and applications. **Surface properties** Determination of surface tension and viscosity of liquids. **Ceramics** Classification, examples and applications. Crystal field theory and the energy level diagrams for transition metal ions.	
Unit – 5	
Spectroscopic Techniques Regions of electromagnetic spectrum, Principles of vibrational and rotational spectroscopy, Vibrational and rotational spectroscopy of diatomic molecules: Rigid diatomic molecules, selection rule, simple Harmonic Oscillator, diatomic vibrating rotator, Nuclear magnetic resonance, Principle and Instrumentation, Principles of chromatography, TLC & Paper.	**10**

Text(T) / Reference(R) Books:	
T1	Stereochemistry of Carbon Compounds, Ernest Eliel, McGraw Hill Education
T2	Fundamentals of Molecular Spectroscopy, C N Banwell
T3	Concise Inorganic Chemistry, J.D.Lee, 5th Edition; Wiley India
T4	Engineering Chemistry – Fundamentals and applications, Shikha Agarwal, CUP
T5	Organic Chemistry: Structure and Function, K P C Volhardt and N E Schore, 5thEdition
T6	Engineering Chemistry, Jain &Jain,Dhanpat Rai Publishing Company
R1	Engineering Chemistry (NPTEL Webbook), B L Tembe, Kamaluddin and M SKrishnan
R2	Physical Chemistry, P. W. Atkins
R3	Physical Chemistry, Glasstone S
R4	Advanced Inorganic Chemistry, Wilkinson G and Cotton FA

Course Outcomes: On completion of this course, students can	
CO1	Rationalize periodic properties like ionization potential, electro negativity and oxidation states
CO2	Describe the nature and working of various electrodes
CO3	Analyze bulk properties and processes using thermodynamic considerations
CO4	Synthesize organic molecules using different types of chemical reactions
CO5	Explain the concepts of atomic and molecular orbitals
CO6	Gain knowledge on spectroscopic techniques and the ranges of the electromagnetic spectrum used for exciting different molecular energy levels

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO5	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO6	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Course	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

BASIC ELECTRICAL ENGINEERING			
Subject Code	18CMEET2040	IA Marks	30
Number of Lecture Hours/week	3(L) +1(T)	Exam Marks	70
Total Number of Lecture Hours	60	Exam Hours	03
Credits – 04			

Unit -1	**Hours**
DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems (Simple numerical problems). Time-domain analysis of first-order RL and RC circuits.	**12**
Unit – 2	
AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three- phase balanced circuits, voltage and current relations in star and delta connections.	**12**
Unit – 3	
Transformers Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers,OC and SC tests, regulation and efficiency. Auto transformer and three-phase transformer connections.	**12**
Unit – 4 **Electrical Machines: AC machines** Generation of rotating magnetic fields, construction details and working of three phase induction motor, significance of torque – slip characteristics. Loss components and efficiency, starting and speed control of induction motor. Single phase induction motor. Construction and working of synchronous generators. **DC machines** Construction, working, torque- speed characteristics and speed control of dc shunt motor.	**14**
Unit – 5	
Power Converters and Electrical Installations DC Buck and boost converters, duty ratio control, PWM techniques, single phase voltage source inverters. Classification of batteries and Low Voltage switch gear.	**10**

Text(T) / Reference(R) Books:	
T1	Electrical and Electronics Technology, E Hughes, Pearson, 2010
T2	Basic Electrical Engineering, DC Kulshreshtha, McGraw Hill, 2009
T3	Basic Electrical Engineering, DP Kothari, IJ Nagrath
T4	Basic Electrical Engineering, J P Tewari, New Age International Publishers, 2003
R1	Power Electronics, M D Singh, 2nd Edition
R2	Battery Energy Storage for Smart Grid Applications, Eurobat, 2013
R3	Fundamentals of Electrical Engineering, L S Bobrow, OUP, 1996
R4	Electrical Engineering Fundamentals, V D Toro, PHI, 1989
R5	Understanding Batteries, RM Dell, DAJ Rand, 2001
R6	Protection and Switchgear, Bhavesh Bhalja, RP Maheshwari, Nilesh G Chothani, 5th impression, OUP, 2014

Course Outcomes: On completion of this course, students can	
CO1	Analyze DC circuits by using KCL, KVL and Network theorems
CO2	Analyze AC circuits
CO3	Explain the operation and compute performance of transformer
CO4	Explain the construction and working of rotating electrical machines
CO5	Describe DC-DC and DC-AC converters
CO6	Explain about types of LV switch gear and types of batteries

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO5	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO6	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Course	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

ENGLISH & COMMUNICATION SKILLS LABORATORY			
Subject Code	18CMEGL2050	IA Marks	50
Number of Practice Hours/Week	2(P)	Exam Marks	50
Total Number of Practice Hours	24	Exam Hours	03
Credits – 1			

List of Experiments

Exercise 1

Listening Comprehension.

Exercise 2

Pronunciation, Stress, Intonation & Rhythm.

Exercise 3

Common Everyday Situations: Conversations & Dialogues.

Exercise 4

Communication at Workplace: Job Application letter, Email & Resume.

Exercise 5

Interpersonal Communication Skills.

Exercise 6

Formal Presentations.

Learning Resources:	
R1	Interact – English Lab Manual for Undergraduate Students by Orient BlackSwan
R2	Ted Talks, Interviews with Achievers and select movies, https://www.ted.com/talk
R3	Toastmaster's speeches and table topics
R4	Book Reviews and movie reviews
R5	Exercises in Spoken English Parts: I-III, CIEFL, Hyderabad
R6	Oxford Guide to Effective Writing and Speaking by John Seely

Course Outcomes: On completion of this course, students can	
CO1	Improve listening comprehension
CO2	Pronounce words and sentences correctly
CO3	Dialogue with others
CO4	Upgrade interpersonal communication skills
CO5	Present ideas/concepts to audience

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	-	-	-	-	-	-	-	-	2	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	2	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	3	-	-	-	-
Course	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**

ENGINEERING CHEMISTRY LABORATORY			
Subject Code	18CMCHL2060	IA Marks	50
Number of Practice Hours/Week	3(P)	Exam Marks	50
Total Number of Practice Hours	36	Exam Hours	03
Credits – 1.5			

List of Experiments

(Any 10 experiments must be conducted)

Exercise 1

Determination of surface tension

Exercise 2

Determination of viscosity of a liquid by Ostwald viscometer

Exercise 3

Thin layer chromatography

Exercise 4

Determination of chloride content of water

Exercise 5

Determination Hardness of water by EDTA

Exercise 6

Determination of the rate constant of first order reaction (Ester hydrolysis)

Exercise 7

Determination of strength of strong acid using conductometric titration.

Exercise 8

Determination of strength of weak acid using conductometric titration.

Exercise 9

Determination of Ferrous iron using potentiometer.

Exercise 10

Synthesis of a drug – Aspirin

Exercise 11

Determination of the partition coefficient of a substance between two immiscible liquids

Exercise 12

Determination of strength of acetic acid using charcoal adsorption.

Exercise 13

Preparation of lattice structure and determination of atomic packing factor.

Exercise 14

Chemical oscillations- Iodine clock reaction

Exercise 15

Synthesis of Phenol formaldehyde resin.

Exercise 16

Saponification of oil

Course Outcomes: On completion of this course, students can	
CO1	Measure molecular properties like surface tension and viscosity
CO2	Determine chloride content of water of given water sample
CO3	Synthesize a drug
CO4	Determine rate constant as a function of time
CO5	Determine strength of acids using conductivity meter
CO6	Determine amount of Fe (II) using potentiometer

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	3	-	-	-	-	-	-	-	-	-	-	-	-
Course	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

BASIC ELECTRICAL ENGINEERING LAB			
Subject Code	18CMEEL2070	IA Marks	50
Number of Practice Hours/Week	2(P)	Exam Marks	50
Total Number of Practice Hours	24	Exam Hours	03
Credits – 01			

List of Experiments

(Any 12 experiments must be conducted)

Exercise 1

Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors andinductors.

Exercise 2

Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storageoscilloscope).

Exercise 3

Series and Parallel resonance of RL and RC circuits.

Exercise 4

No-load and load test on single phase Transformer (measurement of primary and secondary voltages and currents, and power).

Exercise 5

Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents). Phase-shifts between the primary and secondary side. Cumulative three-phase power in balanced three-phase circuits.

Exercise 6

Torque Speed Characteristic of dc shuntmotor.

Exercise 7

Break test on single phase induction motor.

Exercise 8

Field excitation control of Synchronous Machine.

Exercise 9

OC & SC tests on a single-phase transformer.

Exercise 10

V-I characteristics of PN junction diode.

Exercise 11

Half and Full wave rectifier with and without filter.

Exercise 12

Demonstration of

a) dc-dc converters

b) dc-ac converters – PWM waveform
c) the use of dc-ac converter for speed control of an induction motor
d) Components of LTswitchgear.

Course Outcomes: On completion of this course, students can	
CO1	Know the importance of measuring instruments
CO2	Determine the response and resonance of given RL, RC and RLC circuits
CO3	Determine the voltage, current and performance characteristics of a single-phase transformer
CO4	Determine the speed torque characteristics of dc shunt motor
CO5	Determine the breakdown voltage of PN junction diode
CO6	Determine the ripple factor for half wave and full wave rectifier with and without filter

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1	-	-	-	1	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	1	-	-	-	-	-	-	-	-	-
CO3	1	-	-	-	1	-	-	-	-	-	-	-	-	-
CO4	1	-	-	1	1	-	-	-	-	-	-	-	-	-
CO5	1	-	-	1	1	-	-	-	-	-	-	-	-	-
CO6	1	-	-	1	1	-	-	-	-	-	-	-	-	-
Course	**1**	**-**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

CONSTITUTION OF INDIA, PROFESSIONAL ETHICS & HUMAN RIGHTS (Common to all)			
Subject Code	18CMMSN2080	IA Marks	30
Number of Lecture Hours/Week	3(L)	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 00			

Unit -1	**Hours**
Lesson: Introduction to the Constitution of India, The Making of the Constitution and Salient features of the Constitution. Preamble to the Indian Constitution Fundamental Rights & its limitations.	**10**
Unit -2	
Lesson: Directive Principles of State Policy & Relevance of Directive Principles State Policy Fundamental Duties. Union Executives – President, Prime Minister Parliament Supreme Court of India.	**10**
Unit – 3	
Lesson: State Executives – Governor, Chief Minister, State Legislature High Court of State. Electoral Process in India, Amendment Procedures, 42nd, 44th, 74th, 76th, 86th &91st Amendments.	**10**
Unit – 4	
Lesson: Special Provision for SC & ST Special Provision for Women, Children & Backward Classes Emergency Provisions. Human Rights –Meaning and Definitions, Legislation Specific Themes in Human Rights- Working of National Human Rights Commission in India Powers and functions of Municipalities, Panchayats and Co-Operative Societies.	**10**
Unit – 5	
Lesson: Scope & Aims of Engineering Ethics, Responsibility of Engineers Impediments to Responsibility. Risks, Safety and liability of Engineers, Honesty, Integrity & Reliability in Engineering.	**10**

Text(T) / Reference(R) Books:	
T1	Introduction to the Constitution on India, Durga Das Basu, (Students Edn.) Prentice –Hall EEE, 19th / 20th Edn., 2001
T2	Engineering Ethics, Charles E. Haries, Michael S Pritchard and Michael J. Robins Thompson Asia, 2003-08-05.
R1	An Introduction to Constitution of India, M.V.Pylee, Vikas Publishing, 2002.
R2	Engineering Ethics, M.Govindarajan, S.Natarajan, V.S.Senthilkumar, Prentice –Hall of India Pvt. Ltd. New Delhi, 2004
R3	Introduction to the Constitution of India, Brij Kishore Sharma, PHI Learning Pvt. Ltd., New Delhi, 2011.
R4	Latest Publications of Indian Institute of Human Rights, New Delhi

Course Outcomes: On completion of this course, students can	
CO1	Have general knowledge and legal literacy and thereby to take up competitive examinations.
CO2	Understand state and central policies, fundamental duties
CO3	Understand Electoral Process, special provisions
CO4	Understand powers and functions of Municipalities, Panchayats and Co-operative Societies
CO5	Understand Engineering ethics and responsibilities of Engineers
CO6	Understand Engineering Integrity & Reliability

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	-	-	-	-	3	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	3	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	1	-		-	-	-	-	-	-
CO4	-	-	-	-	-	2	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	3			-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-	-	-
Course	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**

III SEMESTER (II-I)

Engineering Mathematics – III Common to all the branches			
Subject Code	18CMMAT3010	IA Marks	30
Number of Lecture Hours/Week	3(L) + 1(T)	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 04			

Unit -1	**Hours**
Function of a complex variable Introduction –continuity –differentiability- analyticity – properties – Cauchy –Riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions – Milne – Thompson method.	**08**
Unit -2	
Integration and series expansions Complex integration: Line integral – Cauchy's integral theorem, Cauchy's in integral formula, generalized integral formula (all without proofs) Radius of convergence – expansion in Taylor's, Maclaurin's and Laurent series	**10**
Unit – 3	
Singularities and Residue Theorem Zeros of an analytic function, Singularity, Isolated singularity, Removable singularity, Essential singularity, pole of order m, simple pole, Residues, Residue theorem, Calculation of residues, Residue at a pole of order m**,** Evaluation of real definite integrals: Integration around the unit circle**,** Integration around semi-circle, Indenting contours having poles on real axis.	**10**
Unit – 4	
Discrete Random variables and Distributions: Introduction-Random variables- Discrete Random Variable-Distribution function- Expectation. Discrete distributions: Binomial, Poisson and Geometric distributions and their fitting to data. **Continuous Random variable and distributions:** Introduction-Continuous Random Variable-Distribution function- Expectation-Continuous distribution: Uniform, Exponential and Normal distributions, Normal approximation to Binomial distribution	**10**
Unit – 5	
Test of Significance: Introduction - Population and samples- Sampling distribution of means (σ-known) t-distribution- Sampling distribution of means(σ-unknown), chi-square and F- test Hypothesis-Null and Alternative Hypothesis- Type I and Type II errors –Level of significance - One tail and two-tail tests- Tests concerning one mean and	**12**

proportion, two means- Proportions and their differences - ANOVA for one – way and two – way classified data	

Text(T) / Reference(R) Books:	
T1	Higher Engineering Mathematics, B.S. Grewal, Khanna publishers, 44th edition, 2016.
T2	Advanced Engineering Mathematics I, Erwin Kreyszig, Wiley, 9th Edition, 2013.
R1	Higher Engineering Mathematics, B.V. Ramana, Tata Mc Graw-Hill, 2006
R2	A text book of Engineering mathematics, N.P.Bali and Manish Goyal, Laxmi publications, 7th Edition.
R3	Higher Engineering Mathematics, H.K. Dass and Er. RajnishVerma, S.Chand publishing, 1st edition, 2011.
R4	Probability and Statistics for Engineers, Dr. B.RamaBhupal Reddy, Research India Publications (DELHI), 2015.
W1	https://nptel.ac.in/courses/122107037/
W2	https://www.udemy.com/mathematics-for-engineering/

Course Outcomes: On completion of this course, students can	
CO1	Find the function of a complex variable
CO2	Evaluate complex integration
CO3	Expand functions using Taylor & Maclaurin's series
CO4	Evaluate integrals using Residues
CO5	Find the statistical parameters for distributions
CO6	Test the hypothesis

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	2	3	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	3	-	-	-	-	-	-	-	-	-	-	-	-
CO6	2	3	-	-	-	-	-	-	-	-	-	-	-	-
Course	**2**	**3**	-	-	-	-	-	-	-	-	-	-	-	**-**

DIGITAL ELECTRONICS			
Subject Code	18ITECT3020	Internal Marks	30
Number of Lecture Hours/Week	3(L)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			
Unit -1 (Fundamentals of Digital Systems and logic families)			**Hours**
Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital lCs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic			**12**
Unit -2 (Combinational Digital Circuits)			
Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.			**07**
Unit – 3 (Sequential circuits and systems)			
1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J-K-T and D-types flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.			**07**
Unit – 4 (A/D and D/A Converters)			
Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter lCs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs			**12**
Unit – 5 (Semiconductor memories and Programmable logic devices)			
Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory(RAM), content addressable memory (CAM), charge de			**12**

coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).	

Text(T) / Reference(R) Books:	
T1	Modern Digital Electronics, R P Jain, McGraw Hill Education, 2009.
T2	Digital logic and Computer design, M MMano,Pearson Education India, 2016.
T3	Digital Design Principles & Practices, John F Wakerly, PHI/ Pearson Education Asia, 3rd Ed., 2005.
T4	Switching Theory and Logic Design, Hill and Peterson Mc-Graw Hill TMH edition.
R1	Fundamentals of Digital Circuits, A Kumar, Prentice Hall India, 2016.
R2	Fundamentals of Logic Design, Charles H Roth Jr, Jaico Publishers
W1	https://www.coursera.org/learn/digital-systems
W2	https://onlinecourses.nptel.ac.in/noc19_ee09/preview

Course Outcomes: On completion of this course, students can	
CO1	State and explain fundamental gates in digital circuits
CO2	Apply Boolean algebra simplification methods to build basic combinatorial circuits
CO3	Construct the sequential circuits & systems
CO4	Explain converters especially basic operation of A/D and D/A converters
CO5	Describe Semiconductor memories and Programmable logic devices

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	1	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	3	-	-	-	-	-	-	-	-	-	2	-
CO3	2	1	3	-	-	-	-	-	-	-	-	-	1	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO5	2	2	1	-	-	-	-	-	-	-	-	-	1	-
Course	**3**	**2**	**3**	-	-	-	-	-	-	-	-	-	**1**	-

Analog Electronic Circuits			
Subject Code	18ITECT3030	Internal Marks	30
Number of Lecture Hours/Week	3(L)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			
Unit -1 (Diode Circuits)			**Hours**
P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, Zener diodes, clamping and clipping circuits			**08**
Unit -2 (BJT circuits)			
Structure and I-V characteristics of a BJT; BJT as a switch. BJT as an amplifier: small-signal model, biasing circuits, current mirror; common-emitter, common-base and common collector amplifiers; Small signal equivalent circuits, high-frequency equivalent circuits			**12**
Unit – 3 (MOSFET Circuits)			
MOSFET structure and I-V characteristics. MOSFET as a switch. MOSFET as an amplifier: small-signal model and biasing circuits, common-source, common-gate and common-drain amplifiers; small signal equivalent circuits - gain, input and output impedances, transconductance, high frequency equivalent circuit.			**10**
Unit – 4 (Differential, multi-stage and operational amplifiers)			
Differential amplifier; power amplifier; direct coupled multi-stage amplifier; internal structure of an operational amplifier, ideal op-amp, non-idealities in an op-amp (Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product)			**08**
Unit – 5 (Applications of op-amp)			
Linear applications: Idealized analysis of op-amp circuits. Inverting and non-inverting amplifier, differential amplifier, instrumentation amplifier, integrator, active filter using op-amp, voltage regulator, oscillators (Wein bridge and phase shift). Analog to Digital Conversion. **Nonlinear applications:** Hysteretic Comparator, Zero Crossing Detector, Square-wave and triangular-wave generators. Precision rectifier, peak detector. Monoshot.			**12**

Text(T) / Reference(R) Books:	
T1	Microelectronic Circuits, A S Sedra and K C Smith, OUP, 1998.
T2	Introduction to Operational Amplifier theory and applications, J V Wait, L P Huelsman and G A Korn, McGraw Hill, 1992.
R1	Microelectronics, J Millman and A Grabel,McGraw Hill Education, 1988.
R2	The Art of Electronics, P Horowitz and W Hill, Cambridge University Press, 1989
R3	Analysis and Design of Analog Integrated Circuits, P R Gray, R G Meyer and S Lewis, John Wiley & Sons, 2001.
W1	https://onlinecourses.nptel.ac.in/noc18_ee45/preview
W2	https://swayam.gov.in/course/3835-analog-circuits

Course Outcomes: On completion of this course, students can	
CO1	Apply the characteristics of Diodes to various applications
CO2	Distinguish the characteristics of transistors.
CO3	Design and analyze various rectifier and amplifier circuits
CO4	Design sinusoidal and non-sinusoidal oscillators.
CO5	Design OP-AMP based circuits

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	1	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	3	-	-	-	-	-	-	-	-	-	2	-
CO3	2	1	3	-	-	-	-	-	-	-	-	-	1	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO5	2	2	1	-	-	-	-	-	-	-	-	-	1	-
Course	**3**	**2**	**3**	-	-	-	-	-	-	-	-	-	**1**	-

DISCRETE MATHEMATICS			
Subject Code	18ITITT3040	IA Marks	30
Number of Lecture Hours/Week	3(L) + 1(T)	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 04			

Unit -1: Propositions and Predicates	**Hours**
Propositional Logic (TB1:001-012) Propositions, Variables, Connectives, Truth tables, Converse, Contrapositive, Inverse of a conditional statement, Compound Propositions, Precedence rules. **Applications of Propositions Logic** (TB1:016-022) **Propositional Equivalences** (TB1:025-034) Logical Equivalences, Tautology, Contradiction, De Morgan's Law, Satisfiability, Applications of Satisfiability, Complexity in solving satisfiability problems. **Predicates and Quantifiers** (TB1:036-051) Predicates, Quantifiers, Binding Variables, Logical equivalences involving quantifiers, Negating Quantified Expressions (De Morgan's Law), Translating English into Logical Expressions, Using quantifiers in System Specifications. **Nested Quantifiers** (TB1:057-064) Statements involving nested quantifiers, Order of Quantifiers, translating to and from Mathematical/English statements to statements involving nested quantifiers. Negating Nested Quantifiers. **Inference Rules** (TB1:069-078) Valid Arguments in Propositional Logic, Rules of Inference for propositional logic, Checking Arguments validity, Rules of Inference for Quantified statements, Combining rules of Inference for propositions and quantified statements.	**10**
Unit-2: Number Theory and Theorem Proving Methods	
Divisibility and Modular Arithmetic (TB1:237-244) Division, Division Algorithm, Modulo Division, Arithmetic modulo M **Integers and Primes** (TB1:246-249, 257-272) Integer Representations, Conversions, Primes, check for primality, finding primes below a given value, Twin primes, Relative Primes, GCD Algorithm, Euclidean Algorithm, GCD as linear combination. **Solving Congruences** (TB1:275-283) Linear Congruences, The Chinese Remainder Theorem, Fermat's Theorem, Euler Theorem. **Introduction to Proofs** (TB1:82-88) Direct Proof, Proof by Contraposition, Contradiction, Counter Example. **Mathematical Induction** (TB1:311-329)	**12**

Why Mathematical Induction, Good and Bad of Mathematical Induction, Examples of Proofs, Guidelines.	
Unit-3: Sets, Relations and Functions	
Sets (TB1:115-124) Introduction, Subsets, Equality, Venn Diagrams, Cardinality, Power sets, Cartesian Product. **Set Operations** (TB1:127-134) Union, Intersection, Disjoint Sets, Difference, Set Identities, Generalized Unions and Intersections. **Relations** (TB2:442-445, 449-457) Binary Relation, Inverse Relation, Properties of Relations, Transitive closure. **Equivalence Relations** (TB2:459-474) Partition of a set, Relation induced by a partition of a set, Equivalence Relation, Equivalence classes. **Partial Order Relations** (TB2:498-507) Antisymmetric, POSET, Hasse Diagrams, Total Ordering, Maximal, Minimal, Greatest, Lowest elements. **Functions** (TB1:138-152) Function, One-to-One functions, Onto Functions, Bijection Functions, Identity function, Inverse Functions, Composition of functions, Floor, Ceiling, round functions, Partial Function. **Cardinality with Applications to Computability** (TB2:428-437) Properties of Cardinality, Finite and Infinite Sets, Countable and Uncountable Sets, Cantor Diagonalization Process.	**08**
Unit-4: Basic Counting and Combinatorics	
The Basics of Counting (TB1 : 385-399) Introduction, Basic Counting Principles, More Complex Counting Problems, The Subtraction Rule, The Division Rule, Tree Diagrams **The Pigeonhole Principle** (TB1: 399-407) Introduction, The Generalized Pigeonhole Principle, Some Elegant Applications of the Pigeonhole Principle **Permutations and Combinations** (TB1: 407-415) Introduction, Permutations, Combinations **Binomial Coefficients and Identities** (TB1: 415-423) The Binomial Theorem, Pascal's Identity and Triangle, Other Identities Involving Binomial Coefficients **Generalized Permutations and Combinations** (TB1: 423-434) Introduction, Permutations with Repetition, Combinations with Repetition, Permutations with Indistinguishable Objects, Distributing Objects into Boxes **Generating Permutations and Combinations** (TB1: 434-439)	**10**

Introduction, Generating Permutations, Generating Combinations	
Unit-5: Algebraic Structures	
Algebraic Systems: Examples and General Properties(TB3: 270-281) Definition and Examples, Some Simple Algebraic Systems and General Properties **Semi groups and Monoids** (TB3: 282- 294) Definition and Examples, Homomorphism of Semigroups and Monoids, Sub Semigroups and Sub monoids **Groups** (TB3: 319-342) Definitions and Examples, Subgroups and Homomorphisms, Cosets and Lagrange's Theorem, Normal Subgroups, Algebraic Systems with Two Binary Operations **Lattices as Partially Ordered sets** (TB3 :379-397) Definition and Examples, Some Properties of Lattices, Lattices as Algebraic Systems, Sublattices, Direct Product and Homomorphism, Special Lattices	**10**

Text(T) / Reference(R) Books:	
T1	Discrete Mathematics and Its Applications, Kenneth H Rosen, 7th edition, MHP, 2012.
T2	Discrete Mathematics with Applications, Susanna SEpp, 4th Edition, CENGAGE
T3	Discrete Mathematical Structures with Applications to Computer Science, J P Tremblay, R Manohar, TMH, 1997.
R1	Discrete Mathematics, Seymour Lipschutz, Marc Lars Lipson, SCHAUM's outlines.
R2	Discrete Mathematical Structures, U S Gupta, Pearson Publications.
W1	https://www.coursera.org/learn/discrete-mathematics
W2	https://swayam.gov.in/course/1396-discrete-mathematics

Course Outcomes: On completion of this course, students can	
CO1	Distinguish between Statement Logic and Predicate Logic.
CO2	Apply mathematical proving techniques in order to solve recurrences and elementary algebra problems.
CO3	Illustrate by examples terminology, operations and mathematical models using theories of sets, relations and functions.
CO4	Apply permutations & Combinations in problem solving
CO5	Explain basic properties of algebraic structures

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	3	-	-	-	-	-	-	-	-	-	-	2	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-	2	-
CO3	2	3	-	-	-	-	-	-	-	-	-	-	2	-
CO4	2	3	-	-	-	-	-	-	-	-	-	-	2	-
CO5	2	3	-	-	-	-	-	-	-	-	-	-	2	-
Course	**2**	**3**	-	-	-	-	-	-	-	-	-	-	**2**	**-**

DATA STRUCTURES			
Subject Code	18ITITT3050	IA Marks	30
Number of Lecture Hours/Week	3(L)	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Unit -1:	**Hours**
Basic concepts (TB1:001-045) Algorithm Specification – Introduction, Recursive Algorithms, Data Abstraction, Performance Analysis – Space Complexity, Time Complexity, Asymptotic Notation, Comparing Time Complexities, Performance Measurement **Divide and Conquer Technique (**TB2**:**65-97**)** Maximum-subarray problem, Strassen`s algorithm for matrix multiplication, Solving recurrence relations: Substitution method, recursion-tree method, master method **Searching and Sorting** (TB1:317-336, TB1:408-423) Searching – Introduction, Sequential Search, Binary Search, Sorting-Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Optimal Sorting Time	**12**
Unit-2:	
Abstract Data Types (TB1:47-70) Abstract Data Type, The Polynomial ADT, The Sparse Matrix ADT, Sparse Matrix Addition and Multiplication. **Stacks and Queues** (TB1:099-109) The Stack Abstract Data Type, The Queue Abstract Data Type, Circular Queue Abstract Data Type **Stack Applications** (TB1:116-126) Introduction, Evaluating Postfix Expressions, Infix to Postfix, Multiple Stacks and Queues	**10**
Unit-3:	
Singly Linked Lists (TB1:138-149) ADT, Operations, Dynamically Linked Stacks and Queues **Polynomials** (TB1:150-155) Representing as SLL, Addition, multiplication and Erase operations **Doubly Linked Lists** (TB1:179, TB1:162-164) ADT, operations	**08**
Unit-4:	
Trees (TB1: 186-190) Introduction Terminology, Representation of Trees **Binary Trees** (TB1: 191-212)	**12**

ADT, Properties, Representations, Traversals, Additional Operations, Threaded Binary Trees **Binary Search Trees** (TB1: 227-232) Introduction, Search, Insert and Delete operations, Height of BST. **Heaps** (TB1: 218-226) The Heap Abstract Data Type, Priority Queues, Insertion into a max heap, Deletion from a max heap. Heap sort.	
Unit-5:	
Search Trees (TB1:528-617) AVL Trees, 2 – 3 Trees, 2 – 3 – 4 Trees, Red – Black Trees, B-Trees and B+ Trees and their operations: search, insert and delete	**08**

Text(T) / Reference(R) Books:	
T1	Fundamentals of Data Structures in C, Second Edition by Ellis Horowitz, Sartaj Sahni, Anderson – Freed, Universities Press.
T2	Interdiction to Algorithms, Thomas H Coremen,CharlesELeiserson, Clifford Stein,Third Edition, MIT Press/McGraw-Hill
R1	Algorithms, Data Structures, and Problem Solving with C++, Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
R2	How to Solve it by Computer, 2nd Impression by R. G. Dromey, Pearson Education.
W1	https://www.coursera.org/specializations/data-structures-algorithms
W2	https://www.edx.org/course/foundations-of-data-structures-2
W3	https://swayam.gov.in/course/1407-programming-and-data-structures

Course Outcomes: On completion of this course, students can	
CO1	Analyze algorithms' time and space complexity and justify the correctness.
CO2	Implement Stack and Queue ADT.
CO3	Implement Linked List ADT.
CO4	Implement Binary Tree ADT and traversal algorithms.
CO5	Implement Graph ADT and BFS and DFS traversal algorithms.

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	3	-	-	-	-	-	-	-	-	-	-	-	2
CO2	2	3	-	-	-	-	-	-	-	-	-	-	-	2
CO3	2	3	-	-	-	-	-	-	-	-	-	-	-	2
CO4	2	3	-	-	-	-	-	-	-	-	-	-	-	2
CO5	2	3	-	-	-	-	-	-	-	-	-	-	-	2
Course	**2**	**3**	-	-	-	-	-	-	-	-	-	-	-	**2**

ANALOG & DIGITAL ELECTRONICS LAB			
Subject Code	18ITECL3060	**IA Marks**	50
Number of Lecture Hours/Week	3(P)	**Exam Marks**	50
Total Number of Lecture Hours	36	**Exam Hours**	03
Credits – 1.5			

List of Experiments

(Minimum 12 Experiments to be done**)**

PART-A: (Experiments to be done by using Hardware Components)

Exercise 1

PN Junction Diode V-I Characteristics

Exercise 2

Zener Diode Characteristics

Exercise 3

Transistor Biasing

Exercise 4

BJT Input and Output Characteristics (CE Configuration)

Exercise 5

FET Drain and Transfer Characteristics (CS Configuration)

Exercise 6

BJT-CE Amplifier

Exercise 7

FET-CS Amplifier

Exercise 8

OP AMP Applications – Adder, Subtractor, Comparator Circuits

PART-B: (Experiments to be done by using MATLAB)

Exercise 9

Represent a signal using MATLAB and perform following

i) Identify even and odd symmetries in a signal

ii) Perform the amplitude scaling, time scaling and time shifting operations

Exercise 10

Determine the Fourier transformation of a signal

Exercise 11

State the sampling theorem and verify it.

Exercise 12

Determine the Laplace transformation of a signal

Exercise 13

Determine the Z - transformation of a signal

Exercise 14

Perform the convolution of two continuous signals

Course Outcomes: On completion of this course, students can	
CO1	Understand the characteristics of semiconductor devices
CO2	Understand the nature of transistor and FET amplifier
CO3	Apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct back.
CO4	Analyze the continuous-time signals and systems using Fourier and Laplace transforms

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	1	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	3	-	-	-	-	-	-	-	-	-	2	-
CO3	2	1	3	-	-	-	-	-	-	-	-	-	1	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	-	-
Course	**3**	**2**	**3**	-	-	-	-	-	-	-	-	-	**1**	-

IT Workshop Lab			
Subject Code	18ITITL3070	IA Marks	50
Number of Tutorial Hours/Week	03(P)	Exam Marks	50
Total Number of Practice Hours	36	Exam Hours	03
Credits – 1.5			

LIST OF EXPERIMENTS

Exercise1

Study of basic scilab commands

Exercise2

Matrix constructors and operations

Exercise3

Matrix bitwise, relational & logical operations

Exercise4

Control structures (If-Else, If-elseif -else, Select)

Exercise5

Control structures (for, while, break and continue)

Exercise6

Graphics - 2d plots

Exercise7

Computer application program

Exercise8

Civil application program

Exercise9

Electronics application program

Exercise10

Electronics application program

Course Outcomes: On completion of this course, students can	
CO1	Understand the need for simulation/implementation for the verification of mathematical functions.
CO2	Understand the main features of the SCILAB program development environment to enable their usage in the higher learning.
CO3	Understand control flow of the program.
CO4	Implement simple mathematical functions/equations in numerical computing environment such as SCILAB.
CO5	Interpret and visualize simple mathematical functions and operations thereon using plots/display.

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	3	-	-	-	-	-	-	-	-	-	-	2	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-	2	-
CO3	2	3	-	-	-	-	-	-	-	-	-	-	2	-
CO4	2	3	-	-	-	-	-	-	-	-	-	-	2	-
CO5	2	3	-	-	-	-	-	-	-	-	-	-	2	-
Course	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	2	**-**

DATA STRUCTURES LAB			
Subject Code	18ITITL3080	IA Marks	50
Number of Tutorial Hours/Week	3(P)	Exam Marks	50
Total Number of Practice Hours	04	Exam Hours	03
Credits – 1.5			

List of Experiments

Exercise 1 (Sorting)
- Bubble Sort
- Selection Sort
- Insertion Sort

Exercise 2 (Sorting)
- Quick Sort
- Merge Sort

Exercise 3 (Abstract Data Types)
- Stacks and Queue using arrays
- Stacks and Queue usingLinked Lists

Exercise 4 (Applications of Stack)
- Infix to Postfix Conversion
- Postfix Expression Evolution

Exercise 5 (Linked List Applications)
- Polynomial Addition
- Polynomial Multiplication

Exercise 6
- Doubly Linked List
- Circular Linked List

Exercise 7 (Search Trees)
- Binary Search Trees

Exercise 8 (Search Trees)
- Binary Heap
- Heap Sort

Exercise 9 (Search Trees)
- AVL Trees

Exercise 10 (Search Trees)
- Red-Black Trees

Exercise 11 (Search Trees)
- B- Trees

Exercise 12 (Search Trees)
- B+ Trees

Course Outcomes: On completion of this course, students can	
CO1	analyze time and space complexity and justify them.
CO2	ImplementStacks and Queues and demonstrate applications of stacks.
CO3	Implement different types of lists and operations.
CO4	Implement variety of search trees and traversal algorithms.
CO5	Implement various sorting algorithms.

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	3	-	-	-	-	-	-	-	-	-	-	-	2
CO2	2	3	-	-	-	-	-	-	-	-	-	-	-	2
CO3	2	3	-	-	-	-	-	-	-	-	-	-	-	2
CO4	2	3	-	-	-	-	-	-	-	-	-	-	-	2
CO5	2	3	-	-	-	-	-	-	-	-	-	-	-	2
Course	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	2

IV SEMESTER (II-II)

SIGNALS & SYSTEMS			
Subject Code	18CMCET4010	Internal Marks	30
Number of Lecture Hours/Week	03	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Unit -1	**Hours**
Introduction: Definition of Signals and Systems, Signal properties: periodicity, absolute integrability, determinism and stochastic character. Some special signals of importance: the unit step, the unit impulse, the sinusoid, the complex exponential, some special time-limited signals; continuous and discrete time signals, continuous and discrete amplitude signals. System properties: linearity: additivity and homogeneity, shift-invariance, causality, stability, realizability. Examples.	**12**
Unit -2	
Behavior of continuous and discrete-time LTI systems: Impulse response and step response, convolution, input-output behavior with aperiodic convergent inputs, cascade interconnections. Characterization of causality and stability of LTI systems. System representation through differential equations and difference equations. State-space Representation of systems. State-Space Analysis, Multi-input, multi-output representation. State Transition Matrix and its Role. Periodic inputs to an LTI system, the notion of a frequency response and its relation to the impulse response.	**12**
Unit – 3	
Fourier Transformation: Fourier series representation of periodic signals, Waveform Symmetries, Calculation of Fourier Coefficients. Fourier Transform, convolution/multiplicat ion and their effect in the frequency domain, magnitude and phase response, Fourier domain duality. The Discrete-Time Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT). Parseval's Theorem.	**8**
Unit – 4	
Laplace Transforms: Review of the Laplace Transform for continuous time signals and systems, system functions, poles and zeros of system functions and signals, Laplace domain analysis, solution to differential equations and system behavior. **Z–Transforms:** The z-Transform for discrete time signals and systems, system functions, poles and zeros of systems and sequences, z-domain analysis.	**10**
Unit – 5	
Sampling and Reconstruction: The Sampling Theorem and its implications. Spectra of sampled signals.	**8**

Reconstruction: ideal interpolator, zero-order hold, first-order hold. Aliasing and its effects. Relation between continuous and discrete time systems. Introduction to the applications of signal and system theory: modulation for communication, filtering, feedback control systems.	

Text(T) / Reference(R) Books:	
T1	Signals and Systems, 2nd Edn, A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI.
T2	Signals, Systems & Communications, B.P. Lathi, BS Publications.
T3	Signals & Systems, 2nd Edition. Simon Haykin and Van Veen, Wiley.
R1	Principles of Linear Systems and Signals, BP Lathi, Oxford University Press.
R2	Fundamentals of Signals and Systems, International Edition, Michel J. Robert, MGH.
R3	Digital Signal Processing: Principles, Algorithms, and Applications, J. G. Proakis and D. G. Manolakis, Pearson.
R4	Signals and Systems, T K Rawat , Oxford University press.
W1	https://www.coursera.org/courses?query=signals%20and%20systems
W2	https://onlinecourses.nptel.ac.in/noc18_ee02/preview

Course Outcomes: On completion of this course, students can	
CO1	Able to characterize the signals and systems.
CO2	Able to understand the Behavior of continuous and discrete-time LTI systems
CO3	Able to analyze the continuous-time signals and continuous-time systems using Fourier series, Fourier transform and Laplace transform.
CO4	Able to apply z-transform to analyze discrete-time signals and systems.
CO5	Able to apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct back.

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	3
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	3
CO3	3	-	-	-	-	-	-	-	-	-	-	-	-	3
CO4	3	-	-	-	-	-	-	-	-	-	-	-	-	3
CO5	3	-	-	-	-	-	-	-	-	-	-	-	-	3
Course	**3**	-	-	-	-	-	-	-	-	-	-	-	**-**	**3**

ENGINEERING MECHANICS			
Subject Code	18CMCET4020	IA Marks	30
Number of Lecture Hours/Week	03	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits - 03			
Unit -1			**Hours**
Systems of Forces: Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems. **Friction:** Introduction, limiting friction and impending motion, coulomb's laws of dry friction, coefficient offriction, cone of friction			**10**
Unit -2			
Equilibrium of Systems of Forces: Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. LamisTheorm, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium, analysis of plane trusses.			**8**
Unit - 3			
Centroid and Centre of Gravity covering,: Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications; Area moment of inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; **Mass moment inertia** of circular plate, Cylinder, Cone, Sphere, Hook.			**10**
Unit – 4			
Kinematics: Rectilinear and Curvilinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion. **Kinetics:** Analysis as a Particle and Analysis as a Rigid Body in Translation– Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.			**12**
Unit-5			
Work – Energy Method: Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.			**10**

Text(T) / Reference(R) Books:	
T1	Engg. Mechanics4th Edn, S.Timoshenko&D.H.Young, Mc Graw Hill publications.
T2	Engineering Mechanics-Statics and Dynamics, A Nelson,Tata McGraw HillEducation Private Ltd.
R1	Engineering Mechanics statics and dynamics, 11th Edn, R.C.Hibbeler,Pearson.
R2	Engineering Mechanics, statics, 6th Edn, J.L.Meriam,Wiley India Pvt Ltd.
R3	Engineering Mechanics, statics and dynamics, I.H.Shames, Pearson
R4	Mechanics For Engineers, statics, 5th Edn, F.P.Beer&E.R.Johnston, Mc Graw Hill
R5	Mechanics For Engineers, dynamics, 5th Edn, F.P.Beer&E.R.Johnston, Mc Graw Hill
R6	Theory & Problems of engineering mechanics, statics & dynamics, 5th Edn, E.W.Nelson, C.L.Best& W.G. McLean,Mc Graw Hill.
R7	Singer's Engineering Mechanics: Statics and Dynamics, K. Vijay Kumar Reddy, J. Suresh Kumar, Bs Publications.
R8	Engineering Mechanics, Fedinand . L. Singer, Harper, Collins
W1	https://swayam.gov.in/courses/5241-engineering-mechanics
W2	https://onlinecourses.nptel.ac.in/noc16_ph02/preview

Course Outcomes: On completion of this course, students can

CO1	Able to Resolve the forces into components, moment of force and its applications
CO2	Construct free body diagrams and develop appropriate equilibrium equations.
CO3	Determine centroid and moment of inertia for composite areas.
CO4	Determine the kinematic relations of particles & rigid bodies.
CO5	Apply equations of motion to particle and rigid body using the principle of energy and momentum methods.

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	2	-
CO2	2	2	-	-	-	-	-	-	-	-	-	-	2	-
CO3	2	2	-	-	-	-	-	-	-	-	-	-	2	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	1	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-	1	-
Course	**3**	**2**	-	-	-	-	-	-	-	-	-	-	**3**	**-**

COMPUTER ORGANIZATION			
Subject Code	18ITITT4030	IA Marks	30
Number of Lecture Hours/Week	03	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits: **03**			

Unit -1	**Hours**
Functional Units: Input Unit, Memory Unit, Arithmetic Logic Unit, Output Unit, Control Unit, **Number Representations**: Integers (Signed and Unsigned), Addition and subtraction, Sign Extension, Overflow in Integer Arithmetic, Floating-point Numbers, Characters,Integer Addition and Subtraction: Ripple-carry adder, Carry-Lookahead Adder, Integer Multiplication: Array Multiplier, Shift-and-Add, Booth Multiplier, Carry-Save Addition of Summands, IntegerDivision: Restoring Division, Non-Restoring Division, Floating Point Arithmetic: Representation, Operations, Guard bits and Truncation, Implementation of Operations	**11**
Unit -2	
Basic Concepts: Memory Locations and Addresses, Byte Addressability, Big-Endian and Little-Endian Assignments, Word Alignment, Memory Operations, Instruction Sets: Notations for Data Transfer, RISC and CISC Instruction Sets, Introduction to RISC Instructions, Logic Instructions, Shift and Rotate, Multiplication and Division, dealing with 32-bit Immediate Values, CISC Instruction Sets, RISC and CISC Styles, Instruction Execution: Sequencing, Branching, Addressing Modes: Accessing Variables, Indirection and Pointers, Indexing and Arrays, Additional Addressing modes, Condition Codes.	**10**
Unit - 3	
Basic Concepts: Main Hardware Components, Data Processing Hardware, Instruction Execution: Load Instructions, Arithmetic and Logic Instructions, Store Instructions, Hardware Components: Register File, ALU, Data Path, Instruction Fetch Section, Instruction Fetch and Execution: ADD, LOAD, STORE, BRANCH and Subroutine call instructions; instruction encoding, Wait for Memory, Control Unit Design: Control Signals, Hardwired Control, Microprogrammed Control	**08**
Unit – 4	
Basic Concepts: Basics, Cache Memory, Virtual Memory, Block Transfers, Memory Organization:	**10**

Internal Organization of Memory Chips, Static RAMs, Dynamic RAMs, Synchronous DRAMs, Structure of Larger Memories, Read-Only Memories, Memory Hierarchies, Cache Memories: Locality of Reference, Cache Hit and Miss, Mapping Techniques: Direct, Associate, Set-associate; Replacement Algorithms, Hit Rate and Miss Penalty, caches on the processor Chip, Enhancing Cache Performance**,** Peripherals: Accessing I/O Device, I/O Interface, Program-controlled I/O, Interrupts: Concept, Enabling and Disabling, Handling Multiple Devices, Controlling I/O Devices (Interrupt-driven I/O), Processor Control Registers, Direct MemoryAccess:DMA Controller and registers	
Unit-5	
Pipeline: Ideal Case, Organization, Issues, Data Dependencies: Concept, Operand Forwarding, Handling Data Dependencies, Effect of Delays: Memory Delays, Delays due to Unconditional and Conditional Branches, Branch Delay Slot, Static and Dynamic Prediction, Branch Target Buffer for Dynamic Prediction, Resource Limitation, Performance Evaluation: Effects of Stalls and Penalties, Number of Pipeline Stages, Super Scalar Operation: Concept, Branches and Data Dependencies, Out-of-order Execution, Execution Completion, Dispatch Operation, Parallel Processing: Hardware Multithreading, Vector Processing, Graphics Processing Units (GPUs), Shared Memory Multiprocessors, Cache Coherence: Write-Through protocol, Write Back Protocol, Snoopy Caches, Directory Based Cache Coherence, Message Passing	**11**

Text(T) / Reference(R) Books:	
T1	Computer Organization and Embedded Systems, 6th Edition, Carl Hamacher, ZvonkoVranesic, SafwatZaky, NaraigManjikian, McGraw-Hill Publications.
R1	Computer Organization and Design: The Hardware/Software Interface, 5th Edition, David A. Patterson, John L. Hennessy,Morgan Kauffman Publishers (Elsevier).
W1	https://swayam.gov.in/course/3747-computer-organization
W2	https://online.stanford.edu/courses/cs107-computer-organization-and-systems

Course Outcomes: On completion of this course, students can	
CO1	Get familiar with Operating System fundamentals.
CO2	Attain knowledge on processes, threads and the communication between them.
CO3	Understand the mechanism for executing jobs by the underlying processor.
CO4	Comprehend the intricacies of sharing limited available resources among the processes and threads.
CO5	Gain insights into the mechanisms for managing memory, disks and I/O devices.

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	-	-	-	-	-	-	-	-	-	2	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	2	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	2	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	2	-
CO5	3	3	3	-	-	-	-	-	-	-	-	-	2	-
Course	**3**	**3**	**3**	-	-	-	-	-	-	-	-	-	2	**-**

ALGORITHMS DESIGN AND ANALYSIS			
Subject Code	18ITITT4040	IA Marks	30
Number of Lecture Hours/Week	03	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits: **03**			

Unit -1	**Hours**
Elements of Dynamic Programming: Optimal sub structure, overlapping sub problems, Reconstructing an optimal solution, Memorization. **Example Problems:** Longest common Subsequence, Optimal Binary search trees, String Editing, 0/1 Knap Sack Problem , The Traveling Salesperson Problem, **Elements of Greedy Strategy:** Concept, Greedy – Choice property, Optimal sub structure, Greedy vs Dynamic programming, **Example Problems:** Huffman codes, Knap Sack Problems, Tree Vertex Splitting, Job Sequencing with Dead Lines.	**11**
Unit -2	
Back Tracking: Concept, State Space, Solution Space, Tree Organization of State Space and Solution Space, illustration using 4-Queens Problem, Sum of Subsets Problems, **Example Problems:** 8-Queens Problem, Sum of Sub sets, Graph Coloring,Hamiltonian Cycles, 0/1 Knap Sack Problem, **Branch and Bound:** Least Cost (LC) Search, 15-Puzzle Example, Control Abstraction for LC-Search, Bounding, FIFO Branch-and-Bound, LC-Branch-and -Bound, **Example Problems:** 0/1 Knap Sack Problem, Traveling Sales Person Problem	**09**
Unit - 3	
Elementary Graph Algorithms: Concepts, Representation of Graphs, Breadth First Search, Depth First Search, Topological sort, Strongly Connected Components, Biconnected Components, Articulation Points **Minimum Spanning Trees:** Growing Minimum Spanning Tree, Kruskal`s Algorithm, Prim`s Algorithms, **Single Source Shortest Paths:** Shortest Path, Edge Weights, Variants of Shortest Path Problems, Optimal Sub Structure of Shortest Path, Negative Edge Weights, Cycles, Representing Shortest Paths, Relaxation, Properties of Shortest path and Relaxation, **All-Pairs Shortest Paths:** Concept, Shortest Path and Matrix Multiplication,	**11**

Shortest Path Algorithms: Bellman Ford Algorithm, Dijkstra`s Algorithm, Floyd- Warshall Algorithm.	
Unit – 4	
Computability of Algorithms: Tractable and Intractable, Computability Classes – P, NP, NPC, NPH, showing problems to be NPC, Reductions, **Tractable Problems:** Supporting arguments, Abstract Problems, Encodings, **Polynomial Time Verification:** Hamiltonian Cycles, Verification Algorithms, Complexity class NP, **NP Completeness:** Reducibility, NP Completeness, Circuit Satisfiability, Circuit Satisfiability, **NP Completeness Proof:** Formula Satisfiability, 3CNF Satisfiability, **NP-Complete Problems:** Clique, Vertex-cover, Hamiltonian Cycle, Traveling-Salesman Problem, Subset Sum Problem	**10**
Unit - 5	
Approximation Algorithms: Roles and functions, Components, Structure, Operations, Load Balancing Problem, Center Selection Problem, Set Cover, Greedy Heuristics, **Randomized Algorithms:** Contention Resolution, Global Minimum Cut, Random Variables and Their Expectations, A Randomized Approximation Algorithm for MAX 3-SAT, Randomized Divide and Conquer: Median Finding and Quick Sort.	**09**

Text(T) / Reference(R) Books:	
T1	Interdiction to Algorithms, Third Edition, Thomas H Coremen,CharlesE.Leiserson, Clifford Stein, MIT Press/McGraw-Hill.
T2	Computer Algorithms, Ellis Horowitz, Sartaj Sahni, S Rajasekaran, Computer Science Press
T3	Algorithm Design, First Edition, JON Kleinberg, EVA Tardos, Pearson Addison Wesley
R1	Algorithm Design: Foundation, analysis, and Internet Examples, First Edition, John Wiley & sons
W1	https://www.coursera.org/specializations/algorithms
W2	https://swayam.gov.in/course/4417-design-and-analysis-of-algorithms

Course Outcomes: On completion of this course, students can	
CO1	For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.
CO2	Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.
CO3	Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.
CO4	Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it.
CO5	For a given problems of dynamic-programming an develop the dynamic programming algorithms and analyze it to determine its computational complexity. For a given model engineering problem model it is using graph and write the corresponding algorithm to solve the problems.

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	3	-	-	-	-	-	-	-	-	-	-	1	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-	-	2
CO3	2	3	-	-	-	-	-	-	-	-	-	-	-	2
CO4	2	3	-	-	-	-	-	-	-	-	-	-	-	2
CO5	2	3	-	-	-	-	-	-	-	-	-	-	-	2
Course	**2**	**3**	-	-	-	-	-	-	-	-	-	-	1	2

JAVA PROGRAMMING			
Subject Code	18ITITT4050	IA Marks	30
Number of Lecture Hours/Week	3(L)	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			
Unit -1: Introduction to OOP			**Hours**
Introduction to Object Oriented Programming, Principles of Object-Oriented Languages, Procedural languages Vs OOP,History and Evolution of Java, Java Virtual Machine, Java Features, Program Structure, Variables, Primitive Data Types, Variables, Type Conversion and Casting, Operators, Control Statements, Arrays, String.			**08**
Unit -2 : Introducing Classes, Methods and Inheritance			
Class Fundamentals, Declaring Objects, Reference Variables, Methods, Constructors, this keyword, Garbage Collection, finalize() method. Overloading Methods and Constructors, usage of static and final keywords, Command line arguments. Inheritance basics, using super, method overriding, dynamic method dispatch, abstract classes.			**10**
Unit – 3: Packages, Interfaces, Exception Handling and I/O			
Packages, Access Protection, Interfaces, Exception Handling, Exception types, built in exceptions, user defined exceptions, using try, catch, throw, throws, finally, chained exceptions, assertions I/O Basics, reading console input and writing console output, Reading and Writing Files			**10**
Unit – 4: Multi-Threading and javautil Package			
Java Thread Model, creating a thread, Thread priorities, Synchronization, Inter Thread Communication, collections overview, collection interfaces, collection classes, iterator, maps, comparators.			**10**
Unit – 5: Introducing GUI Programming with JavaFX			
JavaFX Basic Concepts,JavaFX Application Skeleton,JavaFX, Control: Label, Button, Image, Image View, Radio Button, Checkbox, List View, Combo Box,Text Field, Scroll Pane, JavaFx Menus, JavaFX Event Handling			**12**

Text(T) / Reference(R) Books:	
T1	The complete Reference Java, 9th edition, Herbert Scheldt,TMH.
T2	Programming in JAVA, Sachin Malhotra, SaurabhChoudary, Oxford.
R1	JAVA Programming, KRajkumar, Pearson
R2	Core JAVA, Black Book, Nageswara Rao, Wiley, Dream Tech
R3	Core JAVA for Beginners, Rashmi Kanta Das, Vikas.
R4	Object Oriented Programming Through Java, P. Radha Krishna, Universities Press.
W1	https://www.edx.org/learn/java
W2	https://onlineitguru.com/core-java-online-training-placement.html

Course Outcomes: On completion of this course, students can	
CO1	Design classes, interfaces and packages.
CO2	Demonstrate inheritance, polymorphism, encapsulation.
CO3	Demonstrate user defined exceptions.
CO4	Create Threads to parallelize operations.
CO5	Create rich user-interface applications using modern API JavaFX.

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	-	3	-	-	-	-	-	-	-	2	-
CO2	2	3	3	-	2	-	-	-	-	-	-	-	2	-
CO3	2	3	3	-	2	-	-	-	-	-	-	-	2	-
CO4	2	3	3	-	2	-	-	-	-	-	-	-	2	-
CO5	2	3	3	-	2	-	-	-	-	-	-	-	2	-
Course	**2**	**3**	**3**	-	**2**	-	-	-	-	-	-	-	2	**-**

COMPUTER ORGANIZATION LAB			
Subject Code	18ITITL4060	IA Marks	50
Number of Tutorial Hours/Week	03(P)	Exam Marks	50
Total Number of Practice Hours	48	Exam Hours	03
Credits – 1.5			

List of experiments

Exercise 1

a) Write a Machine Language Program to perform Addition of two numbers.
b) Write a Machine Language Program to perform Subtraction of two numbers.

Exercise 2

a) Write a Machine Language Program to perform Addition of **n** numbers.
b) Write a Machine Language Program to generate **n** numbers.

Exercise 3

a) Write a Machine Language Program to generate **n** Even numbers.
b) Write a Machine Language Program to generate **n**Odd numbers.

Exercise 4

a) Write a Machine Language Program to move data from one block to another block.
b) Write a Machine Language Program to mask 4 high-order bits.

Exercise 5

a) Write a Machine Language Program to read data at location 4400 and unpack data into 07, 0E and store in 4401 & 4402.
b) Write a Machine Language Program to Subtract an array of elements to get positive result

Exercise 6

a) Write a Machine Language Program to Find largest element of an array.
b) Write a Machine Language Program to Perform Linear Search operation.

Exercise 7

a) Write a Machine Language Program to Find smallest element of an array.
b) Write a Machine Language Program to Find largest value among two numbers.

Exercise 8

a) Write a Machine Language Program to Find smallest value among two numbers.
b) Write a Machine Language Program to Find factorial of given number.

Exercise 9

a) Write a Machine Language Program to generate Fibonacci Series.
b) Write a Machine Language Program to Convert a number from Hexadecimal to BCD.

Exercise 10

a) Write a Machine Language Program to separate Even and Odd numbers.
b) Write a Machine Language Program to find 1's Complement and 2's Complement of a number.

Exercise 11

a) Write a Machine Language Program to perform addition of first **n** numbers.
b) Write a Machine Language Program to perform Division of two 8-bit numbers.

Exercise 12

a) Write a Machine Language Program to Convert ASCII to Decimal and vice versa.
b) Write a Machine Language Program to Convert a number from Hexadecimal to Decimal.

Course Outcomes: On completion of this course, students can	
CO1	Get familiar with Operating System fundamentals.
CO2	Attain knowledge on processes, threads and the communication between them.
CO3	Understand the mechanism for executing jobs by the underlying processor.
CO4	Comprehend the intricacies of sharing limited available resources among the processes and threads.
CO5	Gain insights into the mechanisms for managing memory, disks and I/O devices.

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	-	-	-	-	-	-	-	-	-	-	2
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	2
CO3	3	3	3	-	-	-	-	-	-	-	-	-	-	2
CO4	3	3	3	-	-	-	-	-	-	-	-	-	-	2
CO5	3	3	3	-	-	-	-	-	-	-	-	-	-	2
Course	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	2

ALGORITHMS DESIGN AND ANALYSIS LAB			
Subject Code	18ITITL4070	IA Marks	50
Number of Tutorial Hours/Week	03(P)	Exam Marks	50
Total Number of Practice Hours	48	Exam Hours	03
Credits – 1.5			

LIST OF EXPERIMENTS:

Exercise 1 (Dynamic Programming Technique)

a) Longest common Subsequence
b) Develop Optimal Binary search trees

Exercise 2 (Dynamic Programming Technique)

a) 0/1 Knap Sack Problem ,
b) The Traveling Salesperson Problem.

Exercise 3 (Greedy Methods)

a) Huffman codes
b) Knap Sack Problems

Exercise 4 (Greedy Methods)

a) Tree Vertex Splitting
b) Job Sequencing with Dead Lines

Exercise 5 (Back Tracking Techniques)

a) 8-Queens Problem
b) Sum of Sub sets

Exercise6 (Back Tracking Techniques)

a) Graph Coloring.
b) Hamiltonian Cycles

Exercise 7 (Back Tracking Techniques)

a) 0/1 Knap Sack Problem

Exercise 8 (Branch and Bound)

a) 0/1 Knap Sack Problem
b) Traveling Sales Person Problem

Exercise 9 (Graph Algorithms)

a) Breadth First Search
b) Depth First Search

Exercise 10 (Graph Algorithms)

a) Kruskal`s Algorithm
b) Prim`s Algorithms

Exercise 11 (Graph Algorithms)

a) Bellman Ford Algorithm
b) Dijkstra`s Algorithm

Exercise 12 (Graph Algorithms)

a) Floyd- Warshall Algorithm.

Course Outcomes: On completion of this course, students can	
CO1	For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.
CO2	Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.
CO3	Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.
CO4	Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it.
CO5	For a given problem of dynamic-programming an develop the dynamic programming algorithms and analyze it to determine its computational complexity.

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	3	-	-	-	-	-	-	-	-	-	-	-	2
CO2	2	3	-	-	-	-	-	-	-	-	-	-	-	2
CO3	2	3	-	-	-	-	-	-	-	-	-	-	-	2
CO4	2	3	-	-	-	-	-	-	-	-	-	-	-	2
CO5	2	3	-	-	-	-	-	-	-	-	-	-	-	2
Course	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	2

JAVA PROGRAMMINGLAB			
Subject Code	18ITITL4080	IA Marks	50
Number of Tutorial Hours/Week	3(P)	Exam Marks	50
Total Number of Practice Hours	36	Exam Hours	03
Credits – 1.5			

List of experiments

Exercise 1 (Basics)

c) Write a Java program to display default value of all primitive data type of Java.
d) Write a Java Program to print the area of the Triangle
e) Write a Java program to check whether the given number is even or odd.

Exercise 2 (Basics-Continued)

a) Write a Java program to display the Fibonacci sequence
b) Write a Java program that display the roots of a quadratic equation ax2+bx=0. Calculate the discriminate D and basing on value of D, describe the nature of root.
c) Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers.

Exercise 3 (Operations, Expressions, Control-flow, Strings)

a) Write a Java program to search for an element in a given list of elements using binary search.
b) Write a Java program to sort given list of elements using bubble sort
c) Write a Java program using StringBuffer to delete, remove character.

Exercise 4 (Class, Objects, Methods)

a) Write a Java program to implement class mechanism. – Create a class, methods and invoke them inside main method.
b) Write a Java program to implement constructor.
c) Write a Java program to implement constructor overloading.
d) Write a Java program implement method overloading.

Exercise 5 (Inheritance)

a) Write a Java program to implement Single Inheritance
b) Write a Java program to implement multi-level Inheritance
c) Write a Java program to find areas of different shapes using abstract class.

Exercise 6 (Inheritance - Continued)

a) Write a Java program give example for “super” keyword.
b) Write a Java program to implement Interface.
c) Write a Java program that implements Runtime polymorphism

Exercise 7 (Exceptions)

a) Write a Java program that describes exception handling mechanism
b) Write a Java program for creation of Illustrating throw, throws and finally

c) Write a Java program to illustrate sub class exception precedence over base class.
d) Write a Java program for creation of User Defined Exception

Exercise 8 (Packages)

a) Write a Java program to create a package named pl and implement ex1 class in it.
b) Write a Java program to create a package "mypack" and import it in circle class.
c) Write a Java program illustrate class path

Exercise 9 (I/O)

a) Write a Java program to illustrate the concept of I/O Streams.
b) Write a Java program that reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
c) Write a Java program that displays the number of characters, lines and words in a text file.

Exercise 10 (Threads)

a) Write a Java program that creates threads by extending Thread class .First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds ,(Repeat the same by implementing Runnable)
b) Write a Java program to illustrate the concept of Thread synchronization.
c) Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication

Exercise 11 (Collections)

a) Write a Java program to create a new array list, add some colors (string) and print out the collection.
b) Write a Java program to iterate a linked list in reverse order.
c) Write a Java program to iterate through all elements in a hash list.
d) Write a Java program to associate the specified value with the specified key in a HashMap.

Exercise 12 (JavaFX)

a) Write a Java program to demonstrate Mouse and Keyboard event Handling
b) Write a Java program to design a notepad editor.

Course Outcomes: On completion of this course, students can	
CO1	Understand and Apply Object oriented features and Java concepts.
CO2	Examine and analyze alternative solutions to a given problem using java.
CO3	Apply the concept of multithreading and implement exception handling.
CO4	Implement front end and back end of an application using Java
CO5	Develop applications using Console I/O and File I/O, GUI applications.

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	-	3	-	-	-	-	-	-	-	-	2
CO2	2	3	3	-	2	-	-	-	-	-	-	-	-	2
CO3	2	3	3	-	2	-	-	-	-	-	-	-	-	2
CO4	2	3	3	-	2	-	-	-	-	-	-	-	-	2
CO5	2	3	3	-	2	-	-	-	-	-	-	-	-	2
Course	**3**	**3**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	2

V SEMESTER (III-I)

BIOLOGY FOR ENGINEERS			
Subject Code	18CMBIT5010	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Unit -1: Introduction	Hours
Bring out the fundamental differences between science and engineering by drawing a comparison between eye and camera, Bird flying and aircraft. Mention the most exciting aspect of biology as an independent scientific discipline. Why we need to study biology. How biological observations of 18th Century that lead to major discoveries. Examples from Brownian motion and the origin of thermodynamics by referring to the original observation of Robert Brown and Julius Mayor.	**08**
Unit -2:Classification	
Plant Hierarchy of life forms at phenomenological level- classification based on (a) cellularity - Unicellular or multicellular (b) ultra structure- prokaryotes or eucaryotes. (c) energy and Carbon utilization -Autotrophs, heterotrophy, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitata- acquatic or terrestrial (e) Molecular taxonomy- three major kingdoms of life. Model organisms for the study of biology come from different groups. E.coli, S.cerevisiae, D. Melanogaster, C. elegance, A. Thaliana, M. Musculus	**08**
Unit – 3:Genetics & Biomolecules	
Mendel's laws, Concept of segregation and independent assortment. Concept of allele. Gene mapping, Gene interaction, Epistasis. Meiosis and Mitosis be taught as a part of genetics. Emphasis to be give not to the mechanics of cell division nor the phases but how genetic material passes from parent to offspring. Concepts of recessiveness and dominance. Concept of mapping of phenotype to genes. Discuss about the single gene disorders in humans. Discuss the concept of complementation using human genetics. **Molecules of life:** Monomeric units and polymeric structures. Discuss about sugars, starch and cellulose. Amino acids and proteins. Nucleotides and DNA/RNA. Two carbon units and lipids.	**12**
Unit – 4:Enzymes & Proteins	
Enzymology: How to monitor enzyme catalyzed reactions. How does an enzyme catalyze reactions - Enzyme classification. Mechanism of enzyme action. -examples. Enzyme kinetics and kinetic parameters. Why should we know these parameters to understand biology? RNA catalysis. **Proteins**- structure and function. Hierarch in protein structure. Primary secondary, tertiary and quaternary structure. Proteins as enzymes, transporters, receptors and structural elements. **Information Transfer:** The molecular basis of coding and decoding genetic information is universal Molecular basis of information transfer. DNA as a genetic material. Hierarchy of DNA structure- from single stranded to double helix to nucleosides. Concept of genetic code. Universality and degeneracy of genetic code. Define gene in terms of complementation and recombination	**12**
Unit – 5:Microbiology & Metabolism	
Thermodynamics as applied to biological systems - Exothermic and endothermic versus undergone and exergoinc reactions. Concept of K_{eq} and its relation to standard free energy - Spontaneity - ATP as an energy currency. This should include the breakdown of glucose to CO_2 + H_2O (Glycolysis and Krebs cycle) and synthesis of glucose from CO_2 and H_2O (Photosynthesis).	**10**

Energy yielding and energy consuming reactions. Concept of Energy charge **Concept of single celled organisms**. Concept of species and strains. Identification and classification of microorganisms. Microscopy. Ecological aspects of single celled organisms. Sterilization and media compositions. Growth kinetics	

Text(T) / Reference(R) Books:	
T1	Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
T2	Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley and Sons
T3	Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. Brown Publishers
R1	Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company
R2	Molecular Genetics (Second edition), Stent, G. S.; and Calender, R.W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher
W1	https://ocw.mit.edu/courses/biological-engineering/
W2	https://onlinecourses.nptel.ac.in/noc16_ge03/preview

Course Outcomes: On completion of this course, students can	
CO1	Describe how biological observations of 18th Century that lead to major discoveries.
CO2	Convey that classification is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological.
CO3	Highlight the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring
CO4	Convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine
CO5	Classify enzymes and distinguish between different mechanisms of enzyme action, To convey that “Genetics is to biology what Newton’s laws are to Physical Sciences”

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	-	-	-	-	3	2	-	-	-	-	-	1	-
CO2	-	-	-	-	-	2	3	-	-	-	-	-	2	-
CO3	1	-	-	-	-	3		-	-	-	-	-	1	-
CO4	3	-	-	-	-		2	-	-	-	-	-	1	-
CO5	2	-	-	-	-	3		-	-	-	-	-	1	-
Course	**1**	**-**	**-**	**-**	**-**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**-**

PERSONALITY DEVELOPMENT & PROFESSIONAL COMMUNICATION			
Subject Code	18CMEGT5020	IA Marks	30
Number of Lecture Hours/Week	2	Exam Marks	70
Total Number of Lecture Hours	32	Exam Hours	03
Credits – 02			

Unit -1: Personality Development	**Hours**
a) Personal Effectiveness- being proactive- principles of personal vision, b) Intrapersonal communication- emotional intelligence- beginning with the end in mind- c) Time management: understanding priorities- first things first- time – personal effectiveness	**05**
Unit -2: Emotional Intelligence and Intrapersonal Communication	
a) Principles of Emotional Intelligence – b) Intrapersonal Communication- c) Principles of creative cooperation-organization skills-Think win-win d) Principles of balanced self-renewal- Lifelong learning	**05**
Unit – 3:Career and Employability Skills	
a) Understanding Career values- values grid-career thinking- what is a career? b) Skills vs strengths- spotting skills- reflecting on skills- setting goals for developing skills- c) Meeting the expectations of the employer-understanding job description- - Skills Grid exercises- matching the skills with requirements d) Preparing Resume and Preparing for interviews- Structuring interview questions- CAR- Context, Action and Results	**06**
Unit – 4:Problem Solving Skills	
a) Understanding the complexity at workplace- b) defining the problem- identifying the reasons- c) finding possible solutions- planning actions- analyzing results-feedback d) redefining the problem- the problem solving cycle	**06**
Unit – 5:Professional Communication	
a) Active listening skills- note taking- b) Professional presentation skills- understanding the context- expectations of the people- putting across the message effectively- answering questions-	**10**

c) Technical writing skills- practical steps for writing- report writing and writing a report free from plagiarism.	

Text(T) / Reference(R) Books:	
T1	English and Soft Skills, Dr. S.P. Dhanvel, Orient Blackswan, 2011
R1	Seven Habits of Highly Effective People, Stephen R Covey
R2	Professional Communication, ArunaKoneru, Mc Graw Hill
R3	Personality Development and Soft Skills,Barun K Mitra OUP
R4	Enhance Your Employability Skills, David Winter and Laura Brammar, University of London.
W1	https://www.coursera.org/browse/personal-development
W2	https://alison.com/courses/personal-development

Course Outcomes: On completion of this course, students can	
CO1	Understand Personality development process and learn to implement effective techniques.
CO2	Understand how people behave and regulate self-behaviors and learn to work in a team.
CO3	Know their career values, identify their skills, set goals for enhancing their career skills and prepare for interviews
CO4	Understand and learn how to deal with problems and practice problem solving skills.
CO5	Learn the principles of professional communication & application of the same

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	-	-	-	-	-	-	2	-	3	-	2	-	-
CO2	-	-	-	-	-	-	-	2	-	3	-	2	-	-
CO3	-	-	-	-	-	-	-	2	-	3	-	2	-	-
CO4	-	-	-	-	-	-	-	2	-	3	-	2	-	-
CO5	-	-	-	-	-	-	-	2	-	3	-	2	-	-
Course	-	-	-	-	-	-	-	**2**	-	**3**	-	**2**	-	-

MANAGEMENT SCIENCE			
Subject Code	18CMMST5030	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	69	Exam Hours	03
Credits – 03			

Unit -1: Introduction to Management	**Hours**
Concept –nature and importance of Management – Functions of Management – Evaluation of Management thought- Theories of Motivation – Decision making process-Designing organization structure- Principles of organization - Types of organization structure.	**14**
Unit -2: Operations Management	
Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and C chart). Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSNanalysis).	**13**
Unit – 3: Functional Management&Strategic Management	
Functional Management: Concept of HRM, HRD and PMIR- Functions of HRM - Marketing Management- Functions of Marketing, Marketing strategiesbasedonproductLifeCycle,Channelsofdistributions. **Strategic Management**: Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis- Steps in Strategy Formulation and Implementation, Generic Strategy alternatives	**16**
Unit – 4: Project Management: **(PERT/CPM)**	
Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems).	**12**
Unit – 5:Contemporary Management Practices	
Basic concepts of MIS, MRP, Justin- Time (JIT) system, Total Quality Management (TQM), Six sigma , Supply Chain Management, Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business process Re-engineering and Bench Marking, Balanced Scorecard.	**14**

Text(T) / Reference(R) Books:	
T1	*ManagementScience,* Dr. P. Vijaya Kumar & Dr. N. Appa Rao,
T2	*Management Science,* Dr. A. R. Aryasri,TMH2011.
R1	Essentials of Management, Koontz &Weihrich, TMH 2011
R2	Global Management Systems, Seth & Rastogi, Cengage Learning, 2011
R3	Organizational Behaviors, Robbins, Pearson Publications, 2011
R4	Production & Operational Management, Kanishka Bedi, Oxford Publications, 2011
R5	Management Science, Manjunath, Pearson Publications, 2013.
R6	Human Resource Management, Biswajit Patnaik, PHI, 2011
R7	Strategic Management, Hitt and Vijaya Kumar, Cengage Learning
W1	https://msande.stanford.edu/academics/graduate/masters-program/hcp-part-time-ms/online-courses
W2	https://www.coursera.org/browse/business/leadership-and-management

Course Outcomes: On completion of this course, students can	
CO1	Understand the history behind the Java technology, its features and strengths
CO2	Implement the basic principles of Object-Oriented Programming which includes inheritance, polymorphism, encapsulation and abstraction.
CO3	Understand the exception programming techniques by describing and encapsulating exceptions.
CO4	Understand the Thread concepts and Collections Framework in java. N
CO5	Create rich user-interface applications using modern API's such as JAVAFX.

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	-	-	-	-	-	-	-	2	2	3	-	-	-
CO2	-	-	-	-	-	-	-	-	2	2	3	-	-	-
CO3	-	-	-	-	-	-	-	-	2	2	3	-	-	-
CO4	-	-	-	-	-	-	-	-	2	2	3	-	-	-
CO5	-	-	-	-	-	-	-	-	2	2	3	-	-	-
Course	-	-	-	-	-	-	-	-	**2**	**2**	**3**	-	-	-

DATABASE SYSTEMS			
Subject Code	18ITITT5040	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Unit -1: Database system architecture, Introduction	**Hours**
The Three Levels of Architecture, (External Level, Conceptual Level, Internal Level), Mapping, The Database Administrator, The Database Management Systems, Client/Server Architecture. The E/R Models, The Relational Model, Relational Calculus, Introduction to Database Design, Database Design and Er Diagrams, Entities Attributes, and Entity Sets, Relationship and Relationship Sets, Conceptual Design with the Er Models, The Relational Model Integrity Constraints Over Relations, Key Constraints, Foreign Key Constraints, General Constraints	**08**
Unit -2:Relational Algebra and Calculus	
Relational Algebra, Selection and Projection, Set Operation, Renaming, Joins, Division, More Examples of Queries, Relational Calculus, Tuple Relational Calculus, Domain Relational Calculus. *Queries, Constraints, Triggers*: The Form of Basic SQL Query, Union, Intersect, and Except, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and Active Database.	**10**
Unit – 3: Schema Refinement (Normalization)	
Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency (1NF, 2NF and 3 NF), concept of surrogate key, Boyce-Codd normal form (BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF).	**10**
Unit – 4: Transaction Management and Concurrency Control	
Transaction, properties of transactions, transaction log, and transaction management with SQL using commit rollback and save point. Concurrency control for lost updates, Uncommitted data, inconsistent retrievals and the Scheduler. Concurrency control with locking methods: lock granularity, lock types, two phase locking for ensuring serializability, deadlocks, Concurrency control with time stamp ordering: Wait/Die and Wound/Wait Schemes, Database Recovery management: Transaction recovery.	**10**
Unit – 5:Overview of Storages	
Data on External Storage, File Organization and Indexing, Clustered Indexing, Primary and Secondary Indexes, Index Data Structures,*Hashing:*Static Hashing, Hash Table, Hash Functions, Secure Hash Function, Overflow Handling, Theoretical Evaluation of Overflow Techniques, Dynamic Hashing, Motivation for Dynamic Hashing, Dynamic Hashing Using Directories, Directory less Dynamic, Hashing.	**12**

Text(T) / Reference(R) Books:	
T1	Introduction to Database Systems, CJ Date, Pearson
T2	Database Management Systems,3rd Edition,Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill.
T3	Database Systems - The Complete Book, H G Molina, J D Ullman, J Widom Pearson
T4	Database Management Systems,6/e RamezElmasri, Shamkant B. Navathe, PEA
R1	Data base Systems design, Implementation, and Management, 7th Edition, Peter Rob & Carlos Coronel
R2	Database System Concepts, 5th edition, Silberschatz, Korth, TMH
R3	The Database Book Principles & Practice Using Oracle/MySQL, NarainGehani, University Press.
W1	https://onlinecourses.nptel.ac.in/noc18_cs15/preview
W2	https://www.coursera.org/learn/database-management

Course Outcomes: On completion of this course, students can	
CO1	Describe a relational database and object-oriented database. Create, maintain and manipulate a relational database using SQL
CO2	Describe ER model and normalization f or database design.
CO3	Examine issues in data storage and query processing and can formulate appropriate solutions.
CO4	Understand the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage.
CO5	Design and build database system for a given real world problem.

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2	3	-	-	-	-	-	-	-	-	-	-	2
CO2	2	2	3	-	-	-	-	-	-	-	-	-	-	2
CO3	2	2	3	-	-	-	-	-	-	-	-	-	-	2
CO4	2	2	3	-	-	-	-	-	-	-	-	-	-	2
CO5	2	2	3	-	-	-	-	-	-	-	-	-	-	2
Course	**2**	**2**	**3**	-	-	-	-	-	-	-	-	-	-	2

OPERATING SYSTEMS			
Subject Code	18ITITT5050	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Unit -1: Operating Systems Overview	**Hours**
Computer system organization, Operating system structure, Process, memory, storage management, Protection and security, Distributed systems, Computing Environments, Open-source operating systems, OS services, User operating-system interface, System calls, Types, System programs, OS structure, OS generation, System Boot Process concept, scheduling (Operations on processes, Cooperating processes, Inter-process communication), Multi-threading models, Thread Libraries, Threading issues.	**08**
Unit -2:Process Management	
Basic concepts, Scheduling criteria, Scheduling algorithms, Thread scheduling, Multiple processor scheduling Operating system, Algorithm Evaluation, The critical section problem, Peterson's solution, Synchronization hardware, Semaphores, Classic problems of synchronization, Critical regions, Monitors.	**10**
Unit – 3:Deadlocks	
System model, Deadlock characterization, Methods for handling deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock detection, Recovery from deadlock. *Storage Management:* Swapping, Contiguous memory allocation, Paging, Segmentation Virtual Memory Background, Demand paging, copy on write, Page replacement and various Page replacement algorithms, Allocation of frames, Thrashing.	**10**
Unit – 4:I/O Systems	
File concept, Access methods, Directory structure, File-system mounting, Protection, Directory implementation, Allocation methods, Free-space management, Disk scheduling, Disk management, Swap-space management, Protection.	**10**
Unit – 5:Case Study	
Linux System: Components of LINUX, Inter-process Communication, Synchronization, Interrupt, Exception and System Call. *Android Software Platform:* Android Architecture, Operating System Services, Android Runtime Application Development, Application Structure, Application Process management.	**12**

Text(T) / Reference(R) Books:	
T1	Operating System Concepts Essentials, Abraham Silberschatz, Peter B. Galvin, Greg Gagne, John Wiley & Sons Inc., 2010.
T2	Operating System Concepts, 9th Edition, Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, John Wiley and Sons Inc., 2012
T3	Operating Systems, Second Edition, S Halder, Alex A Aravind, Pearson Education, 2016
T4	Operating Systems – Internals and Design Principles, 7th Edition,WilliamStallings,Prentice Hall, 2011
R1	Modern Operating Systems, Second Edition,Andrew S. Tanenbaum,Addison Wesley, 2001.
R2	Operating Systems: A Design-Oriented Approach, Charles Crowley, Tata McGraw Hill Education, 1996.
R3	Operating Systems: A Concept-based Approach, Second Edition, D M Dhamdhere, Tata McGraw-Hill Education, 2007
R4	Operating Systems: Internals and Design Principles, Seventh Edition,William Stallings, Prentice Hall, 2011
W1	https://www.coursera.org/courses?query=operating%20system
W2	https://onlinecourses.nptel.ac.in/noc16_cs10/preview

Course Outcomes: On completion of this course, students can	
CO1	Design various Scheduling algorithms, Apply the principles of concurrency.
CO2	Design deadlock, prevention and avoidance algorithms.
CO3	Compare and contrast various memory management schemes.
CO4	Design and Implement a prototype file system, Perform administrative tasks on Linux Servers.
CO5	Introduction to Android Operating System Internals.

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2	2	3	-	-	-	-	-	-	-	-	2	-
CO2	2	2	2	3	-	-	-	-	-	-	-	-	2	-
CO3	2	2	2	3	-	-	-	-	-	-	-	-	2	-
CO4	2	2	2	3	-	-	-	-	-	-	-	-	2	-
CO5	2	2	2	3	-	-	-	-	-	-	-	-	2	-
Course	**2**	**2**	**2**	**3**	-	-	-	-	-	-	-	-	2	-

ADVANCED JAVA & WEB TECHNOLOGIES LAB			
Subject Code	18ITITL5060	IA Marks	25
Number of Tutorial Hours/Week	03(P)	Exam Marks	50
Total Number of Practice Hours	36	Exam Hours	03
Credits – 1.5			

List of Experiments

Exercise1

Write programs for TCP server and Client interaction as per given below.

i. A program to create TCP server to send a message to client.
ii. A program to create TCP client to receive the message sent by the server.

Exercise2

Write programs for Datagram server and Client interaction as per given below.

a) A program to create Datagram server to send a message to client.
b) A program to create Datagram client to receive the message sent by the server.

Exercise3

Write a program to create a chatting application.

Exercise4

a) Write a program by using JDBC to execute a SQL query for inserting data into a database.

b) Write a program by using JDBC to execute a SQL query for a database and display the results.

Exercise5

a) Write a program by using JDBC to execute an update query without using prepared statement and display the results.

b) Write a program by using JDBC to execute an update query by using Prepared Statement and display the results.

Exercise6

Write a program to execute a stored procedure in the database by using CallableStatement and display the results.

Exercise7

A) Write a program to display a greeting message in the browser by using HttpServlet.

B) Write a program to receive data from a HTML form and display the information in a table format using Servlets. Also store same information in MySQL.

Exercise8

Write a program to display a list of five websites links in a HTML form and visit to the selected website by using Response redirection using servlets.

Exercise9

A) Write a program to store the user information into Cookies. Write another program to display the above stored information by retrieving from Cookies using servlets.

B) Write a program to store the user information into Cookies. Write another program

to display the above stored information by retrieving from Cookies using JSP.

Exercise10

A) Write a program to explain the usage of Sessions concept using servlets.

B) Write a program to explain the usage of Sessions concept using JSP.

Exercise11

A) Write a program to develop an Enterprise Java Bean of "Session Bean" type.

B) Write a program to create Login application using struts.

Exercise12

Create an application for registering a student using PHP and to store same in MySQL.

Course Outcomes: On completion of this course, students can	
CO1	Create chat applications using TCP/IP and datagram
CO2	Develop applications to store, update and retrieve the data into database.
CO3	Design dynamic web pages and storing the data onto the database server using servlets and JSP
CO4	Build webpages that can work with Cookies and sessions using Servlets and JSP.
CO5	Develop applications using struts Framework, to store the data to MYSQL database using PHP

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1	1	1	-	1	-	-	-	1	-	1	1	1	2
CO2	1	1	1	-	1	-	-	-	1	-	1	1	1	2
CO3	1	1	1	-	1	-	-	-	1	-	1	1	1	2
CO4	1	-	-	-	1	-	-	-	-	-	1	1	1	2
CO5	1	-	-	-	1	-	-	-	-	-	1	1	1	2
Course	**2**	**2**	**2**	**-**	**2**	**-**	**-**	**-**	**2**	**-**	**2**	**2**	**2**	2

OPERATING SYSTEMS& UNIX PROGRAMMING LAB			
Subject Code	18ITITL5070	IA Marks	50
Number of Tutorial Hours/Week	03(P)	Exam Marks	50
Total Number of Practice Hours	36	Exam Hours	03
Credits – 1.5			

List of Experiments

Exercise1

Simulate the following CPU scheduling algorithms

a) Round Robin
b) SJF
c) FCFS
d) Priority

Exercise2

Loading executable programs into memory and execute system call implementation for read(), write(), open(), and close().

Exercise3

Implement fork(), wait(), exec() and exit() system calls.

Exercise4

Simulate the following file allocation strategies

a) Sequenced
b) Indexed and
c) Linked

Exercise5

Simulate MVT and MFT

Exercise6

Simulate the following File Organization Techniques

a) Single Level Directory
b) Two Level
c) Hierarchical
d) DAG

Exercise7

Simulate Bankers Algorithm for Deadlock Avoidance

Exercise 8

Simulate Bankers Algorithm for Deadlock Prevention

Exercise9

Simulate the following page replacement algorithms

a) FIFO
b) LRU
c) LFU

Exercise10

Simulate Paging Technique of memory management.

Course Outcomes: On completion of this course, students can	
CO1	Design various Scheduling algorithms, Apply the principles of concurrency.
CO2	Design deadlock, prevention and avoidance algorithms.
CO3	Compare and contrast various memory management schemes.
CO4	Design and Implement a prototype file system, Perform administrative tasks on Linux Servers.
CO5	Introduction to Android Operating System Internals.

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2	3	-	-	-	-	-	-	-	-	-	-	2
CO2	2	2	3	-	-	-	-	-	-	-	-	-	-	2
CO3	2	2	3	-	-	-	-	-	-	-	-	-	-	2
CO4	2	2	3	-	-	-	-	-	-	-	-	-	-	2
CO5	2	2	3	-	-	-	-	-	-	-	-	-	-	2
Course	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	2

DATABASE SYSTEMS LAB			
Subject Code	18ITITL5080	IA Marks	50
Number of Tutorial Hours/Week	03(P)	Exam Marks	50
Total Number of Practice Hours	36	Exam Hours	03
Credits – 1.5			

List of Experiments

SQL

Exercise1

Queries to facilitate acquaintance of Built-In Functions, String Functions, NumericFunctions, Date Functions and Conversion Functions.

Exercise2

Queries using operators in SQL

Exercise3

Queries to Retrieve and Change Data: Select, Insert, Delete, and Update

Exercise4

Queries using Group By, Order By, and Having Clauses

Exercise5

Queries on Controlling Data: Commit, Rollback, and Save point

Exercise6

Queries to Build Report in SQL *PLUS

Exercise7

Queries for Creating, Dropping, and Altering Tables, Views, and Constraints

Exercise8

Queries on Joins and Correlated Sub-Queries

Exercise9

Queries on Working with Index, Sequence, Synonym, Controlling Access, and Locking Rows for Update, Creating Password and Security features

PL/SQL

Exercise10

Write a PL/SQL Code using Basic Variable, Anchored Declarations, and Usage of Assignment Operation

Exercise11

Write a PL/SQL Code Bind and Substitution Variables. Printing in PL/SQL

Exercise12

Write a PL/SQL block using SQL and Control Structures in PL/SQL

Exercise13

Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types

Exercise14

Write a PL/SQL Code using Procedures, Functions, and Packages FORMS

Exercise15

Write a PL/SQL Code Creation of forms for any Information System such as Student Information System, Employee Information System etc. 18

Exercise16

Demonstration of database connectivity

Course Outcomes: On completion of this course, students can	
CO1	Understand, appreciate and effectively explain the underlying concepts of database technologies.
CO2	Design and implement a database schema for a given problem-domain, Normalize a database
CO3	Populate and query a database using SQL DML/DDL commands.
CO4	Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS
CO5	Programming PL/SQL including stored procedures, stored functions, cursors, packages.Design and build a GUI application using a 4GL

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2	3	-	-	-	-	-	-	-	-	-	-	2
CO2	2	2	3	-	-	-	-	-	-	-	-	-	-	2
CO3	2	2	3	-	-	-	-	-	-	-	-	-	-	2
CO4	2	2	3	-	-	-	-	-	-	-	-	-	-	2
CO5	2	2	3	-	-	-	-	-	-	-	-	-	-	2
Course	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	2

VI SEMESTER (III-II)

COMPUTER NETWORKS			
Subject Code	18ITITT6010	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Unit -1: Introduction	**Hours**
Network Topologies, WAN, LAN, MAN. OSI Reference Model, TCP/IP Reference Model, Multiplexing (Frequency Division, Wavelength Division, Synchronous Time Division and Statistical Time Division Multiplexing Techniques), Switching Techniques (Circuit-switching, Datagram, Virtual Circuit Networks).	**08**
Unit -2:The Data Link Layer	
Design Issues, Services Provided to the Network Layer, Framing, Error Control, Flow Control, Error Detection and Correction, Error Correcting Codes, Error Detecting Codes, A Simplex Stop and Wait Protocol for an Error free channel, A Simplex Stop and Wait Protocol for a Noisy Channel, Sliding Window Protocols (A One Bit Sliding Window Protocol-A Protocol Using Go-Back-NA Protocol Using Selective Repeat), *Data Link Layer in HDLC:* Configuration and transmission modes, frames, control fields, *Point-to-Point Protocol:* Framing transmission phase, multiplexing, multi-link PPP.	**10**
Unit – 3:The Medium Access Control Sub layer & Network Layer	
The Channel Allocation Problem, Static Channel Allocation, Assumptions for Dynamic Channel Allocation, Multiple Access Protocols (Aloha, Carrier Sense Multiple Access Protocols, Collision-Free Protocols, Limited Contention Protocols, Wireless LAN Protocols). Routing Algorithms- Shortest-Path Routing, Flooding, Hierarchical routing, Broadcast, Multicast and Distance Vector Routing.	**10**
Unit – 4:Congestion Control	
Congestion Control Algorithms, Approaches to Congestion Control-Traffic Aware Routing-Admission Control-Traffic Throttling-Load Shedding, IP Addressing, Classless and Class full Addressing, Sub-netting, Standard Ethernet (MAC Sub Layer and Physical Layer), Fast Ethernet (MAC Sub Layer and Physical Layer), IEEE-802.11 (Architecture, Mechanism and Frame Structure), IEEE-805.11 Frame Structure and Services.	**10**
Unit – 5:Application Layer	
The Domain Name System- The DNS Name Space, Resource Records, Name Servers, Electronic Mail Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery, The Wireless Application Protocol.	**12**

Text(T) / Reference(R) Books:	
T1	Computer Networks, 5th Edition,Tanenbaum and David J Wetherall,Pearson Edu, 2010.
T2	Computer Networks: A Top Down Approach, Behrouz A. Forouzan, FirouzMosharraf, McGraw Hill Education.
T3	Computer Networks, Mayank Dave, CENGAGE
T4	Data and Computer Communications, Fifth Edition, William Stallings, PHI, 2005.
R1	Computer Networks, A Systems Approach, Fifth Edition, Peterson & Davie, Harcourt, 2011.
R2	Network Management Standards, Second Edition, Ulysses Black, McGraw Hill, 1994
R3	Computer Networking - A Top-down Approach, Sixth Edition, James F. Kurose, Keith W. Ross,Pearson, 2013.
R4	Computer Networks - A Systems Approach, 5th ed, Larry L. Peterson and Bruce S. Davie, Morgan Kaufmann/ Elsevier, 2011
R5	An Engineering Approach to Computer Networks, 2nd Edition, S.Keshav, Pearson Education.
R6	Understanding Communications and Networks, 3rd Edition, W.A.Shay, Thomson
W1	https://swayam.gov.in/courses/5172-computer-networks
W2	https://www.coursera.org/courses?query=computer%20network

Course Outcomes: On completion of this course, students can	
CO1	Understand OSI and TCP/IP models
CO2	Analyze MAC layer protocols and LAN technologies
CO3	Design applications using internet protocols
CO4	Understand routing and congestion control algorithms
CO5	Understand how internet works.

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2	3	-	-	-	-	-	-	-	-	-	1	2
CO2	2	2	3	-	-	-	-	-	-	-	-	-	-	2
CO3	2	2	3	-	-	-	-	-	-	-	-	-	-	2
CO4	2	2	3	-	-	-	-	-	-	-	-	-	-	2
CO5	2	2	3	-	-	-	-	-	-	-	-	-	-	2
Course	**2**	**2**	**3**	-	-	-	-	-	-	-	-	-	1	2

SOFTWARE ENGINEERING			
Subject Code	18ITITT6020	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Unit -1: Software and Software Engineering	**Hours**
The Nature of Software, The Unique Nature of Web Apps, Software Engineering, Software Process, Software Engineering Practice, software Myths. *Process Models:*A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Terminology, Product and Process.*Requirements Analysis and Specification:*Requirements Gathering and Analysis, Software Requirement Specification (SRS), Formal System Specification.	**08**
Unit -2: Software Design	
Overview of the Design Process, How to Characterize of a Design, Cohesion and Coupling, Layered Arrangement of Modules, Approaches to Software Design. *Function-Oriented Software Design:*Overview of SA/SD Methodology, Structured analysis, Developing the DFD Model of a System, Structured Design, Detailed Design, Design Review, over view of Object-Oriented design. *User Interface Design:* Characteristics of Good User Interface, Basic Concepts, Types of User Interfaces, Fundamentals of component-based GUI Development, A User Interface Design Methodology.	**10**
Unit – 3: Coding and Testing	
Coding, Code Review, Software Documentation, Testing, Unit Testing, Black-Box Testing, White-Box Testing, Debugging, Program Analysis Tool, Integration Testing, Testing Object-Oriented Programs, System Testing, Some General Issues Associated with Testing.	**10**
Unit – 4: Software Reliability and Quality Management	
Software Reliability, Statistical Testing, Software Quality, Software Quality Management System, ISO 9000, SEI Capability Maturity Model. *Computer Aided Software Engineering:*Case and its Scope, Case Environment, Case Support in Software Life Cycle, Other Characteristics of Case tools, Towards Second Generation CASE Tool, Architecture of a Case Environment.	**10**
Unit – 5: Software Maintenance	
Software maintenance, Maintenance Process Models, Maintenance Cost, Software Configuration Management. *Software Reuse:* what can be reused? Why almost No Reuse So Far? Basic Issues in Reuse Approach, Reuse at organization Level.	**12**

Text(T) / Reference(R) Books:	
T1	Software engineering A practitioner's Approach,Roger S. Pressman, Seventh Edition McGrawHill International Edition.
T2	Fundamentals of Software Engineering,ThirdEdition,RajibMall,PHI.
T3	Software Engineering, Ian Sommerville, Ninth edition, Pearson education
T4	Software Engineering, Concepts and Practices, Ugrasen Suman, Cengage Learning
R1	Software Engineering A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
R2	Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010.
R3	Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press
R4	Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.
R5	Software Engineering concepts, R. Fairley, TMH.
W1	https://www.edx.org/learn/software-engineering
W2	https://www.coursera.org/courses?query=software%20engineering

Course Outcomes: On completion of this course, students can	
CO1	Define and develop a software project from requirement gathering to implementation.
CO2	Obtain knowledge about principles and practices of software engineering
CO3	Focus on the fundamentals of software project
CO4	Focus on modelling asoftware project
CO5	Obtain knowledge about estimation and maintenance of software systems

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	3	2	-	-	-	-	-	-	-	-	-	2	-
CO2	2	3	2	-	-	-	-	-	-	-	-	-	2	-
CO3	2	3	2	-	-	-	-	-	-	-	-	-	2	-
CO4	2	3	2	-	-	-	-	-	-	-	-	-	2	-
CO5	2	3	2	-	-	-	-	-	-	-	-	-	2	-
Course	**2**	**3**	**2**	-	-	-	-	-	-	-	-	-	2	-

WIRELESS SENSOR NETWORKS (PROGRAM ELECTIVE-I)			
Subject Code	18ITITP603G	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Unit -1	**Hours**
OVERVIEW OF WIRELESS SENSOR NETWORKS: Key definitions of sensor networks, Advantages of sensor Networks, Unique constraints an challenges, Driving Applications, Enabling Technologies for Wireless Sensor Networks. **ARCHITECTURES**: Single-Node Architecture – Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments, Network Architecture -Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.	**10**
Unit -2	
NETWORKING Technologies: Physical Layer and Transceiver Design Considerations, Personal area networks (PANs), hidden node and exposed node problem, Topologies of PANs, MANETs, WANETs.	**08**
Unit – 3	
MAC Protocols for Wireless Sensor Networks: Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Contention – Based Protocols, Contention – Based Protocols with reservation Mechanisms, Contention – Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that use Directional Antennas, Other MAC Protocols.	**10**
Unit – 4	
ROUTING PROTOCOLS: Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table –Driven Routing Protocols, On – Demand Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power – Aware Routing Protocols, Proactive Routing.	**10**
Unit – 5	
PROTOCOLS: Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocol for Ad Hoc Wireless Networks. **APPLICATIONS of WSN:** S Ultra-wide band radio communication, Wireless fidelity systems. Future directions, Home automation, smart metering Applications.	**12**

Text(T) / Reference(R) Books:	
T1	Ad Hoc Wireless Networks: Architectures and Protocols – C. Siva Ram Murthy and B.S.Manoj, 2004, PHI
T2	Wireless Ad- hoc and Sensor Networks: Protocols, Performance and Control – Jagannathan Sarangapani, Holger Karl & Andreas Willig, CRC Press
T3	"Protocols And Architectures for Wireless Sensor Networks", John Wiley, 2005.
R1	, "Wireless Sensor Networks- Technology, Protocols, and Applications", Kazem Sohraby, Daniel Minoli, &TaiebZnati John Wiley, 2007.
R2	, "Wireless Sensor Networks- An Information Processing Approach", Feng Zhao & Leonidas J. Guibas Elsevier, 2007.
R3	Ad- Hoc Mobile Wireless Networks: Protocols & Systems, C.K. Toh ,1 ed. Pearson Education.
R4	Wireless Sensor Networks – C. S. Raghavendra, Krishna M. Sivalingam, 2004, Springer.
R5	Wireless Sensor Networks – S Anandamurugan , Lakshmi Publications
W1	https://onlinecourses.nptel.ac.in/noc18_cs09/preview
W2	https://www.coursera.org/courses?query=WIRELESS%20SENSOR%20NETWORKS&

Course Outcomes: On completion of this course, students can	
CO1	Explain the Fundamental Concepts and applications of ad hoc and wireless sensor networks
CO2	Describe the MAC protocol issues of ad hoc networks
CO3	Describe routing protocols for ad hoc wireless networks with respect to TCP design issues
CO4	Explain the concepts of network architecture and MAC layer protocol for WSN
CO5	Discuss the WSN routing issues by considering QoS measurements

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	**1**	-	-	**2**	-	-	-	-	-	-	-	-	2	-
CO2	-	-	-	**2**	-	-	-	-	-	-	-	-	2	-
CO3	-	**1**	-	**2**	-	-	-	-	-	-	-	-	2	-
CO4	**2**	-	-	**1**	-	-	-	-	-	-	-	-	2	-
CO5	**2**	-	-	**1**	-	-	-	-	-	-	-	-	2	-
Course	**2**	**1**	-	**3**	-	-	-	-	-	-	-	-	2	-

UI DESIGN (PROGRAM ELECTIVE-I)			
Subject Code	18ITITP603G	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Unit -1	**Hours**
The User Interface: Introduction, Importance of the User Interface, Importance and benefits of Good Design History of Human Computer Interface. Characteristics of Graphical and Web User Interface: Graphical User Interface, popularity of graphics, concepts of Direct Manipulation, Graphical System advantage and disadvantage, Characteristics of GUI. Web User Interface, popularity of web, Characteristics of Web Interface, Merging of Graphical Business systems& the Web, Principles of User Interface Design	**12**
Unit -2	
The User Interface Design Process: Obstacles and Pitfall in the development Process, Usability, The Design Team, Human Interaction with Computers, Important Human Characteristics in Design, Human Consideration in Design, Human Interaction Speeds, Performance versus Preference, Methods for Gaining and Understanding of Users	**10**
Unit – 3	
Understanding Business Functions: Business Definitions & Requirement analysis, Determining Business Functions, Design standards or Style Guides, System Training and Documentation	**10**
Unit – 4	
Principles of Good Screen Design: Human considerations in screen Design, interface design goals, test for a good design, screen meaning and purpose, Technological considerations in Interface Design System Menus and Navigation Schemes: Structure, Functions, Context, Formatting, Phrasing and Selecting, Navigating of Menus, Kinds of Graphical Menus Windows Interface: Windows characteristic, Components of Window, Windows Presentation Styles, Types of Windows, Window Management, Web systems	**12**
Unit – 5	
Device and Screen-Based Control: Device based controls, Operable Controls, Text entry/read-Only Controls, Section Controls, Combining Entry/Selection Controls, Other Operable Controls and Presentation Controls, Selecting proper controls	**08**

Text(T) / Reference(R) Books:	
T1	"The Essential Guide to User Interface Design", Wilbert O. Galitz, Wiley India Edition
T2	Prece, Rogers, "Sharps Interaction Design", Wiley India
T3	"Designing the user interfaces". Ben Shneidermann 3rd Edition, Pearson Education Asia.
R1	"User Interface Design" , Soren Lauesen, Pearson Education
R2	"Essentials of Interaction Design", Alan Cooper, Robert Riemann, David Cronin, Wiley
R3	"HumanComputer Interaction", Alan Dix, Janet Fincay, GreGoryd, Abowd, Russell, Bealg,Pearson Education.
W1	https://www.coursera.org/specializations/user-interface-design
W2	https://onlinecourses.nptel.ac.in/noc19_ar10/preview

Course Outcomes: On completion of this course, students can	
CO1	Demonstrate an understanding of guidelines, principles, and theories influencing human Computer interaction.
CO2	Recognize how a computer system may be modified to include human diversity.
CO3	Select an effective style for a specific application.
CO4	Design mock ups and carry out user and expert evaluation of interfaces.
CO5	Carry out the steps of experimental design, usability and experimental testing, and evaluation of human computer interaction systems.

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1	3	-	-	-	-	-	-	-	-	-	-	2	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-	2	-
CO3	1	2	-	-	-	-	-	-	-	-	-	-	2	-
CO4	2	1	-	-	-	-	-	-	-	-	-	-	2	-
CO5	2	2	-	-	-	-	-	-	-	-	-	-	2	-
Course	**2**	**3**	-	-	-	-	-	-	-	-	-	-	2	-

ENGINEERING ECONOMICS & FINANCIAL MANAGEMENT			
Subject Code	18CMMST6050	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	69	Exam Hours	03
Credits – 03			

Unit -1: Introduction to Managerial Economics and demand Analysis	**Hours**
Definition of Managerial Economics and Scope-Managerial Economics and its relation with other subjects-Concepts of Demand-Types-Determents-Law of Demand its Exception-Elasticity of Demand-Types and Measurement-Demand forecasting and its Methods.	**16**
Unit -2:Production and Cost Analysis	
Production function-Isoquants and Isocost-Law of Variable proportions-Cobb-Douglas Production Function-Economics of Sale-Cost Concepts-Opportunity Cost-Fixed vs Variable Costs-Explicit Costs vs Implicit Costs-Cost Volume Profit analysis- Determination of Break-Even Point (Simple Problems).	**14**
Unit – 3:Introduction To Markets, Pricing Policies & forms Organizations and Business Cycles	
Market Structures: Perfect Competition, Monopoly and Monopolistic and Oligopoly – Features – Price, Output Determination – Methods of Pricing: Market Skimming Pricing, And Internet Pricing: Flat Rate Pricing. Features and Evaluation of Sole Trader – Partnership – Joint Stock Company – State/Public Enterprises and their forms – Business Cycles – Meaning and Features – Phases of Business Cycle	**13**
Unit – 4:Introduction to Accounting & Financing Analysis	
Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow cash flow statements (Simple Problems)	**12**
Unit – 5:Capital and Capital Budgeting	
Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Need for Capital Budgeting-Techniques of Capital Budgeting-Traditional and Modern Methods.	**14**

Text(T) / Reference(R) Books:	
T1	Managerial Economics and Financial Analysis, Dr. A. R. Aryasri, TMH 2011.
T2	Managerial Economics and Financial Analysis, 1/e,B.Kuberadu, HPH, 2013
T3	Management Science, Dr. P. Vijaya Kumar & Dr. N. Apparao, Cengage, Delhi, 2012
T4	Management Science, Dr. A. R. Arya Sri,TNH, 2011.
R1	Financial Accounting for Management, AmbrishGupta,Pearson Education, New Delhi.
R2	Managerial Economics, 4th Ed, H. Craig Peterson & W. CrisLewis,PHI.
R3	Essentials of management, Koontz and weihrich, TMH 2011
R4	Global management systems, Seth& Rastogi, Cengage learning,delhi,2011
R5	Managerial Economics, V. Maheswari, Sultan Chand
R6	Managerial Economics & Financial Analysis, Dr. B. Kuberudu and Dr. T. V. Ramana, Himalaya Publishing House 2011.
W1	https://www.coursera.org/courses?query=financial%20management
W2	https://www.edx.org/learn/economics

Course Outcomes: On completion of this course, students can	
CO1	Students are equipped with the knowledge of managerial economics and estimating demand for a product.
CO2	Students understand Production and Cost concepts, estimating Cost Break even Analysis.
CO3	Students are equipped with the knowledge on Markets and Pricing methods along with Business Cycles.
CO4	Students are able to understand Accounting Concepts and Prepare Financial Statements- Analysis
CO5	Students are able to analyze various investment project proposals with the help of Capital Budgeting techniques.

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2	2	-	-	-	-	-	-	-	3	-	-	-
CO2	2	2	2	-	-	-	-	-	-	-	3	-	-	-
CO3	2	2	2	-	-	-	-	-	-	-	3	-	-	-
CO4	2	2	2	-	-	-	-	-	-	-	3	-	-	-
CO5	2	2	2	-	-	-	-	-	-	-	3	-	-	-
Course	**2**	**2**	**2**	-	-	-	-	-	-	-	**3**	-	-	-

SOFTWARE ENGINEERING LAB			
Subject Code	18ITITL6060	IA Marks	25
Number of Tutorial Hours/Week	03(P)	Exam Marks	50
Total Number of Practice Hours	36	Exam Hours	03
Credits – 1.5			

List of Experiments

Exercise1
Do the Requirement Analysis and Prepare SRS

Exercise2
Using COCOMO model estimate effort.

Exercise3
Calculate effort using FP oriented estimation model.

Exercise4
Analyze the Risk related to the project and prepare RMMM plan.

Exercise5
Develop Time-line chart and project table using PERT or CPM project scheduling methods.

Exercise6
Draw E-R diagrams, DFD, CFD and structured charts for the project.

Exercise7
Design of Test cases based on requirements and design.

Exercise8
Prepare FTR

Exercise 9
Prepare Version control and change control for software configuration items.

Exercise10
DesignSoftware interface

Exercise11
Mini Project

Course Outcomes: On completion of this course, students can	
CO1	Attain knowledge on preparing SRS document
CO2	Estimate the cost of the project.
CO3	Design ER and DFD Diagrams
CO4	Design the test cases for the user specification.
CO5	Implement various versions of software for customization.

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	-	3	-	-	-	-	-	-	-	2	-
CO2	2	3	3	-	2	-	-	-	-	-	-	-	2	-
CO3	2	3	3	-	2	-	-	-	-	-	-	-	2	-
CO4	2	3	3	-	2	-	-	-	-	-	-	-	2	-
CO5	2	3	3	-	2	-	-	-	-	-	-	-	2	-
Course	**2**	**3**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	2	**-**

PYTHON PROGRAMMING LAB			
Subject Code	18ITITL6070	IA Marks	50
Number of Tutorial Hours/Week	03(P)	Exam Marks	50
Total Number of Practice Hours	36	Exam Hours	03
Credits – 1.5			

List of Experiments

Exercise 1 - Basics

a) Running instructions in Interactive interpreter and a Python Script

b) Write a program to purposefully raise Indentation Error and Correct it

Exercise 2 - Operations

a) Write a program to compute distance between two points taking input from the user

(Pythagorean Theorem)

b) Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

Exercise - 3 Control Flow

a) Write a Program for checking whether the given number is a even number or not.

b) Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . . ,1/10

c) Write a program using a for loop that loops over a sequence. What is sequence?

d) Write a program using a while loop that asks the user for a number, and prints a countdown

from that number to zero.

Exercise 4 - Control Flow - Continued

a) Find the sum of all the primes below two million.

Each new term in the Fibonacci sequence is generated by adding the previous two terms. By

starting with 1 and 2, the first 10 terms will be:

1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...

b) By considering the terms in the Fibonacci sequence whose values do not exceed four million,

find the sum of the even-valued terms.

Exercise - 5 - DS

a) Write a program to count the numbers of characters in the string and store them in a

dictionary data structure

b) Write a program to use split and join methods in the string and trace a birthday with a

dictionary data structure.

Exercise - 6 DS - Continued

a) Write a program combine_lists that combines these lists into a dictionary.

b) Write a program to count frequency of characters in a given file. Can you use character

frequency to tell whether the given file is a Python program file, C program file or a text file?

Exercise - 7 Files

a) Write a program to print each line of a file in reverse order.

b) Write a program to compute the number of characters, words and lines in a file.

Exercise - 8 Functions

a) Write a function ball_collide that takes two balls as parameters and computes if they are

colliding. Your function should return a Boolean representing whether or not the balls are

colliding.

Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius

If (distance between two balls centers) <= (sum of their radii) then (they are colliding)

b) Find mean, median, mode for the given set of numbers in a list.

Exercise - 9 Functions - Continued

a) Write a function nearly_equal to test whether two strings are nearly equal. Two strings a and b

are nearly equal when a can be generated by a single mutation on b.

b) Write a function dups to find all duplicates in the list.

c) Write a function unique to find all the unique elements of a list.

Exercise - 10 - Functions - Problem Solving

a) Write a function cumulative_product to compute cumulative product of a list of numbers.

b) Write a function reverse to reverse a list. Without using the reverse function.

c) Write function to compute gcd, lcm of two numbers. Each function shouldn’t exceed one line.

Exercise 11 - Multi-D Lists

a) Write a program that defines a matrix and prints

b) Write a program to perform addition of two square matrices

c) Write a program to perform multiplication of two square matrices

Exercise - 12 - Modules

a) Install packages requests, flask and explore them. using (pip)

b) Write a script that imports requests and fetch content from the page. Eg. (Wiki)

c) Write a simple script that serves a simple HTTP Response and a simple HTML Page

Exercise - 13 OOP

a) Class variables and instance variable

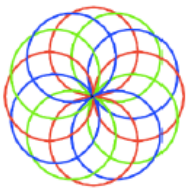
i) Robot

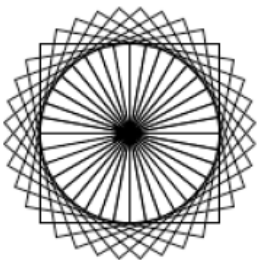
ii) ATM Machine

Exercise - 14 GUI, Graphics

1. Write a GUI for an Expression

2. Write a program to implement





Exercise - 15 - Testing

a) Write a test-case to check the function even_numbers which return True on passing a list of all even numbers

b) Write a test-case to check the function reverse_string which returns the reversed string.

Exercise - 16 - Advanced

a) Build any one classical data

b) Write a program to solve knapsack

Course Outcomes: On completion of this course, students can

CO1	Making Software easily right out of the box.
CO2	Experience with an interpreted Language.
CO3	To build software for real needs.
CO4	Prior Introduction to testing software

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2	-	-	3	-	-	-	-	-	-	-	-	2
CO2	2	2	-	-	3	-	-	-	-	-	-	-	-	2
CO3	2	2	-	-	3	-	-	-	-	-	-	-	-	2
CO4	2	2	-	-	3	-	-	-	-	-	-	-	-	2
CO5	2	2	-	-	3	-	-	-	-	-	-	-	-	2
Course	**2**	**2**	**-**	**-**	**3**	-	-	-	-	-	-	-	-	2

VII SEMESTER (IV-I)

R PROGRAMMING (PROGRAM ELECTIVE-II)			
Subject Code	18ITITP702G	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			
Unit -1:Introduction			**Hours**
How to run R, R Sessions and Functions, Basic Math, Variables, Data Types,Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes.			**08**
Unit -2:R Programming Structures, Control Statements, Loops			
Looping Over Nonvector Sets,- If-Else,Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quicksort Implementation-Extended Extended Example: A Binary Search Tree.			**10**
Unit – 3: Math and Simulation in R			
Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability- Cumulative Sums and Products-Minima and Maxima-Calculus, Functions Fir Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product-Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /output, Accessing the Keyboard and Monitor, Reading and writer Files			**10**
Unit – 4: Graphics			
Creating Graphs, The Workhorse of R Base Graphics, the plot() Function – Customizing Graphs, Saving Graphs to Files, Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,-ANOVA.			**10**
Unit – 5: Linear Models			
Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression- other Generalized Linear Models-Survival Analysis, Nonlinear Models, Splines- Decision- Random Forests			**12**

Text(T) / Reference(R) Books:	
T1	The Art of R Programming, Norman Matloff, Cengage Learning
T2	R for Everyone, Lander, Pearson
R1	R Cookbook, PaulTeetor, Oreilly.
R2	R in Action,RobKabacoff, Manning
W1	https://www.edx.org/learn/r-programming
W2	https://www.coursera.org/learn/r-programming

Course Outcomes: On completion of this course, students can	
CO1	List motivation for learning a programming language
CO2	Access online resources for R and import new function packages into the R workspace
CO3	Import, review, manipulate and summarize data-sets in R
CO4	Explore data-sets to create testable hypotheses and identify appropriate statistical tests
CO5	Perform appropriate statistical tests using R Create and edit visualizations

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2	3	-	-	-	-	-	-	-	-	-	-	2
CO2	2	2	3	-	-	-	-	-	-	-	-	-	-	2
CO3	2	2	3	-	-	-	-	-	-	-	-	-	-	2
CO4	2	2	3	-	-	-	-	-	-	-	-	-	-	2
CO5	2	2	3	-	-	-	-	-	-	-	-	-	-	2
Course	**2**	**2**	**3**	-	-	-	-	-	-	-	-	-	-	2

SOFTWARE QUALITY ASSURANCE (PROGRAM ELECTIVE-II)			
Subject Code	18ITITP702G	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			
Unit -1: INTRODUCTION TO SOFTWARE QUALITY & ARCHITECTURE			**Hours**
Need for Software quality – Quality challenges – Software quality assurance (SQA) – Definition and objectives – Software quality factors- McCall's quality model – SQA system and architecture – Software Project life cycle Components – Pre project quality components – Development and quality plans.			**10**
Unit -2: SQA COMPONENTS AND PROJECT LIFE CYCLE			
Software Development methodologies – Quality assurance activities in the development process- Verification & Validation – Reviews – Software Testing – Software Testing implementations – Quality of software maintenance – Pre-Maintenance of software quality components – Quality assurance tools – Software maintenance quality – Project Management			**10**
Unit – 3: SOFTWARE QUALITY INFRASTRUCTURE			
Procedures and work instructions – Templates – Checklists – 3S development – Staff training and certification Corrective and preventive actions – Configuration management – Software change control – Configuration management audit -Documentation control – Storage and retrieval			**08**
Unit – 4: SOFTWARE QUALITY MANAGEMENT & METRICS			
Project process control – Computerized tools – Software quality metrics – Objectives of quality measurement – Process metrics – Product metrics – Implementation – Limitations of software metrics – Cost of software quality – Classical quality cost model – Extended model – Application of Cost model			**10**
Unit – 5: STANDARDS, CERTIFICATIONS & ASSESSMENTS			
Quality management standards – ISO 9001,9003 – capability Maturity Models – CMM and CMMI – Bootstrap methodology –SQA project process standards – IEEE st 1012 & 1028 – Organization of Quality Assurance – Department management responsibilities – Project management responsibilities-SQA units and other actors in SQA systems			**12**

Text(T) / Reference(R) Books:	
T1	"Software Quality Assurance, Daniel Galin, Pearson Publication, 2009
T2	"Software Quality: Theory and Management, Alan C. Gillies, International Thomson Computer Press
R1	"Software Quality: Producing Practical Consistent Software", Mordechai Ben-Menachem International Thompson Computer Press, 1997
R2	"Metrics and Models in Software Quality Engineering", Stephen H Khan Pearson Education, Second Edition, 2004
W1	https://www.coursera.org/courses?query=software%20testing
W2	https://www.coursera.org/courses?query=quality%20assurance

Course Outcomes: On completion of this course, students can	
CO1	Describe the basic concepts in SQA, challenges and SQA system architecture
CO2	Explain SQA components and maintenance activities.
CO3	Choose the corrective actions to assess the quality of software product.
CO4	Apply the metrics involved in software development
CO5	Develop the concepts in preparing the quality plan & documents

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	2	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	2	-
CO3	-	3	2	-	-	-	-	-	-	-	-	-	2	-
CO4	-	2	3	-	-	-	-	-	-	-	-	-	2	-
CO5	2	-	3	-	-	-	-	-	-	-	-	-	2	-
Course	**3**	**2**	**3**	-	-	-	-	-	-	-	-	-	2	-

CLOUD COMPUTING (PROGRAM ELECTIVE-III)			
Subject Code	18ITITP703G	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			
Unit -1: INTRODUCTION			**Hours**
Where Are We Today, What Is Cloud Computing, Cloud Deployment Models, Private vs. Public Clouds, Business Drivers for CloudComputing, Introduction to Cloud Technologies. *INFRASTRUCTURE AS A SERVICE*: Storage as a Service: Amazon Storage Services, Compute as a Service: Amazon Elastic Compute Cloud (EC2), HP Cloud System Matrix, Cells-as-a-Service.			**10**
Unit -2: PLATFORM AS A SERVICE			
Windows Azure, A "Hello World" Example, Example: Passing a Message, Azure Test and Deployment, Technical Details of the Azure Platform, Azure Programming Model, Using Azure Cloud Storage Services, Handling the Cloud Challenges, Designing Pustak Portal in Azure, Google App Engine, Platform as a Service: Storage Aspects, Apache Hadoop, Mashups. *SOFTWARE AS A SERVICE:*CRM as a Service, Salesforce.com, Social Computing Services, Document Services: Google Docs.			**10**
Unit – 3: PARADIGMS FOR DEVELOPING CLOUD APPLICATIONS			
Scalable Data Storage Techniques, MapReduce Revisited, Rich Internet Applications. *ADDRESSING THE CLOUD CHALLENGES:*Scaling Computation, Scale Out versus Scale Up, Amdahl's Law, Scaling Cloud Applications with a Reverse Proxy, Hybrid Cloud and Cloud Bursting: Open Nebula, Scaling Storage, CAP Theorem, Implementing Weak Consistency, Consistency in No SQL Systems, Multi-Tenancy, Multi-Tenancy Levels, Tenants and Users, Authentication, Implementing Multi-Tenancy: Resource Sharing, Case Study: Multi-Tenancy in Salesforce.com, Multi-Tenancy and Security in Hadoop.			**10**
Unit – 4: DESIGNING CLOUD SECURITY			
Cloud Security Requirements and Best Practices, Physical Security, Virtual Security, Risk Management, Risk Management Concepts, Risk Management Process, Security Design Patterns, Defense in Depth, Honeypots, Sandboxes, Network Patterns, Common Management Database, Example: Security Design for a PaaS System, Security Architecture Standards, SSE-CMM, Legal and Regulatory Issues, Selecting a Cloud Service Provider, Cloud Security Evaluation Frameworks.			**10**
Unit – 5: MANAGING THE CLOUD			
Managing IaaS, Managing PaaS, Managing SaaS, Other Cloud-Scale Management Systems, *RELATED TECHNOLOGIES*: Server Virtualization, Two Popular Hypervisors, Storage Virtualization, Grid Computing, Other Cloud-Related Technologies.			**10**

Text(T) / Reference(R) Books:	
T1	Moving to the Cloud:Developing Apps in the New World of Cloud Computing, DinkarSitaram, GeethaManjunath, 1stEdition, Elsevier,2012
R1	"Cloud Computing Bible" Barrie Sosinsky ,1stEdition,Wiley India Pvt Ltd, 2011
R2	"Cloud Computing: A Practical Approach", Robert Elsenpeter, Toby J. Velte, Anthony T. Velte, ", 1st Edition, TataMcGraw Hill Education, 2011
W1	https://www.edx.org/learn/cloud-computing
W2	https://www.coursera.org/courses?query=cloud%20computing

Course Outcomes: On completion of this course, students can	
CO1	Summarize importance of cloud computing in real world.
CO2	Identify applications that can be integrated using cloud services.
CO3	Evaluate cloud-based applications.
CO4	Understand the security issues in cloud services.
CO5	Identify the cloud services managing

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1	3	2	-	-	-	-	-	-	-	-	-	2	-
CO2	1	3	2	-	-	-	-	-	-	-	-	-	2	-
CO3	1	-	2	-	-	-	-	-	-	-	-	-	2	-
CO4	1	3	2	-	-	-	-	-	-	-	-	-	2	-
CO5	1	-	2	-	-	-	-	-	-	-	-	-	2	-
Course	**1**	**3**	**2**	-	-	-	-	-	-	-	-	-	2	-

SOFTWARE TESTING METHODOLOGIES (PROGRAM ELECTIVE-III)			
Subject Code	18ITITP703G	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Unit -1	**Hours**
Introduction: Purpose of Testing, Dichotomies, Model for Testing, Levels of Testing ,Basic definitions, Software Testing Principles, The Tester‘s Role in a Software Development, Consequences of Bugs, Taxonomy of Bugs. **Flow graphs and Path testing:** Basics Concepts of Path Testing, Predicates, Path Predicates and Achievable Paths, Path Sensitizing, Path Instrumentation, Applications of Path Testing.	**10**
Unit -2	
Transaction Flow Testing: Transaction Flows, Transaction Flow Testing Techniques. **Dataflow testing:** Basics of Dataflow Testing, Strategies in Dataflow Testing, Application of Dataflow Testing	**08**
Unit – 3	
Paths and Regular expressions: Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection. **Syntax Testing:** Grammar for formats, Test Case Generation, Implementation and Application and Testability Tips	**10**
Unit – 4	
Logic Based Testing: Overview, Decision Tables, KV Charts, and Specifications **State, State Graphs and Transition Testing:** State Graphs, Good & Bad State Graphs, State Testing, and Testability Tips. **Graph Matrices and Application:-** Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm.	**12**
Unit – 5	
Software Testing Tools: Introduction to Testing, Automated Testing, Concepts of Test Automation, skills needed for automation, scope of automation, challenges in automation, Introduction to testing tools like Win runner, Load Runner, Selenium and working with selenium	**10**

Text(T) / Reference(R) Books:	
T1	"Software testing techniques" – Boris Beizer, Dream tech, second edition.
T2	"Software Testing"- Yogesh Singh, Camebridge
R1	"The Craft of software testing" - Brian Marick, Pearson Education.
R2	"Software Testing", N.Chauhan, Oxford University Press.
R3	"Introduction to Software Testing", P.Ammann&J.Offutt, Cambridge Univ.Press.
R4	"Effective methods of Software Testing", Perry, John Wiley, 2nd Edition, 1999.
R5	"Foundations of Software Testing", D.Graham, Cengage Learning
W1	https://www.coursera.org/courses?query=software%20testing
W2	https://www.edx.org/course/software-testing-fundamentals-usmx-umuc-stv1-1x-4

Course Outcomes: On completion of this course, students can	
CO1	Discuss basic software testing terminology, concepts of path testing and applications.
CO2	Understand Data flow testing and transaction flow testing methods
CO3	Implement and generate test cases in syntax testing
CO4	Develop test cases and test suites by using different testing methods
CO5	Analyze the applications manually by applying different testing methods in state graphs and transition testing

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	2	-
CO2	3	1	-	-	-	-	-	-	-	-	-	-	2	-
CO3	-	-	3	-	2	-	-	-	-	-	-	-	2	-
CO4	-	-	3	-	2	-	-	-	-	-	-	-	2	-
CO5	-	3	-	**1**	-	-	-	-	-	-	-	-	2	-
Course	**3**	**2**	**3**	**1**	**2**	-	-	-	-	-	-	-	2	-

OBJECT ORIENTED ANALYSIS AND DESIGN LAB			
Subject Code	18ITITL7060	IA Marks	25
Number of Tutorial Hours/Week	03(P)	Exam Marks	50
Total Number of Practice Hours	36	Exam Hours	03
Credits – 1.5			

List of Experiments

Exercise1

Familiarization with Rational Rose or Umbrello

Exercise2

- Identify and analyze events
- Identify Use cases
- Develop event table

Exercise3

- Identify &analyze domain classes
- Represent use cases and a domain class diagram using Rational Rose
- Develop CRUD matrix to represent relationships between use cases and problem domain classes.

Exercise4

- Develop Use case diagrams
- Develop elaborate Use case descriptions & scenarios.

Exercise5

- Develop prototypes (without functionality)
- Develop system sequence diagrams.

Exercise6

- Develop high-level sequence diagrams for each use case
- Identify MVC classes / objects for each use case

Exercise7 Develop Detailed Sequence Diagrams / Communication diagrams for each use case showing interactions among all the three-layer objects.

Exercise8

- Develop detailed design class model (use GRASP patterns for responsibility assignment)
- Develop three-layer package diagrams for each case study

Exercise 9

- Develop Use case Packages
- Develop component diagrams.

Exercise10

- Identify relationships between use cases and represent them
- Refine domain class model by showing all the associations among classes

Exercise11

Develop sample diagrams for other UML diagrams - state chart diagrams, activity diagrams and deployment diagrams

Course Outcomes: On completion of this course, students can	
CO1	Understand the Case studies and design the Model.
CO2	Understand how design patterns solve design problems.
CO3	Develop design solutions using creational patterns.
CO4	Construct design solutions by using structural and behavioural patterns
CO5	Construct creational patterns by applicable patterns for given context.

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	-	3	-	-	-	-	-	-	-	2	-
CO2	2	3	3	-	2	-	-	-	-	-	-	-	2	-
CO3	2	3	3	-	2	-	-	-	-	-	-	-	2	-
CO4	2	3	3	-	2	-	-	-	-	-	-	-	2	-
CO5	2	3	3	-	2	-	-	-	-	-	-	-	2	-
Course	**2**	**3**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	2	**-**

VIII SEMESTER (IV-II)

DISTRIBUTED DATABASES (PROGRAM ELECTIVE-IV)			
Subject Code	18ITITP801G	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Unit -1	**Hours**
Introduction: Distributed Data processing, Distributed database system (DDBMS), Promises of DDBMSs, Complicating factors and Problem areas in DDBMSs, Overview Of Relational DBMS Relational Database concepts, Normalization	**10**
Unit -2	
Distributed DBMS Architecture: DBMS Standardization, Architectural models for Distributed DBMS, Distributed DBMS Architecture. Distributed Database Design: Alternative design Strategies, Distribution design issues, Fragmentation, Allocation. Semantic Data Control: View Management, Data security, Semantic Integrity Control.	**08**
Unit – 3	
Overview of Query Processing: Query processing problem, Objectives of Query Processing, Complexity of Relational Algebra operations, characterization of Query processors, Layers of Query Processing. Introduction to Transaction Management: Definition of Transaction, Properties of transaction, types of transaction Distributed concurrency control: Serializability theory Taxonomy of concurrency control mechanisms, locking bases concurrency control algorithms.	**12**
Unit – 4	
Parallel Database Systems: Database servers, Parallel architecture, Parallel DBMS techniques parallel execution problems, parallel execution for hierarchical architecture	**10**
Unit – 5	
Distributed Object Database Management systems: Fundamental Object concepts and Object models, Object distribution design. Architectural issues, Object management, Distributed object storage, object query processing Transaction management Database Interoperability	**10**

Text(T) / Reference(R) Books:	
T1	Principles of Distributed Database Systems, Second Edition, M. Tamer Ozsu Patrick Valduriez
T2	Distributed Databases principles and systems,StefanoCeri, Giuseppe pelagatti, Tata McGrawHill
R1	Distributed Databases Principles & Systems", Stefano Ceri, Giuseppe Pelagatti ", McGraw-Hill.
R2	Distributed database systems, M.TamerOzsu, Patrick Valduriez, , 2nd Edition, Prentice Hall of India, New Delhi.
W1	https://www.coursera.org/learn/distributed-database
W2	https://www.ntnu.edu/studies/courses/DT8103

Course Outcomes: On completion of this course, students can	
CO1	Understand relational database management systems, normalization to make efficient retrieval from database and query.
CO2	Understand the architecture of distributed database design
CO3	Understand the relational algebra operations.
CO4	Understand the parallelization of various operations.
CO5	Analyze the distributed object database management systems

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	1	-	-	-	-	-	-	-	-	-	-	2	-
CO2	2	-	2	-	-	-	-	-	-	-	-	-	2	-
CO3	2	3	-	-	-	-	-	-	-	-	-	-	2	-
CO4	1	2	-	-	-	-	-	-	-	-	-	-	2	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-	2	-
Course	2	3	2	-	-	-	-	-	-	-	-	-	2	-

FAULT TOLERANCE SYSTEMS (PROGRAM ELECTIVE-IV)			
Subject Code	18ITITP801G	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Unit -1	**Hours**
Definition of fault tolerance, Redundancy, Applications of fault-tolerance, Fundamentals of dependability.	**08**
Unit -2	
Reliability, availability, safety, Impairments: faults, errors and failures, Means: fault prevention, removal and forecasting	**10**
Unit – 3	
Common measures: failures rate, mean time to failure, mean time to repair, etc. Reliability block diagrams, Markov processes	**10**
Unit – 4	
Hardware redundancy, Redundancy schemes, Evaluation and comparison, Applications, Information redundancy ,Codes: linear, Hamming, cyclic, unordered, arithmetic, etc. Encoding and decoding techniques ,Applications , Time redundancy.	**12**
Unit – 5	
Software fault tolerance, Specific features, Software fault tolerance techniques: N-version programming, recovery blocks, self-checking software, etc.	**10**

Text(T) / Reference(R) Books:	
T1	Fault-Tolerant Principles and Practices, Anderson, T., and P.A. Lee,,Prentice-Hall
T2	Computer Architecture and Parallel Processing, Hwang, K., and F.A. Briggs, McGraw-Hill,jalots
T3	Tolerance in Distributed Systems, Fault, ISBN 0-13-301367-7, Prentice-Hall
R1	" Design and Analysis of Fault-Tolerant SystemsJohnson, B.W, Addison Wesely
R2	, "Safeware, system safety and computers", Leveson, Nancy G, Addison Wesely
R3	Tolerant Computing — Theory and Techniques, Pradhan, D.K., Fault, , (2 Volumes), Prentice-Hall
R4	Fault-Tolerant Computer System Design, Pradhan, Dhiraj K, ISBN 0-13-057887-8, Prentice-Hall
W1	https://courses.elo.iastate.edu/spring/2018/CPR%20E/545/XE/overview
W2	https://www.online.colostate.edu/courses/CS/CS530.dot

Course Outcomes: On completion of this course, students can	
CO1	Identify principles of fault tolerance Systems.
CO2	Summarize the attributes, Impairments and Fault Tolerant Systems.
CO3	Evaluate common measures of Fault Tolerant Systems using Reliability block Diagrams and Markov processes.
CO4	Analyze the forms of Redundancy for enhancing reliability of Fault Tolerant Systems.
CO5	Analyse the software features of Fault Tolerance and implement fault tolerance techniques including N-version programming, recovery blocks and self-checking software

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	2	-
CO2	-	2	-	-	-	-	-	-	-	-	-	-	2	-
CO3	-	1	-	-	-	-	-	-	-	-	-	-	2	-
CO4	-	2	-	-	-	-	-	-	-	-	-	-	2	-
CO5	3	-	-	-	**3**	-	-	-	-	-	-	-	2	-
Course	**3**	**2**	-	-	**1**	-	-	-	-	-	-	-	2	-

BIG DATA ANALYTICS (PROGRAM ELECTIVE-V)			
Subject Code	18ITITP802G	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Unit -1	**Hours**
Hadoop Distributed File System Basics, Running Example Programs and Benchmarks, Hadoop MapReduce Framework, MapReduce Programming	**10**
Unit -2	
Essential Hadoop Tools, Hadoop YARN Applications, Managing Hadoop with Apache Ambari, Basic Hadoop Administration Procedures	**10**
Unit – 3	
Business Intelligence Concepts and Application, Data Warehousing, Data Mining, Data Visualization	**10**
Unit – 4	
Decision Trees, Regression, Artificial Neural Networks, Cluster Analysis, Association Rule Mining	**10**
Unit – 5	
Text Mining, Naïve-Bayes Analysis, Support Vector Machines, Web Mining, Social Network Analysis	**10**

Text(T) / Reference(R) Books:	
T1	"Hadoop 2 Quick-Start Guide: Learn the Essentials of Big Data Douglas Eadline
T2	Computing in the Apache Hadoop, "Data Analytics", 1stEdition, Pearson Education, 2016.Anil Maheshwari, "Data Analytics",1stEdition, McGraw Hill Education, 2017.
R1	"Hadoop: The Definitive Guide " Tom White, O'Reilly Media, 2015.ISBN-13: 978-9352130672
R2	"Professional Hadoop Solutions",BorisLublinsky, Kevin T.Smith, Alexey Yakubovich, ", 1stEdition, Wrox Press, 2014ISBN-13: 978-8126551071
R3	"Hadoop Operations: A Guide for Developers and Administrators", Eric Sammer, O'Reilly Media, 2012.ISB
W1	https://www.coursera.org/courses?query=big%20data%20analytics
W2	https://www.edx.org/learn/big-data

Course Outcomes: On completion of this course, students can	
CO1	Master the concepts of HDFS and MapReduce framework
CO2	Investigate Hadoop related tools for Big Data Analytics and perform basic Hadoop
CO3	Administration
CO4	Recognize the role of Business Intelligence, Data warehousing and Visualization in decision making
CO5	Infer the importance of core data mining techniques for data analytics

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	1	2	-	-	-	-	-	-	-	-	-	2	-
CO2	-	1	2	-	1	-	-	-	-	-	-	-	2	-
CO3	2	1	-	-	-	-	-	-	-	-	-	-	2	-
CO4	-	1	2	-	-	-	-	-	-	-	-	-	2	-
CO5	-	1	2	-	1	-	-	-	-	-	-	-	2	-
Course	**2**	**1**	**2**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	2	-

SOFTWARE PROJECT MANAGEMENT (PROGRAM ELECTIVE-V)			
Subject Code	18ITITP802G	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Unit -1	**Hours**
Introduction Project, Management, Software Project Management activities, Challenges in software projects, Stakeholders, Objectives & goals **Project Planning**: Step-wise planning, Project Scope, Project Products & deliverables, Project activities, Effort estimation, Infrastructure	**10**
Unit -2	
Project Approach -Lifecycle models, Choosing Technology, Prototyping Iterative & incremental Process Framework: Lifecycle phases, Process Artifacts, Process workflows	**08**
Unit – 3	
Effort estimation & activity Planning Estimation techniques, Function Point analysis, SLOC, COCOMO, Use case-based estimation , Activity Identification Approaches, Network planning models, Critical path analysis	**10**
Unit – 4	
Risk Management Risk categories, Identification, Assessment, Planning and management, PERT technique, Software configuration management **Project Monitoring & Control** Creating a framework for monitoring & control, Progress monitoring, Cost monitoring, Earned value Analysis, Defects Tracking, Issues	**12**
Unit – 5	
Software Quality Planning Quality, Defining Quality - ISO 9016, Quality Measures, Quantitative Quality Management Planning, Product Quality & Process Quality Metrics, Statistical Process Control Capability Maturity Model, Enhancing software Quality	**10**

Text(T) / Reference(R) Books:	
T1	“Software Project Management”, Bob Hughes & Mike Cotterell, TATA Mcgraw-Hill
T2	“Software Project Management”, Walker Royce: Pearson Education, 2005.
T3	"Software Project Management” in practice, Pankaj Jalote, Pearson
R1	Software Project Management, Joel Henry, Pearson Education
R2	Software Project Management, Chandramouli&Dutt , Pearson Education 2015
W1	https://www.coursera.org/courses?query=software%20project%20management
W2	https://www.edx.org/learn/project-management

Course Outcomes: On completion of this course, students can	
CO1	Describe basic concepts and issues and planning in software project management
CO2	Choose the appropriate life cycle model for software management process
CO3	Compute Effort estimation techniques and critical path
CO4	Explain Risk management process and PERT technique
CO5	Develop the skills for tracking and controlling software deliverables

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	2	-	-	-	-	-	-	-	-	-	2	-
CO2	-	3	2	-	-	-	-	-	-	-	-	-	2	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	2	-
CO4	2	2	-	-	-	-	-	-	-	-	-	-	2	-
CO5	-	2	2	-	-	-	-	-	-	-	-	-	2	-
Course	**3**	**3**	**2**	-	-	-	-	-	-	-	-	-	2	-

OPEN SOURCE SOFTWARE (PROGRAM ELECTIVE-VI)			
Subject Code	18ITITP803G	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Unit -1	**Hours**
Introduction to Open source: Need of Open sources, Advantages and Applications of open sources, Open Source Operating Systems: Linux Introduction, General overview - Kernel and user Mode, Linux: Process, Advanced Concepts, scheduling, Personalities, Cloning, Signals, Development with Linux.	**10**
Unit -2	
Open Source Database: Introduction to MYSQL, Setting up account, starting, writing own sql Programs, Record selection, working with strings, date and Time, Sorting query Results, generating summary, Working with metadata, Using Sequences, Mysql and web.	**08**
Unit – 3	
Introduction to PHP: Programming In web environment, Variable, constants, data types, Operators, statements, Functions and Arrays, OOP, string manipulation, Regular expression, File handling & Data Storage, PHP and SQL database, PHP and LDAP, PHP Connectivity - sending and receiving mails, Debugging and Error handling, Security and Templates.	**10**
Unit – 4	
PYTHON: Syntax and Style, Python objects, Numbers, Sequences, Strings, Lists, Tuples, Dictionaries, Conditionals, Loops, Files –Input and Output, Errors and Exceptions, Functions, Modules, Classes and OOP, Execution Environment.	**10**
Unit – 5	
PERL: Overview, Variables - scalars, arrays and hashes, Operators, Control Structures - Conditional and looping statements, Subroutines, Packages and Modules, Working with files, Working with Database, Data manipulation. **RUBY:** Overview, Variables - arrays and hashes, Control Structures - Conditional and looping statements, Methods, Blocks, Modules, Iterators, Working with files, Working with Database.	**12**

Text(T) / Reference(R) Books:	
T1	The Linux Kernel Book Wiley Publications,2003:Remy card, Eric Dumas,frankmevel
T2	MySQL Bible John Wiley,2002:SteveSuchring
T3	Learning Python, Mark Lutz, Orielly
T4	Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012)
T5	Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, Curt

	Hibbs, Oreilly (2006)
R1	Programming PHP, O'Reilly 2002 RamsusLerdof and Levin Tatroe
R2	PHP:The Complete Reference, Steven Holzner, 2nd Edition, Tata McGrawHill
R3	Wesley J.Chun, Core PhythonProgramming,Prentice hall, 2001
R4	Python Programming, Reema Thareja, Oxford
R5	Perl :The Complete Reference, Martin C. Brown, 2nd Edition, Tata McGrawHill
R6	MYSQL: The Complete Reference, Vikram Vaswani, 2nd Edition, Tata McGrawHill
W1	https://www.class-central.com/tag/open-source
W2	https://www.udemy.com/topic/open-source-tools/

Course Outcomes: On completion of this course, students can	
CO1	Make use of advanced concepts like scheduling, signals to work with processes efficiently.
CO2	Outlines how open source DB like MYSQL works using different Commands in real-time applications.
CO3	Make use of simple and large scale real time applications using OSS programming language like PHP.
CO4	Apply the concepts of Python functions, modules and packages to build software for real needs.
CO5	Develop programs using concepts of PERL and RUBY

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	2	3	-	-	-	-	-	-	-	-	2	2	-
CO2	2	3	-	-	3	-	-	-	-	-	-	2	2	2
CO3	2	3	-	-	3	-	-	-	-	-	-	2	2	2
CO4	2	3	-	-	-	-	-	-	-	-	-	2	2	2
CO5	2	3	-	-	-	-	-	-	-	-	-	2	2	2
Course	**2**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**-**

OPTIMIZATION TECHNIQUES (PROGRAM ELECTIVE-VI)			
Subject Code	18ITITP803G	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	60	Exam Hours	03
Credits – 03			

Unit -1	**Hours**
Introduction to Operations Research: Definition, Features, types of OR models, Methodology, Tools, Limitations and applications of Linear Programming. **Linear Programming, I:** Introduction, Formulation of LPP, Assumptions for solving LPP, Applications of LPP, Graphical method of solving LPP.	**12**
Unit -2	
Linear Programming II: Introduction, steps in solving problems using simplex method, Principle of simplex method- Maximization and minimization problems, solution by simplex method, limitations of LPP simplex method. **Linear Programming III:** Introduction, concept of primal dual relationship, formulation of the dual of the primal problem, solution of LP problems using duality.	**12**
Unit – 3	
The Transportation Problem: Basics, Solution of Transportation problem with several methods, performing optimality test, degeneracy in transportation problem. **Assignment model:** Definition, Formulation, Different methods of solutions, Hungarian assignment method, unbalanced assignment problems	**12**
Unit – 4	
The Sequencing problems: introduction, basics, types of sequencing problems, priority sequencing, sequencing n jobs through two machines, n jobs and m machines, two jobs 3 machines case. **Inventory Management:** introduction, objectives, developing the model, EOQ, Selective inventory management.	**12**
Unit – 5	
Game Theory: Introduction, Two Person Zero sum games, Maximin - Minimax principle, Games without saddle points- mixed strategies, Graphical solution of 2Xn, mX2 games, and Dominance property.	**12**

Text(T) / Reference(R) Books:	
T1	Operations Research / A.M.Natarajan, P. Balasubramani, A. Tamilarasi / Pearson Education.
T2	Operations Research / Col DS Cheema, University Science press/ Lakshmi Publications.
R1	Operations Research / S.D.Sharma-Kedarnath Ramnath(JNTU)
R2	Operation Research /J.K.Sharma/MacMilan.
R3	Operations Research / R.Pannerselvam / PHI Publications.
R4	Operation Research /Premkumar Gupta, D.S.Hira / S.Chand
R5	Operation Research An Introduction / Taha / Pearson
R6	Operation Research / Kanthi Swarup, P.K Gupta, Man Mohan / Sultan Chand & sons
W1	https://www.coursera.org/courses?query=operations%20research
W2	https://onlinecourses.nptel.ac.in/noc17_mg10/preview

Course Outcomes: On completion of this course, students can	
CO1	Summarize importance of cloud computing in real world.
CO2	Identify applications that can be integrated using cloud services.
CO3	Evaluate cloud-based applications.
CO4	Understand the security issues in cloud services.
CO5	Identify the cloud services managing

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	-	-	-	-	-	-	2	-	-	1	2	-
CO2	3	2	-	-	-	-	-	-	2	-	-	-	2	-
CO3	3	2	2	-	-	-	-	-	2	-	-	-	2	-
CO4	3	2	-	-	-	-	-	-	2	-	-	1	2	-
CO5	3	2	2	-	-	-	-	-	-	-	-	1	2	-
Course	**3**	**2**	**1**	-	-	-	-	-	**2**	-	-	**1**	2	-

OPEN ELECTIVES

OFFICE AUTOMATION			
Subject Code	18ITITO604G	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Unit -1	**Hours**
Computer & Internet: Desktop computers, Block diagram of a computer, Input and output devices, memory and storage devices, Different ports and its uses, Types of printers. Software: OS, Windows OS, Application software. Types of Networks, connecting to a network, testing connection, Internet, IP address, Hypertext, URL, Web Browsers, IP Address, Domain Name, Internet Services Providers, Internet Security, Internet Requirements, Web Search Engine, Net Surfing, Internet Services. **Windows XP:** Windows concepts, Features, Windows Structure, Desktop, Taskbar, Start Menu, MyComputer, Recycle Bin, Windows Accessories- Calculator, Notepad, Paint, Wordpad, Character Map, Windows Explorer, Entertainment, Installation of Hardware & Software, Scanner, System Tools, Sharing Information.	**10**
Unit -2	
Word Processing; MS Word: Features, Creating, Saving and Opening Documents in Word, Toolbars, Ruler, Menus, Keyboard Shortcut, Editing, Previewing, Printing & Formatting a Document, Advanced Features of MS Word, Find & Replace, Mail Merge, Handling Graphics, Tables & Charts, Converting a word document into various formats. **Worksheet- MS-Excel:** Worksheet basics, creating worksheet, entering into worksheet, heading information, data, text, dates, alpha numeric values, saving & quitting worksheet, Opening and moving around in an existing worksheet, Toolbars and Menus, Keyboard shortcuts, Working with single and multiple workbook, cell referencing, Setting formula, Absolute & relative addressing, formatting , Previewing & Printing worksheet, Graphs and charts, Database, Creating and Using macros.	**10**
Unit – 3	
MS Power Point: Introduction to presentation – Opening new presentation, Different presentation templates, Setting backgrounds, Selecting presentation layouts.	**10**

Creating a presentation, Formatting a Presentation, Adding Effects to the Presentation. **Database Basics & MS ACCESS :** Database Basics: Databases, Records · Fields, data types, Database Types , Library Catalogues. Introduction to Microsoft Access: Starting Up Microsoft Access, Creating New, and Opening Existing Databases, Creating a database with and without using wizard, Creating Tables, Working with Forms, Creating queries, Finding Information in Databases Creating Reports, Types of Reports, Printing & Print Preview – Importing data from other databases.	
Unit – 4	
Intranet: Intranet tools: E-mail: Anatomy of e-mail, e-mail address, finding e-mail address, adding signature, attaching files, opening attachments, managing e-mail account, Web mail ,Case study: Yahoo Mail, Outlook express. FTP: ftp commands, ftp software, Telnet, Web pages, HTML, basics of HTML. MS Front page: Page Properties, Text, Hyperlinks, Tables, Graphics and Pictures, Shared borders, Navigation bars, CSS, Themes, Frames, Components, Forms, Creating web site, Uploading and downloading files. Portals, Creating portals, digital signature, computer virus and antivirus software.	**10**
Unit – 5	
E-governance: Need of E-governance, E-assistance, E-democracy, E-administration, citizen services, E-procurement, Mobile government, Law and policies, IT Act, Right for Information Act, Introduction to various TAX Payable, Purchase & Tender procedures and E-filing of Information. **E-governance implementations:** Software and Hardware required for E-governance Implementation, E-governance in a Small Office, Web Portal for E-governance, E-governance for Public utilities, E-governance in a Medium Enterprise, E-governance & Finance, E-Tender & Web E-governance efforts of State Government of Rajasthan, Andhra Pradesh Model.	**10**

Text(T) / Reference(R) Books:	
T1	Professional Office Procedure by Susan H Cooperman, Printice Hall.
T2	Public Information Technology and E-Governance: Managing the Virtual State (Paperback) by G. David Garson
R1	Information Technology: Principles , Practices and Opportunities by James A Senn, Printice Hall
R2	Technology And Procedures for Administrative Professionals by Patsy Fulton-Calkins, Thomson Learning
W1	http://beta.nielit.gov.in/content/data-entry-and-office-automation
W2	https://compufield.com/office_automation_courses.html

Course Outcomes: On completion of this course, students can	
CO1	Summarize importance of cloud computing in real world.
CO2	Identify applications that can be integrated using cloud services.
CO3	Evaluate cloud-based applications.
CO4	Understand the security issues in cloud services
CO5	Identify the cloud services managing.

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	2	2	-	-	-	-	-	-	-	-	-	2	-
CO2	-	2	2	-	-	-	-	-	-	-	-	-	2	-
CO3	1	2	2	-	-	-	-	-	-	-	-	-	2	-
CO4	-	2	2	-	-	-	-	-	-	-	-	-	2	-
CO5	-	2	2	-	-	-	-	-	-	-	-	-	2	-
Course	**1**	**2**	**2**	-	-	-	-	-	-	-	-	-	2	-

INTERNET & WEB HOSTING			
Subject Code	18ITITO604G	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Unit -1	**Hours**
Introduction to Internet, Growth of Internet, Owners of the Internet, Anatomy of Internet, ARPANET, basic Internet Terminology, Net etiquette. Internet Applications – Commerce on the Internet, Governance on the Internet, Impact of Internet on Society – Crime on/through the Internet. **Introduction to World Wide Web:** WWW, Browser, Web Page – Contents, Web Clients, Web Servers, Web Applications, Websites – Home Pages, Web Site Development – How to Builds Web Sites?, Web Programming, Webserver Administration, Protocols – HTTP.	**10**
Unit -2	
HTML: Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext, Links, Lists, Tables, Forms, HTML5 **CSS:** Levels of Style Sheets, Style Specification Formats, Selector Forms, The Box Model, Conflict Resolution	**10**
Unit – 3	
Javascript: Introduction, Where to, Variables, Operators, Screen Output and Keyboard Input, Control Statements, Objects, Events, Arrays, Functions, Object Creation and Modification, Constructors, Pattern Matching using Regular Expressions **DHTML:** Positioning Moving and Changing Elements.	**10**
Unit – 4	
PHP Programming: Introducing PHP: Creating PHP script, Running PHP script, variables, constants, Data types, Operators. Controlling program flow: Conditional statements, Looping statements, Arrays, functions. Files & I/O, Cookies, Sessions, Working with forms and Databases such as MySQL, Object oriented, Sending email.	**10**
Unit – 5	
Internet Services & Internet Security: Electronic Mail, FTP, Newsgroups, Other Internet Services, Security and the Internet, Security Tools, E-commerce Security Issues, TCP/IP, Domain Names and IP addressing, Host Names, Domain Names, Addressing – Reserved IP addresses. **Web Publishing and Browsing**:	**10**

Overview, SGML, Web hosting – Hosting a web site, HTML, CGI, Documents Interchange Standards, Components of Web Publishing, Document management, Web Page Design Consideration and Principles, Search Engines & Meta Search Engines, Publishing Tools.	

Text(T) / Reference® Books:	
T1	Fundamentals of Internet and www, Greenlaw R and Hepp E, 2nd EL, Tata McGrawHill,2007.
T2	Web Technologies, Black book, Dream Tech.
T3	The Complete reference to Internet, M. L. Young, Tata McGraw Hill, 2007.
R1	The Internet Book, D. Comer
R2	Programming PHP, O'Reilly 2002 RamsusLerdof and Levin Tatroe
R3	PHP:The Complete Reference, Steven Holzner, 2nd Edition, Tata McGrawHill
R4	MYSQL: The Complete Reference, Vikram Vaswani, 2nd Edition, Tata McGrawHill
W1	https://www.udemy.com/web-hosting-for-beginners/
W2	https://www.coursera.org/lecture/web-development/what-is-a-web-hosting-company-uGePI

Course Outcomes: On completion of this course, students can	
CO1	Understand the basic structure of the Internet, web page, website and protocols.
CO2	Apply HTML tags and CSS to develop static web pages with styles.
CO3	Develop a dynamic webpage by the use of JavaScript and DHTML.
CO4	Make use of PHP code to write simple client and server-side programs.
CO5	Understand tools related to security and web publishing.

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	2	2	-	-	-	-	-	-	-	-	-	2	-
CO2	2	3	-	-	3	-	-	-	-	-	-	-	2	-
CO3	2	3	-	-	3	-	-	-	-	-	-	-	2	-
CO4	2	3	-	-	3	-	-	-	-	-	-	-	2	-
CO5	2	3	-	-	3	-	-	-	-	-	-	-	2	-
Course	**2**	**3**	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	2	**-**

CLOUD COMPUTING			
Subject Code	18ITITO604G	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Unit -1: INTRODUCTION	**Hours**
Where Are We Today, What Is Cloud Computing, Cloud Deployment Models, Private vs. Public Clouds, Business Drivers for CloudComputing, Introduction to Cloud Technologies. *INFRASTRUCTURE AS A SERVICE*: Storage as a Service: Amazon Storage Services, Compute as a Service: Amazon Elastic Compute Cloud (EC2), HP Cloud System Matrix, Cells-as-a-Service.	**10**
Unit -2: PLATFORM AS A SERVICE	
Windows Azure, A "Hello World" Example, Example: Passing a Message, Azure Test and Deployment, Technical Details of the Azure Platform, Azure Programming Model, Using Azure Cloud Storage Services, Handling the Cloud Challenges, Designing Pustak Portal in Azure, Google App Engine, Platform as a Service: Storage Aspects, Apache Hadoop, Mashups. *SOFTWARE AS A SERVICE:*CRM as a Service, Salesforce.com, Social Computing Services, Document Services: Google Docs.	**10**
Unit – 3: PARADIGMS FOR DEVELOPING CLOUD APPLICATIONS	
Scalable Data Storage Techniques, MapReduce Revisited, Rich Internet Applications. *ADDRESSING THE CLOUD CHALLENGES:*Scaling Computation, Scale Out versus Scale Up, Amdahl's Law, Scaling Cloud Applications with a Reverse Proxy, Hybrid Cloud and Cloud Bursting: Open Nebula, Scaling Storage, CAP Theorem, Implementing Weak Consistency, Consistency in No SQL Systems, Multi-Tenancy, Multi-Tenancy Levels, Tenants and Users, Authentication, Implementing Multi-Tenancy: Resource Sharing, Case Study: Multi-Tenancy in Salesforce.com, Multi-Tenancy and Security in Hadoop.	**10**
Unit – 4: DESIGNING CLOUD SECURITY	
Cloud Security Requirements and Best Practices, Physical Security, Virtual Security, Risk Management, Risk Management Concepts, Risk Management Process, Security Design Patterns, Defense in Depth, Honeypots, Sandboxes, Network Patterns, Common Management Database, Example: Security Design for a PaaS System, Security Architecture Standards, SSE-CMM, Legal and Regulatory Issues, Selecting a Cloud Service Provider, Cloud Security Evaluation Frameworks.	**10**
Unit – 5: MANAGING THE CLOUD	
Managing IaaS, Managing PaaS, Managing SaaS, Other Cloud-Scale Management Systems, *RELATED TECHNOLOGIES*: Server Virtualization, Two Popular Hypervisors, Storage Virtualization, Grid Computing, Other Cloud-Related Technologies.	**10**

Text(T) / Reference(R) Books:	
T1	Moving to the Cloud:Developing Apps in the New World of Cloud Computing, DinkarSitaram, GeethaManjunath, 1stEdition, Elsevier,2012
R1	"Cloud Computing Bible" Barrie Sosinsky ,1stEdition,Wiley India Pvt Ltd, 2011
R2	"Cloud Computing: A Practical Approach", Robert Elsenpeter, Toby J. Velte, Anthony T. Velte, ", 1st Edition, TataMcGraw Hill Education, 2011
W1	https://www.edx.org/learn/cloud-computing
W2	https://www.coursera.org/courses?query=cloud%20computing

Course Outcomes: On completion of this course, students can	
CO1	Summarize importance of cloud computing in real world.
CO2	Identify applications that can be integrated using cloud services.
CO3	Evaluate cloud-based applications.
CO4	Understand the security issues in cloud services.
CO5	Identify the cloud services managing

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1	3	2	-	-	-	-	-	-	-	-	-	2	-
CO2	1	3	2	-	-	-	-	-	-	-	-	-	2	-
CO3	1	-	2	-	-	-	-	-	-	-	-	-	2	-
CO4	1	3	2	-	-	-	-	-	-	-	-	-	2	-
CO5	1	-	2	-	-	-	-	-	-	-	-	-	2	-
Course	**1**	**3**	**2**	-	-	-	-	-	-	-	-	-	2	-

E-COMMERCE			
Subject Code	18ITITO604G	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Unit -1:	**Hours**
Electronic Commerce-Frame work, anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications. Consumer Oriented Electronic commerce – Mercantile Process models.	**10**
Unit -2:	
Electronic payment systems – Digital Token-Based, Smart Cards, Credit Cards, Risks in Electronic Payment systems. Inter Organizational Commerce – EDI, EDI Implementation, Value added networks.	**10**
Unit – 3:	
Intra Organizational Commerce – work Flow, Automation Customization and internal Commerce, Supply chain Management.	**08**
Unit – 4:	
Corporate Digital Library – Document Library, digital Document types, corporate Data Warehouses. Advertising and Marketing – Information based marketing, Advertising on Internet, on-line marketing process, market research.	**10**
Unit – 5:	
Consumer Search and Resource Discovery – Information search and Retrieval, Commerce Catalogues, Information Filtering. Multimedia – key multimedia concepts, Digital Video and electronic Commerce, Desktop video processing's, Desktop video conferencing.	**12**

Text(T) / Reference(R) Books:	
T1	Frontiers of electronic commerce, Kalakata, Whinston, Pearson.
R1	E-Commerce fundamentals and applications Hendry Chan, Raymond Lee, Tharam Dillon, Ellizabeth Chang, John Wiley.
R2	E-Commerce, S.JaiswalGalgotia.
R3	E-Commerce, Efrain Turbon, Jae Lee, David King, H.Michael Chang.
R4	Electronic Commerce Gary P.Schneider — Thomson.
R5	E-Commerce — Business, Technology, Society, Kenneth C.Taudon, Carol Guyerico Traver
W1	https://www.edx.org/learn/ecommerce
W2	https://www.coursera.org/courses?query=e-commerce

Course Outcomes: On completion of this course, students can	
CO1	Ability to identify the business relationships between the organizations and their customers
CO2	Ability to perform various transactions like payment, data transfer and etc.
CO3	Evaluate Knowledge with Supply Chain Management.
CO4	Understand the Desktop video processing and Video Conferencing
CO5	Identify the Importance of Advertising and Marketing in on line processing

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	-	-	-	-	-	-	-	-	-	2	-
CO2	3	2	3	-	-	-	-	-	-	-	-	-	2	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	2	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	2	-
CO5	2	3	2	-	-	-	-	-	-	-	-	-	2	-
Course	**3**	**2**	**3**	-	-	-	-	-	-	-	-	-	2	-

STATISTICS AND R PROGRAMMING			
Subject Code	18ITITO604G	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Unit -1:Introduction	**Hours**
How to run R, R Sessions and Functions, Basic Math, Variables, Data Types,Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes.	**08**
Unit -2:R Programming Structures, Control Statements, Loops	
Looping Over Nonvector Sets,- If-Else,Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quicksort Implementation-Extended Extended Example: A Binary Search Tree.	**10**
Unit – 3: Math and Simulation in R	
Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability- Cumulative Sums and Products-Minima and Maxima- Calculus, Functions Fir Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product- Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /output, Accessing the Keyboard and Monitor, Reading and writer Files	**10**
Unit – 4: Graphics	
Creating Graphs, The Workhorse of R Base Graphics, the plot() Function – Customizing Graphs, Saving Graphs to Files, Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,-ANOVA.	**10**
Unit – 5: Linear Models	
Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression- other Generalized Linear Models- Survival Analysis, Nonlinear Models, Splines- Decision- Random Forests	**12**

Text(T) / Reference(R) Books:	
T1	The Art of R Programming, Norman Matloff, Cengage Learning
T2	R for Everyone, Lander, Pearson
R1	R Cookbook, PaulTeetor, Oreilly.
R2	R in Action,RobKabacoff, Manning
W1	https://www.edx.org/learn/r-programming
W2	https://www.coursera.org/learn/r-programming

Course Outcomes: On completion of this course, students can	
CO1	List motivation for learning a programming language
CO2	Access online resources for R and import new function packages into the R workspace
CO3	Import, review, manipulate and summarize data-sets in R
CO4	Explore data-sets to create testable hypotheses and identify appropriate statistical tests
CO5	Perform appropriate statistical tests using R Create and edit visualizations

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2	3	-	-	-	-	-	-	-	-	-	2	-
CO2	2	2	3	-	-	-	-	-	-	-	-	-	2	-
CO3	2	2	3	-	-	-	-	-	-	-	-	-	2	-
CO4	2	2	3	-	-	-	-	-	-	-	-	-	2	-
CO5	2	2	3	-	-	-	-	-	-	-	-	-	2	-
Course	**2**	**2**	**3**	-	-	-	-	-	-	-	-	-	2	-

OPEN SOURCE SOFTWARE			
Subject Code	18ITITO604G	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Unit -1	**Hours**
Introduction to Open source: Need of Open sources, Advantages and Applications of open sources, Open Source Operating Systems: Linux Introduction, General overview - Kernel and user Mode, Linux: Process, Advanced Concepts, scheduling, Personalities, Cloning, Signals, Development with Linux.	**10**
Unit -2	
Open Source Database: Introduction to MYSQL, Setting up account, starting, writing own sql Programs, Record selection, working with strings, date and Time, Sorting query Results, generating summary, Working with metadata, Using Sequences, Mysql and web.	**08**
Unit – 3	
Introduction to PHP: Programming In web environment, Variable, constants, data types, Operators, statements, Functions and Arrays, OOP, string manipulation, Regular expression, File handling & Data Storage, PHP and SQL database, PHP and LDAP, PHP Connectivity - sending and receiving mails, Debugging and Error handling, Security and Templates.	**10**
Unit – 4	
PYTHON: Syntax and Style, Python objects, Numbers, Sequences, Strings, Lists, Tuples, Dictionaries, Conditionals, Loops, Files –Input and Output, Errors and Exceptions, Functions, Modules, Classes and OOP, Execution Environment.	**10**
Unit – 5	
PERL: Overview, Variables - scalars, arrays and hashes, Operators, Control Structures - Conditional and looping statements, Subroutines, Packages and Modules, Working with files, Working with Database, Data manipulation. **RUBY:** Overview, Variables - arrays and hashes, Control Structures - Conditional and looping statements, Methods, Blocks, Modules, Iterators, Working with files, Working with Database.	**12**

Text(T) / Reference(R) Books:	
T1	The Linux Kernel Book Wiley Publications,2003:Remy card, Eric Dumas,frankmevel
T2	MySQL Bible John Wiley,2002:SteveSuchring
T3	Learning Python, Mark Lutz, Orielly
T4	Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012)
T5	Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006)
R1	Programming PHP, O'Reilly 2002 RamsusLerdof and Levin Tatroe
R2	PHP:The Complete Reference, Steven Holzner, 2nd Edition, Tata McGrawHill
R3	Wesley J.Chun, Core PhythonProgramming,Prentice hall, 2001
R4	Python Programming, Reema Thareja, Oxford
R5	Perl :The Complete Reference, Martin C. Brown, 2nd Edition, Tata McGrawHill
R6	MYSQL: The Complete Reference, Vikram Vaswani, 2nd Edition, Tata McGrawHill
W1	https://www.class-central.com/tag/open-source
W2	https://www.udemy.com/topic/open-source-tools/

Course Outcomes: On completion of this course, students can	
CO1	Make use of advanced concepts like scheduling, signals to work with processes efficiently.
CO2	Outlines how open source DB like MYSQL works using different Commands in real-time applications.
CO3	Make use of simple and large-scale real-time applications using OSS programming language like PHP.
CO4	Apply the concepts of Python functions, modules and packages to build software for real needs.
CO5	Develop programs using concepts of PERL and RUBY

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	2	3	-	-	-	-	-	-	-	-	2	2	-
CO2	2	3	-	-	3	-	-	-	-	-	-	2	2	2
CO3	2	3	-	-	3	-	-	-	-	-	-	2	2	2
CO4	2	3	-	-	-	-	-	-	-	-	-	2	2	2
CO5	2	3	-	-	-	-	-	-	-	-	-	2	2	2
Course	**2**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**-**

MOBILE APPLICATION DEVELOPMENT			
Subject Code	18ITITO604G	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Unit -1: Introduction	**Hours**
Get started, build your first app, Activities, Testing, debugging and using support libraries.	**08**
Unit -2: User Interaction	
User Interaction, Delightful user experience, Testing your UI.	**10**
Unit – 3: Background Tasks	
Background Tasks, Triggering, scheduling and optimizing background tasks.	**10**
Unit – 4: Data	
All about data, Preferences and Settings, storing data using SQLite, sharing data with content providers, loading data using Loaders.	**10**
Unit – 5: Permissions	
Permissions, Performance and Security, Firebase and Ad Mob, Publish.	**12**

Text(T) / Reference(R) Books:	
T1	The complete Reference Java, 9th edition, Herbert Scheldt,TMH.
T2	Programming in JAVA, Sachin Malhotra, SaurabhChoudary, Oxford.
R1	JAVA Programming, K.Rajkumar.Pearson
R2	Core JAVA, Black Book, Nageswara Rao, Wiley, Dream Tech
R3	Core JAVA for Beginners, Rashmi Kanta Das, Vikas.
R4	Object Oriented Programming Through Java, P. Radha Krishna, Universities Press.
W1	https://www.edx.org/learn/app-development
W2	https://www.coursera.org/courses?query=mobile%20app%20development

Course Outcomes: On completion of this course, students can	
CO1	Understand the history behind the Java technology, its features and strengths
CO2	Implement the basic principles of Object-Oriented Programming which includes inheritance, polymorphism, encapsulation and abstraction.
CO3	Understand the exception programming techniques by describing and encapsulating exceptions.
CO4	Understand the Thread concepts and Collections Framework in java. N
CO5	Create rich user-interface applications using modern API's such as JAVAFX.

Course Outcomes to Program Outcomes Mapping: (1: Low, 2: Medium, 3: High)														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	-	3	-	-	-	-	-	-	-	2	-
CO2	2	3	3	-	2	-	-	-	-	-	-	-	2	-
CO3	2	3	3	-	2	-	-	-	-	-	-	-	2	-
CO4	2	3	3	-	2	-	-	-	-	-	-	-	2	-
CO5	2	3	3	-	2	-	-	-	-	-	-	-	2	-
Course	**3**	**3**	**3**	-	**2**	-	-	-	-	-	-	-	2	**-**